

General Stakeholder Workgroup Meeting

Date: October 3, 2025

Time: 9:00 AM

Location: 4224 Cox Rd, Glen Allen, VA 23060 - Virginia Housing Center

AGENDA

(Revised 10/02/25)

- I. Welcome
- II. Introductions
- III. Code Change Proposals (see list below)

Administrative Proposals

- 1. B101.2-24
- 2. B101.2(1)-24
- 3. B103.5-24
- 4. B105.2.1-24
- 5. B107.1-24
- 6. B109.1-24
- 7. B109.2-24
- 8. B109.4-24 Tabled (at the request of proponent)
- 9. B110.6-24
- 10. PM105.2-24
- 11. FP112.5-24

VCC Proposals

- 12. B406.2.7-24
 - 13. B509.1-24
 - 14. B906.1-24
 - 15. B917.1-24
 - 16. B1006.2.1-24
 - 17. B1006.2.1(1)-24
 - 18. B1006.3.4-24
 - 19. B1110.20-24
 - 20. B3002.4-24
 - 21. B3102.1-24 Withdrawn (at the request of proponent)
 - 22. B3500-24
-

VEBC Proposals

- 23. EB202-24
 - 24. EB601.5-24
 - 25. EB601.6-24
-

VPMC Proposals

- 26. PM602.2(1)-24
 - 27. PM602.2(2)-24
-

SFPC Proposals

- 28. FP405.5-24
 - 29. FP601.2-24
 - 30. FP807.2-24
 - 31. FP901.6.3-24
 - 32. FP906.1-24
 - 33. FP1208-24
 - 34. **FP3101.1-24 Withdrawn (at the request of proponent)**
 - 35. FP4101.9-24
 - 36. FP4106.1.3-24
 - 37. FP5001.7-24
 - 38. FP6112-24
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Energy Proposals

- 39. EC-C402.1.6-24
- 40. EC-C403.7.4.1-24
- 41. EC-C405.17-24
- 42. **EC-C405.17(1)-24 Tabled (at the request of proponent)**
- 43. **EC-1301-24 Tabled (at the request of proponent)**
- 44. **REC-R402.1.2-24 Tabled (at the request of proponent)**
- 45. **REC-R402.1.2(1)-24 Tabled (at the request of proponent)**
- 46. **REC-R402.1.2(2)-24 Tabled (at the request of proponent)**
- 47. **REC-R402.1.2(4)-24 Tabled (at the request of proponent)**
- 48. **REC-R402.4.1.2-24 Tabled (at the request of proponent)**
- 49. REC-R402.4.1.2(1)-24
- 50. **REC-R403.14-24 Tabled (at the request of proponent)**
- 51. **REC-R404.5-24 Tabled (at the request of proponent)**
- 52. REC-R404.5(1)-24

- 53. REC-R404.6-24
 - 54. REC-R404.7-24
 - 55. REC-R405.2-24 Tabled (at the request of proponent)
 - 56. REC-R405.2(1)-24
 - 57. REC-R408.2.9-24 Tabled (at the request of proponent)
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Trades Proposals

- 58. M1103.1-24
 - 59. M-FG310.2-24
 - 60. RE3601.8-24
 - 61. RE3705.6-24
 - 62. RE3901.4.2-24
 - 63. RM-FG2411.2-24
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Industrialized Building Safety Regulation Proposal

- 64. IB260-24

2024 cdpVA Proposal Subject Matter Designations

(cdpVA Proposal Name “Agenda Number” Prefixes)

The following prefixes will be utilized as part of each proposal name to assist in identifying the subject matter of the proposal. DHCD staff assign proposal names after they have been submitted, reviewed and before they are placed in “Ready for Public Comment” status.

B = Virginia Construction Code
EB = Virginia Existing Building Code
PM = Virginia Property Maintenance Code
FP = Statewide Fire Prevention Code
BF = Virginia Construction Code - IFC
EC = Virginia Energy Conservation Code
M = Virginia Mechanical Code
M-FG = Virginia Fuel Gas Code
P = Virginia Plumbing Code
E = VCC Electrical
RB = Virginia Residential Code
REC = Virginia Residential Code - Energy
RE = Virginia Residential Code - Electric
RM = Virginia Residential Code - Mechanical
RM-FG = Virginia Residential Code - Fuel Gas
RP = Virginia Residential Code - Plumbing
IB = Industrialized Building Safety Regulations
MH = Manufactured Home Safety Regulations
AD = Virginia Amusement Device Regulations
CS = Virginia Certification Standards

Example: cdpVA Proposal Agenda Number “**RM-FG**2415.7-24” indicates a proposal to the fuel gas provisions (VRC Section G2415.7) of the 2024 Virginia Residential Code.

B101.2-24

VCC: 101.2

Proponents: Joseph Willis, Prince William County, representing Self (jwillis@pwcgov.org)

2021 Virginia Construction Code

Revise as follows:

101.2 Incorporation by reference. Chapters 2 – 35 of the 2021 *International Building Code*®, published by the International Code Council, Inc. (ICC), are adopted and incorporated by reference to be an enforceable part of the USBC. The term “IBC®” means the 2021 *International Building Code*, published by the International Code Council, Inc. Any codes and standards referenced in the IBC are also considered to be part of the incorporation by reference, except that such codes and standards are used only to the prescribed extent of each such reference. In addition, any provisions of the appendices of the IBC specifically identified to be part of the USBC are also considered to be part of the incorporation by reference.

Notes:

1. The IBC references other International Codes and standards including the following major codes:

2020 NFPA 70

~~2021 International Energy Conservation Code® (IECC®)~~

2021 *International Fuel Gas Code*® (IFGC®)

2021 *International Mechanical Code*® (IMC®)

2021 *International Plumbing Code*® (IPC®)

2021 *International Residential Code*® (IRC®)

2. The IRC is applicable to the *construction* of detached one-family and two-family dwellings and townhouses as set out in Section 310 .

Reason Statement: The requirements of the Energy Conservation Code and cumbersome and out of touch with reality. The strangle hold the Energy Conservation Code puts on businesses and business owners, especially those that are just getting started, is a cost that is sometimes more than they can handle.

Cost Impact: The code change proposal will decrease the cost

The actual economic impact is very difficult to estimate and vary wildly.

A small tenant space could save a minimum of \$300 where a large warehouse, high rise, data center could easily saves thousands of dollars in just material and equipment alone not the mention the possibility of plan review resubmission and permit fees for these projects depending on the fee schedule of each locality.

B101.2(1)-24

VCC: 101.2

Proponents: Joseph Wages, representing National Electrical Manufacturers Association (NEMA) (joseph.wages@nema.org)

2021 Virginia Construction Code

Revise as follows:

101.2 Incorporation by reference. Chapters 2 – 35 of the 2021 *International Building Code*®, published by the International Code Council, Inc. (ICC), are adopted and incorporated by reference to be an enforceable part of the USBC. The term “IBC®” means the 2021 *International Building Code*, published by the International Code Council, Inc. Any codes and standards referenced in the IBC are also considered to be part of the incorporation by reference, except that such codes and standards are used only to the prescribed extent of each such reference. In addition, any provisions of the appendices of the IBC specifically identified to be part of the USBC are also considered to be part of the incorporation by reference. The following appendices to the 2024 International Energy Conservation Code® (IECC®) have been adopted and are a part of this code.

- Appendix CH Electric-Ready Commercial Building Provisions
- Appendix CI Demand Responsive Controls
- Appendix CJ Electrical Energy Storage System
- Appendix RD Electric Energy Storage Provisions
- Appendix RI On-Site Renewable Energy
- Appendix RK Electric-Ready Residential Building Provisions
- Appendix RL Renewable Energy Infrastructure

Notes:

1. The IBC references other International Codes and standards including the following major codes:

2020 NFPA 70

2021 *International Energy Conservation Code*® (IECC®)

2021 *International Fuel Gas Code*® (IFGC®)

2021 *International Mechanical Code*® (IMC®)

2021 *International Plumbing Code*® (IPC®)

2021 *International Residential Code*® (IRC®)

2. The IRC is applicable to the *construction* of detached one-family and two-family dwellings and townhouses as set out in Section 310.

Reason Statement: The requirements outlined in Appendices CH, CI, and CJ of the 2024 IECC-C and Appendices RD, RI, RK, and RL were all approved by the ICC appointed Energy Code Consensus Committees by a two-thirds majority vote to be included in the Chapter 4 of the 2024 IECC as mandatory provisions of the code. While certain stakeholders submitted an appeal to ICC making the argument that these requirements are not within scope of the IECC, the ICC Board appointed Appeals Board stated in their final report dated March 4, 2024: “With respect to each of the nine appeals, the Appeals Board finds that the appellants have not demonstrated a material and significant irregularity of process or procedure, and therefore recommends the ICC Board of Directors deny each appeal.” NEMA was opposed the final ruling of the ICC Board that relocated these important requirements to the appendices undermining the entire consensus process and recommendation of their own appeal board and therefore recommend the 2024 VECC officially adopt and incorporate these seven appendices as mandatory requirements.

Cost Impact: The code change proposal will increase the cost

This proposal will increase the cost of compliance with the code, however, the requirements outlined in the seven adopted appendices have been shown to be cost effective by PNNL analysis during the 2024 IECC code development process.

It should be noted NEMA proposals are developed by a member consensus process where both our bylaws and federal regulations prohibit us from discussing prices, costs, and other financial details of electrical products.

B103.5-24

VCC: 103.5

Proponents: David Beahm, representing Warren County (dbeahm@warrencountyva.gov)

2021 Virginia Construction Code

Revise as follows:

103.5 Functional design. The following criteria for functional design is in accordance with § 36-98 of the Code of Virginia. The USBC shall not supersede the regulations of other state agencies that require and govern the functional design and operation of *building* related activities not covered by the USBC, including (i) public water supply systems, (ii) waste water treatment and disposal systems, and (iii) solid waste facilities. Nor shall state agencies be prohibited from requiring, pursuant to other state law, that *buildings* and *equipment* be maintained in accordance with provisions of this code. ~~In addition, as established by this code, the building official may refuse to issue a permit until the applicant has supplied certificates of functional design approval from the appropriate state agency or agencies. For purposes of coordination, the locality may require reports to the building official by other departments or agencies indicating compliance with their regulations applicable to the functional design of a building or structure as a condition for issuance of a building permit or certificate of occupancy. Such reports shall be based upon review of the plans or inspection of the project as determined by the locality. All code. All~~ enforcement of these conditions shall not be the responsibility of the building official, but rather the agency imposing the condition.

Note: Identified state agencies with functional design approval are listed in the “Related Laws Package,” which is available from DHCD.

Reason Statement: This section already indicates that the Building Official is not responsible for the enforcement of the regulations of other agencies. It also infers that the Building Official has no control over their approval process. It therefore doesn't make sense that the Building Official be required to or be able to hold issuing a building permit based on their regulations or conditions. The responsibility of imposing their requirements should solely be on their respective agency.

Cost Impact: The code change proposal will decrease the cost

This will decrease the cost of construction in allowing the construction to begin as soon as approved without having to wait on other agencies that may be delaying approval due to their regulations. It will decrease any loan interest that may be in place or the return on investment being realized sooner when sold.

B105.2.1-24

VCC: 105.2.1

Proponents: Kyle Kratzer, Fairfax County, representing VBCOA (kyle.kratzer@fairfaxcounty.gov)

2021 Virginia Construction Code

Delete without substitution:

~~**105.2.1 Qualifications of technical assistants.** A *technical assistant* shall have at least 3 years of experience and general knowledge in at least one of the following areas: building construction; building construction conceptual and administrative processes; building, fire or housing inspections; plumbing, electrical or mechanical trades; or fire protection, elevator or property maintenance work. Any combination of education and experience that would confer equivalent knowledge and ability, including high school technical training programs or college engineering, architecture, or construction degree programs, shall be deemed to satisfy this requirement. The *locality* may establish additional qualification requirements.~~

Reason Statement:

Over the past decade, several changes have rendered this section unrealistic for all technical assistant positions. Significant pay disparities between the public and private sectors, along with the inclusion of permit technicians under the "technical assistant" designation, have made it increasingly difficult for code officials to fill these roles. As a result, recruiters are turning to non-traditional talent pools to meet staffing needs. Deleting this section shifts the responsibility for determining minimum qualifications to each locality, allowing for greater flexibility in hiring decisions. All technical assistants will still be required to demonstrate competence through certification, ensuring uniform enforcement capability regardless of individual experience or background.

The Virginia Building and Code Officials Association (VBCOA) supports this change.

Cost Impact: The code change proposal will not increase or decrease the cost

This change should make it easier for departments to fill vacant positions and should have no bearing on the cost of construction.

B107.1-24

VCC: 107.1

Proponents: David Beahm, representing Warren County (dbeahm@warrencountyva.gov)

2021 Virginia Construction Code

Revise as follows:

107.1 Authority for charging fees. In accordance with § 36-105 of the Code of Virginia, fees may be levied by the *local governing body* in order to defray the cost of enforcement of the ~~USBC~~. USBC and shall not exceed the actual cost by more than 10%. With the exception of the levy collected pursuant to Section 107.2 , fees levied pursuant to this section shall be used only to support the functions of the *local building department*.

Note: See subsection D of § 36-105 of the Code of Virginia for rules for permit fees involving property with easements or liens.

Reason Statement: Many smaller jurisdictions struggle to have the appropriate resources to perform inspections to satisfy the general public and businesses. This increase would allow those, as well as all, to have a buffer to provide more personal, equipment (vehicles, computers, etc.) and software to assist. The increase will still be required to be solely used for the enforcement of the USBC and not to provide a revenue stream to the jurisdiction and would allow local jurisdictions to see the value in providing what is needed.

Cost Impact: The code change proposal will increase the cost
It will increase the fees by 10% possibly if the jurisdiction chooses to.

B109.1-24

VCC: 109.1

Proponents: David Beahm, representing Warren County (dbeahm@warrencountyva.gov)

2021 Virginia Construction Code

Revise as follows:

109.1 Submittal of documents. Construction documents shall be submitted with the application for a permit. The number of sets of such documents to be submitted shall be determined by the *locality*. Construction documents for one-and two-family dwellings may have floor plans reversed ~~provided an accompanying site plan is approved.~~reversed.

Exception: *Construction* documents do not need to be submitted when the building official determines the proposed work is of a minor nature.

Note: Information on the types of *construction* required to be designed by an *RDP* is included in the "Related Laws Package" available from *DHCD*.

Reason Statement:

Reversing floor plans would not necessitate needing a site plan, only changes to the location on the site that would cause a code violation may. The requirement is not something that should be mandated just to reverse the floor plan. Section 109.2 supports this thought process since it states, "When determined necessary by the building official", it does not indicate that it is "required". However, Section 109.1 appears to mandate it when only reversing the floor plan.

Cost Impact: The code change proposal will decrease the cost

While the site plan may be required for other departments or agencies the need to provide just to reverse the floor plan could save the cost of having to provide just because the section states that it is provided.

B109.2-24

VCC: 109.2, 109.3, 109.4, 109.5, 109.6, 110.1, 113.3, 113.7.2, 116.1, 116.2

Proponents: David Beahm, representing Warren County (dbeahm@warrencountyva.gov)

2021 Virginia Construction Code

Revise as follows:

109.2 Site plan. When determined necessary by the building official, a site plan shall be submitted with the application for a permit. The site plan shall show to scale the size and location of all proposed *construction*, including any associated wells, septic tanks or drain fields. The site plan shall also show to scale the size and location of all existing *structures* on the site, the distances from lot lines to all proposed *construction*, the established street grades and the proposed finished grades. When determined necessary by the building official, the site plan shall contain the elevation of the lowest floor of any proposed *buildings*. The site plan shall also be drawn in accordance with an accurate boundary line survey. When the application for a permit is for demolition, the site plan shall show all *construction* to be demolished and the location and size of all *existing structures* that are to remain on the site.

Exceptions:

1. Site plans for new one- and two-family dwellings shall not be required to include information for wells, septic tanks, drain fields, distances to lot lines, established street grades, elevation of the lowest floor or boundary lines per 109.4 Exception.
2. Site plans are generally not necessary for alterations, renovations, repairs or the installation of equipment.

Note: ~~Site plans are generally not necessary for alterations, renovations, repairs or the installation of equipment.~~

109.3 Engineering details. When determined necessary by the building official, *construction* documents shall include adequate detail of the structural, mechanical, plumbing or electrical components. Adequate detail may include computations, stress diagrams or other essential technical data and when proposed *buildings* are more than two stories in height, adequate detail may specifically be required to include where floor penetrations will be made for pipes, wires, conduits, and other components of the electrical, mechanical and plumbing systems and how such floor penetrations will be protected to maintain the required structural integrity or fire-resistance rating, or both. When dry floodproofing is provided, the engineering details shall include detail of the *walls*, floors, and flood shields designed to resist flood-related loads, including the sealing of floor and *wall* penetrations. All engineered documents, including relevant computations, shall be sealed by the *RDP* responsible for the design.

Exception: For new one- and two- family dwellings per 109.4 Exception.

109.4 Examination of documents. The building official shall examine or cause to be examined all construction documents or site plans, or both, within a reasonable time after filing. If such documents or plans do not comply with the provisions of this code, the permit applicant shall be notified in writing of the reasons, which shall include any adverse construction document review comments or determinations that additional information or engineering details need to be submitted. The review of construction documents for new one- and two-family dwellings for determining compliance with the technical provisions of this code not relating to the site, location or soil conditions associated with the dwellings shall not be required when identical construction documents for identical dwellings have been previously approved in the same *locality* under the same edition of the code and such construction documents are on file with the *local building department*.

Exception: For new one- and two-family dwellings that applications for a permit have been made by an RDP or a properly licensed Class A contractor shall not require examination. Plans and documents shall be signed and sealed or signed and license number affixed respectively. All plans, documents and construction shall be in accordance with Section 103.1.

109.5 Approval of construction documents. The approval of construction documents shall be limited to only those items within the scope of the USBC. Either the word "Approved" shall be stamped on all required sets of approved construction documents or an equivalent endorsement in writing shall be provided. One set of the approved construction documents shall be retained for the records of the *local building department* and one set shall be kept at the *building* site and shall be available to the building official at all reasonable

times.

Exception: For new one- and two-family dwellings no "Approved" stamp or any other endorsement by the local building department shall be required when the application is presented per 109.4 Exception. However, one set of the documents indicated in 109.4 Exception shall be provided to the local building department for every building application.

109.6 Phased approval. The building official is authorized to issue a permit for the *construction* of foundations or any other part of a *building* or *structure* before the *construction* documents for the whole *building* or *structure* have been submitted, provided that adequate information and detailed statements have been filed complying with pertinent requirements of this code. The holder of such permit for the foundation or other parts of a *building* or *structure* shall proceed at the holder's own risk with the *building* operation and without assurance that a permit for the entire *structure* will be granted.

Note: Phased approval shall not apply to 109.4 Exception applications.

110.1 Approval and issuance of permits. The building official shall examine or cause to be examined all applications for permits or amendments to such applications within a reasonable time after filing. If the applications or amendments do not comply with the provisions of this code ~~or all pertinent laws and ordinances~~, the permit shall not be issued and the permit applicant shall be notified in writing of the reasons for not issuing the permit. If the application complies with the applicable requirements of this code, a permit shall be issued as soon as practicable. The issuance of permits shall not be delayed in an effort to control the pace of *construction* of new detached one- or two-family dwellings.

113.3 Minimum inspections. The following minimum inspections shall be conducted by the building official when applicable to the *construction* or permit:

1. Inspection of footing excavations and reinforcement material for concrete footings prior to the placement of concrete.
2. Inspection of foundation systems during phases of *construction* necessary to assure compliance with this code.
3. Inspection of preparatory work prior to the placement of concrete.
4. Inspection of structural members and fasteners prior to concealment.
5. Inspection of electrical, mechanical and plumbing materials, *equipment* and systems prior to concealment.
6. Inspection of energy conservation material prior to concealment.
7. Final inspection.

Note: For new one- and two-family dwellings, permitted under 109.4 Exception, the final inspections, when approved, shall be determined to have completed Section 116.1, Exception 3.

113.7.2 Qualifications. In determining third-party inspector qualifications, the building official may consider such items as *DHCD* inspector certification, other state or national certifications, state professional registrations, related experience, education and any other factors that would demonstrate competency and reliability to conduct inspections.

Exception: For new one- and two-family dwellings per 109.4 Exception that applications for a permit have been made by an RDP shall be approved as a third-party inspector on that permit for the allowed inspections within the written policy.

116.1 General; when to be issued. Prior to occupancy or *change of occupancy* of a *building* or *structure*, a certificate of occupancy shall be obtained in accordance with this section. The building official shall issue the certificate of occupancy within 5 *working days* after approval of the final inspection and when the *building* or *structure* or portion thereof is determined to be in compliance with this code and any pertinent laws or ordinances, or when otherwise entitled.

Exceptions:

1. A certificate of occupancy is not required for an accessory *structure* as defined in the IRC .
2. A new certificate of occupancy is not required for an addition to an existing Group R-5 *building* that already has a certificate of occupancy.

3. A certificate of occupancy shall be issued at the time of permit issuance when applied for per 109.4 Exception and will be determined in compliance when all final inspections have been approved.

116.2 Contents of certificate. A certificate of occupancy shall specify the following:

1. The edition of the USBC under which the permit is issued.
2. The group classification and occupancy in accordance with the provisions of Chapter 3 .
3. The type of *construction* as defined in Chapter 6 .
4. If an automatic sprinkler system is provided and whether or not such system was required.
5. Any special stipulations and conditions of the building permit and if any modifications were issued under the permit, there shall be a notation on the certificate that modifications were issued.
6. Group R-5 occupancies complying with Section R320.3 of the VRC shall have a notation of compliance with that section on the certificate.
7. Group R-5 109.4 Exception shall be indicated when applicable.

Reason Statement:

Section 109.2 provides for the building official to have information and documentation provide to the department that we have no authority/responsibility/enforcement over per Section 103.5. This may be a consideration for large projects and anything that is subject to the VCC, but it should not affect a new one- and two-family dwelling that is being built by a Class A contractor who is the applicant or designed by an RDP.

Section 109.3 will need to have the exemption shown given that no department review is required when submitting this specific permit. If the plans are not subject to the Building Official's review, there is no need to have engineering details provided.

Section 109.4 requires the examination of plans and documents, which is needed in many cases, but for a new one- and two-family dwelling that is being applied for and built by a Class A contractor should not need to be reviewed, given that they know the code and are required to meet the code. If a code violation is found during inspections it will be up to the contractor to correct, or no passed inspection will be given. The permit will not be able to continue, and the certificate of occupancy will not be valid. In this case the contractor would be required to be the applicant and the contractor for the permit to be issued in this regard. If the applicant is an RDP the plans would be assumed to have designed per code and again, any violation found during inspections would need to be corrected or construction could not continue, and certificate of occupancy would not be valid. The exemption includes the indication that Section 103.1 would be required and that the individuals utilizing this exception would be fully responsible if they do not conform to the code during construction.

Section 109.5 requires that the plans be approved or an equivalent method, but if Section 109.4 were used the plans would not be required to be reviewed and would not be approved by the Building Official and no indication would be provided as such.

Section 109.6 would not be necessary for this Exception given the timing and would not be a possible method to start work without having the permit issued because the plans do not require review or Building Official approval.

Section 110.1 should only address what is under the authority of the Building Official and not indicate that permits can be held up by other laws or ordinances. This goes back to the proposal (Functional Design (1383)) and what authority the Building Official jurisdiction over.

Section 113.3 would indicate that only when final inspections for one- and two-family dwellings using 109.4 Exception have received all approved finals the certificate of occupancy would be approved. See additional portion of this proposal in Section 116.2.

Section 113.7.2 would allow the RDP that has made application can perform the inspections that are allowed under the jurisdictions written Third Party Policy without having to go through the qualification process for that permit only. Again, they would be attesting that they have completed the inspection per Section 103.1.

Section 116.1 would have the certificate of occupancy to be issued at the time the permit is issued, which would at that time have all of the information that is required to be on the certificate of occupancy and would only be in affect once all of the final inspections have been approved. There would be no waiting on obtaining a document when the required inspections have been approved. All other agencies would be required to enforce their regulations and not the Building Official.

Section 116.2 would require a new item to be placed on the certificate of occupancy if 109.4 Exception is used, to indicate that while the Building Official has approved the required inspections the applicant can be fully held responsible for any code violation that is found given that they have taken on an expedited permit process and they are attesting to the fact that they know the code sufficiently enough to have undertaken this obligation.

Cost Impact: The code change proposal will decrease the cost

This will decrease the cost of construction in allowing the construction to be completed as soon as all finals are approved not having to wait on a certificate of occupancy to be issued or other agencies delaying the issuance. It will decrease any loan interest that may be in place or the return on investment being realized sooner when sold.

B109.4-24

VCC: 109.4, 109.4.1, 109.4.2 (New), 109.4.3 (New), 109.4.3.1 (New), 109.4.3.2 (New), 109.4.4 (New), 110.1, 110.8, 114.1, 116.1

Proponents: Paul Milde, representing Virginia House of Delegates, District 64

2021 Virginia Construction Code

Revise as follows:

109.4 Examination of documents. The building official shall examine or cause to be examined all construction documents or site plans, or both, within a reasonable time after filing. ~~If such documents or plans do not comply with the provisions of this code, the permit applicant shall be notified in writing of the reasons, which shall include any adverse construction document review comments or determinations that additional information or engineering details need to be submitted. The review of construction documents for new one- and two-family dwellings for determining compliance with the technical provisions of this code not relating to the site, location or soil conditions associated with the dwellings shall not be required when identical construction documents for identical dwellings have been previously approved in the same locality under the same edition of the code and such construction documents are on file with the local building department.~~ 15 business days for Group R-5 structures and accessory structures to Group R-5, and within 20 business days for all other structures.

109.4.1 Expedited construction document review. ~~Identical One- and Two-family Dwellings.~~ The building official may accept reports from an approved person or agency that the construction documents have been examined and conform to the requirements of the USBC and may establish requirements for the person or agency submitting such reports. ~~In addition, where such reports have been submitted, the building official may expedite the issuance of the permit.~~ review of construction documents for new one- and two-family dwellings for determining compliance with the technical provisions of this code not relating to the site, location or soil conditions associated with the dwellings shall not be required when identical construction documents for identical dwellings have been previously approved in the same locality under the same edition of the code and such construction documents are on file with the local building department.

Add new text as follows:

109.4.2 Concurrent review. When the issuance of permits are contingent upon review and approval by other state agencies that require and govern the functional design and operation of building related activities not covered by the USBC, including (i) public water supply systems, (ii) waste water treatment and disposal systems, and (iii) solid waste facilities, the examination of construction documents by the building official shall not be delayed until such approval is granted by the state agency.

109.4.3 Expedited construction review. The building official may accept reports from an approved individual or agency that the construction documents have been examined and conform to the requirements of the USBC. Such individual or agency shall be approved in accordance with Section 109.4.3.2. Where such reports have been submitted, the building official may expedite the issuance of the permit.

109.4.3.1 Third-party construction document examination. Under circumstances where the building official is unable to examine, or cause to be examined, the construction documents within the timeframe set forth in Section 109.4, or an agreed upon date, the building official shall accept third-party plan review reports from individuals or agencies approved in accordance with the building official's written policy required by Section 109.4.3.2. The building official shall approve such reports unless there is cause for rejection. Failure to approve a report shall be in writing within five working days of receiving it stating the reason for the rejection. The building official shall notify the permit applicant of their inability to comply with the timeframe set forth in Section 109.4 within five working days after filing.

109.4.3.2 Third-party plans examiners. Each building official charged with the enforcement of the USBC shall have a written policy establishing the minimum acceptable qualifications for approval of third-party plans examiners. The policy shall include the format and time frame required for submission of reports, any prequalification or preapproval requirements before conducting a third-party plan review, and any other requirements and procedures established by the building official.

109.4.4 Notification. Upon completion of construction documents examination by the building official, the permit applicant shall be

notified in writing, via electronic mail, of the status of the project and required next steps.

Exception: If the permit applicant does not have a valid email address, notification via telephone or mutually agreed upon method is acceptable.

If the construction documents do not comply with the provisions of this code, the permit applicant shall be notified in writing, via electronic mail, of the reasons, which shall include any adverse construction document review comments or determinations that additional information or engineering details need to be submitted.

Exception: If the permit applicant does not have a valid email address, notification via a mutually agreed upon method is acceptable.

Revise as follows:

110.1 Approval and issuance of permits. The building official shall examine or cause to be examined all applications for permits or amendments to such applications within a reasonable time after filing. If the applications or amendments do not comply with the provisions of this code ~~or all pertinent laws and ordinances~~, the permit shall not be issued and the permit applicant shall be notified in writing of the reasons for not issuing the permit. If the application complies with the applicable requirements of this code, a permit shall be issued as soon as practicable. The issuance of permits shall not be delayed in an effort to control the pace of *construction* of new detached one- or two-family dwellings.

110.8 Revocation of a permit. The building official may revoke a permit or approval issued under this code in the case of any false statement, misrepresentation of fact, abandonment of work, failure to complete *construction* as required by Section 110.7 , noncompliance with provisions of this code ~~and pertinent laws and ordinances~~, or incorrect information supplied by the applicant in the application or construction documents on which the permit or approval was based.

114.1 Issuance of order. When the building official finds that work on any *building or structure* is being executed contrary to the provisions of this code ~~or any pertinent laws or ordinances~~, or in a manner endangering the general public, a written stop work order may be issued. The order shall identify the nature of the work to be stopped and be given either to the *owner* of the property involved, to the *owner's* agent or to the person performing the work. Following the issuance of such an order, the affected work shall cease immediately. The order shall state the conditions under which such work may be resumed.

116.1 General; when to be issued. Prior to occupancy or *change of occupancy* of a *building or structure*, a certificate of occupancy shall be obtained in accordance with this section. The building official shall issue the certificate of occupancy within ~~5-2~~ *working days* after approval of the final inspection and when the *building or structure* or portion thereof is determined to be in compliance with this code ~~and any pertinent laws or ordinances~~, or when otherwise entitled.

Exceptions:

1. A certificate of occupancy is not required for an accessory *structure* as defined in the IRC .
2. A new certificate of occupancy is not required for an addition to an existing Group R-5 *building* that already has a certificate of occupancy.

Reason Statement:

Summary of changes:

109.4 - "A reasonable time" was replaced with set times. The balance of existing provisions set forth by the Section have been relocated to other sections.

109.4.1 - These are existing provisions that have been relocated from Section 109.4 to their own subsection to provide clarity and highlight the importance of the proposed timeframes in Section 109.4.

109.4.2 - New provisions have been added to address concerns related to building departments not performing technical review of construction documents prior to receiving approval from the Virginia Department of Health.

109.4.3 - "Person" has been replaced with "individual" for consistency with terminology used in Section 113.7.

109.4.3.1 - Newly proposed Section intended to allow for third-party plan review if the local building departments cannot comply with the

newly proposed timeframe for construction document review.

109.4.3.2 - Newly proposed Section, modeled after existing requirements for third-party inspectors (see Section 113.7.1) intended to set the framework for establishing policies for third-party plan reviewers.

109.4.4 - Newly proposed requirements intended to eliminate the need for contractors to constantly monitor permit status due to lack of notification from building departments. The exceptions have been added to account for isolated cases where the permit applicant may not have an email address nor the means to create or utilize one.

110.1 - Deleted "or all pertinent laws and ordinances" to avoid conflicts with the subsequent sentence within the Section, which mandates the issuance of the permit "If the application complies with the applicable requirements of this code."

110.8, 114.1 - "or all pertinent laws and ordinances" have been removed for consistency with the proposed changes to Section 110.1

116.1 - Revised the timeframe for the issuance of the Certificate of Occupancy from 5 working days to 2 working days. Deleted "or all pertinent laws and ordinances" for consistency with the proposed revisions to Section 110.1.

Summary of June 25th Expediting Permits and COs Study Group (See Attached)

Cost Impact: The code change proposal will not increase or decrease the cost

"The code change proposal will not increase or decrease the cost" option was selected.

Attached Files

- **20250625-expediting-permits-and-cos-sg-meeting-summary.pdf**
<https://va.cdpassess.com/proposal/1397/2029/files/download/948/>

B110.6-24

VCC: 110.6

Proponents: David Beahm, representing Warren County (dbeahm@warrencountyva.gov)

2021 Virginia Construction Code

Revise as follows:

110.6 Abandonment of work. A building official shall be permitted to revoke a permit if work on the site authorized by the permit is not commenced within 6 months after issuance of the permit, or if the authorized work on the site is suspended or abandoned for a period of 6 months after the permit is issued; however, permits issued for plumbing, electrical and mechanical work shall not be revoked if the building permit is still in effect. It shall be the responsibility of the permit applicant to prove to the building official that authorized work includes substantive progress, characterized by approved inspections as specified in Section 113.3 of at least one inspection within a period of 6 months or other evidence that would indicate substantial work has been performed. ~~Upon written request, the~~ The building official may grant one or more extensions of time, not to exceed 1 year per extension.

Reason Statement: Section 108.8 where it also indicates that the Building Official can grant an extension, nothing is mentioned about it needing to be requested or in writing or directing you to Section 110.6. Why would you be required to provide a written request to extend a permit and not require a written request when you ask to have a permit canceled as it is in Section 110.9. If anything, it should be reversed given that 110.9 is completely stopping a permit and then having to indicate that the incomplete building or structure shall not be left as an unsafe building or structure.

Cost Impact: The code change proposal will not increase or decrease the cost

Should not change the cost unless you consider someone having to supply an actual letter on paper and potentially having to mail it in.

PM105.2-24

VPMC: 105.2

Proponents: Matthew Mertz, Fairfax County Department of Code Compliance, representing Fairfax County, Property Maintenance Official, Department of Code Compliance (matthew.mertz@fairfaxcounty.gov)

2021 Virginia Property Maintenance Code

Revise as follows:

105.2 Notices, reports and orders. Upon findings by the *code official* that violations of this code exist, the *code official* shall issue a correction notice or notice of violation to the *owner, tenant* or the person responsible for the maintenance of the *structure*; or, a notice of *unsafe structure* in accordance with Section 106 when a *building or structure* is determined by the *code official* to be an *unsafe structure*. Work done to correct violations of this code subject to the permit, inspection and approval provisions of the VCC shall not be construed as authorization to extend the time limits established for compliance with this ~~code~~-code. The notice shall be issued by either delivering a copy by mail to the last known address of the responsible party, by delivering the notice in person, by leaving it in the possession of any person in charge of the premises, by electronic service, or by posting the notice in a conspicuous place if the person in charge of the premises cannot be found. When the *owner* is not the responsible party to whom the notice of violation or correction notice is issued, a copy of the notice shall also be delivered to the *owner*.

Reason Statement:

Currently, the VPMC doesn't provide instruction on notice of violation service methods. This proposal would add text to the 2024 VPMC to make it read very similar to the applicable text of VCC Section 115.2 [when factoring in 2024 code cycle proposal # B115.2(2)-24 that already obtained a consensus approval from the first combined workgroup], as far as text that speaks to service of a notice. It's noted that this proposal (# PM105.2-24) originally proposed aligning text most closely with the applicable text of the SFPC regarding service of notices. However, after consultation with a concerned stakeholder, it was agreed that since both the VCC and VPMC are part of the USBC, whereas the SFPC is not, it makes sense to more closely align the applicable text of the VPMC to the VCC. That said, this revised proposed text for Section 105.2 of the proposed 2024 VPMC is still similar in substance to the applicable text of the 2021 SFPC, an excerpt of which is attached. There were various stakeholders who spoke to this proposal at the first combined workgroup meeting. I only recall one stakeholder specifically stating that they were opposed (non-consensus). With these revisions, the concerned stakeholder is no longer opposed. An additional stakeholder, who didn't necessarily voice opposition to the original proposal but spoke to it, was also consulted and indicated that he has no issue with this revised version.

Cost Impact: The code change proposal will not increase or decrease the cost
There is no anticipated impact on costs.

Attached Files

- 2021 SFPC excerpt Chapter 1 including Section 111.2.pdf
<https://va.cdpass.com/proposal/1310/1872/files/download/924/>

FP112.5-24

SFPC: 112.5

Proponents: Andrew Milliken, representing Stafford County Fire Marshal's Office (amilliken@staffordcountyva.gov)

2021 Virginia Statewide Fire Prevention Code

Revise as follows:

112.5 Application for appeal. The *owner* of a structure, the owner's agent or any other person involved in the maintenance of the structure, or activity, may appeal a decision of the fire official concerning the application of the SFPC or the fire official's refusal to grant modification under Section 106.5 to the provisions of the SFPC. The appeal shall first lie to the *LBFPCA* and then to the State Review Board except that appeals concerning the application of the SFPC or refusal to grant modifications by the *State Fire Marshal* shall be made directly to the State Review Board. The appeal shall be submitted to the *LBFPCA* within 14 calendar days of the application of the SFPC. The application shall contain the name and address of the *owner* of the structure and the person appealing if not the *owner*. A copy of the written decision of the fire official shall be submitted along with the application for appeal and maintained as part of the record. The application shall be stamped or otherwise marked by the *LBFPCA* to indicate the date received. Failure to submit an application for appeal within the time limit established by this section shall constitute acceptance of the fire official's ~~decision~~. Reaffirmation of a prior code decision does not constitute a new application of code subject to appeal.

Note: In accordance with § 27-98 of the Code of Virginia, any local fire code may provide for an appeal to a local board of appeals. If no local board of appeals exists, the State Review Board shall hear appeals of any local fire code violation.

Reason Statement: This proposal is a companion change to proposal B119.5 which has received consensus for approval. The new language provided here for the SFPC is identical to proposal B119.5 for the Virginia Construction Code and the Virginia Property Maintenance Code which closes a potential loop hole regarding the time limit for appeals. See the reason statement in proposal B119.5 for more details.

Cost Impact: The code change proposal will not increase or decrease the cost
This is an administrative change that does not impact cost.

B406.2.7-24

VCC: 406.2.7, 406.2.7.1 (New), 406.2.7.2 (New), 406.2.7.3 (New)

Proponents: Ernest Little, Retired Prince William County Department of Fire and Rescue, representing Myself (prwmfm4@aol.com)

2021 Virginia Construction Code

406.2.7 Electric vehicle charging stations and systems. Where provided, electric vehicle charging systems shall be installed in accordance with NFPA 70. Electric vehicle charging system equipment shall be *listed* and labeled in accordance with UL 2202. Electric vehicle supply equipment shall be *listed* and labeled in accordance with UL 2594. Accessibility to *electric vehicle charging stations* shall be provided in accordance with Section 1107 .

Add new text as follows:

406.2.7.1 Emergency Shutoff. For fixed-in-place electric vehicle charging systems equipment supplying dc power to the electric vehicle, one or more clearly identified emergency shutoffs shall be provided and maintained and meet the following requirements: (1) Be installed at an approved location no less than 20 feet nor more than 100 feet which is readily accessible and has a clear line of sight of the charging equipment. (2) The emergency shutoff shall disconnect power to all electric vehicle power transfer system equipment on the premises. (3) The emergency shutoff be marked "ELECTRIC VEHICLE EMERGENCY SHUTOFF" with signs provided in approved locations. (4) The emergency shutoff shall require manual intervention in order to reset from an emergency shutoff condition. *Exception: Emergency disconnects, other than those required in accordance with NFPA 70, section 230.85, shall not be required for EVSE and WPTE installed at one- and two-family dwelling units.*

406.2.7.2 Impact Protection. Electric vehicle charging stations shall be protected against physical damage, in an approved manner, where charging stations are located in areas near parking areas, multiple charging stations, or other areas where there is a higher potential for vehicle impacts.

406.2.7.3 Emergency Procedures. Approved emergency procedures shall be posted on a sign at an approved and conspicuous location of the charging station(s) and shall read:

1. IF POSSIBLE, DISABLE THE VEHICLE TO PREVENT MOVEMENT 2. USE THE ELECTRIC VEHICLE EMERGENCY SHUTOFF
3. REPORT THE INCIDENT TO THE FIRE DEPARTMENT FIRE DEPARTMENT PHONE NUMBER: 4. FACILITY ADDRESS:

Reason Statement:

The Virginia Construction (VCC) and Virginia Statewide Fire Prevention Code (SFPC) lack an emergency disconnecting requirement similar to that required by NFPA 30A at motor fuel dispensing facilities. Charging stations supplying DC power to electric vehicles (EVs) are available to the general public along major highways and have become more available in public parking garages, public parking lots, and workplace parking lots. When an emergency occurs at one of these EV charging stations, first responders need a quick means to disconnect power in order to mitigate the emergency safely. The proposed amendments are intended to correct a previously unknown existing hazard. The proposed amendments intend to offer the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

The 2024 International Fire Code references the National Fire Protection Association (NFPA) 2023 National Electrical Code (NEC) which had a tentative interim amendment (TIA) regarding vehicle impact protection and emergency shutoffs. This TIA was considered by the

National Fire Protection Association in development of the 2026 NEC) and emergency disconnects for electric vehicle charging stations were added to the code requirements. The 2026 NEC will be published in October of 2025. The impact protection provision of the amendments brings an existing requirement of the NEC for electrical equipment exposed to vehicle impact into the VCC to make the requirement easier to access for installers of electric vehicle charging equipment.

Currently, shutdown controls are required for both refueling stations and DC charging stations; however, access to these shutdowns is quite different and create unnecessary and potentially lethal intervention hazard delays for first responders who are called to address emergencies at DC charging stations.

Concerns:

- (1) First responders, who respond to emergencies at DC Charging stations do so in an electrical energy environment that can exceed normal household voltages. These first responders are not trained, nor equipped, to operate in electrical hazard areas without a shut off or lock out device being available.
- (2) First responders do not have tools capable of ensuring that the DC energy hazard has been controlled. Unlike AC hazards, where tools have been made available to first responders that allow them to gather some information about the energy status of electrical equipment, there are very few tools available to first responders for ascertaining DC energy status.
- (3) While not required at EV charging stations, some vendors are installing emergency shut offs and they are being installed in locations that are not safe or readily accessible for first responders. Some are being installed at the actual charging device location rather than at a safe location away from the hazard area. While well intended, the installation of these devices requires first responders to work in the hazard area to operate them. NFPA 30A requires that the e-stop be located at least 20 feet away from the hazard.
- (4) EV Charging station electrical shut offs are not labelled and are not readily accessible and Energy disconnects (per code) are allowed to be in locked cabinets which are often not labeled. This creates confusion and frustration for first responders attempting to address the electrical hazards present. Since emergency shut offs have been present at refueling stations since 1984, first responders look for emergency shut offs where they have seen at refueling stations.

Cost Impact: The code change proposal will increase the cost

There will be cost associated with the installation of impact protection, disconnecting means, and the required materials. The cost could be offset by the reduction in damaged components due to vehicle impact and the possible injury to first responders due to exposure to live electrical components in mitigating events associated with malfunction or misuse of electric vehicle charging equipment.

Attached Files

- **commercial-ev-charging-station.jpg**
<https://va.cdpassess.com/proposal/1381/1970/files/download/944/>
- **IMG_3797.jpg**
<https://va.cdpassess.com/proposal/1381/1970/files/download/943/>
- **TOIBIB97Q7aDANnGZA0xeQ - no impact protection provided.jpeg**
<https://va.cdpassess.com/proposal/1381/1970/files/download/942/>
- **burning-electric-car-after-catching-fire-while-charging-at-a-station.png**
<https://va.cdpassess.com/proposal/1381/1970/files/download/941/>
- **charging-station-damaged-1100x825.jpg**
<https://va.cdpassess.com/proposal/1381/1970/files/download/940/>

B509.1-24

VCC: [F]TABLE 509.1

Proponents: Andrew Milliken, representing Stafford County Fire Marshal's Office (amilliken@staffordcountyva.gov)

2021 Virginia Construction Code

Revise as follows:

[F]TABLE 509.1 INCIDENTAL USES

ROOM OR AREA	SEPARATION AND/OR PROTECTION
Furnace room where any piece of equipment is over 400,000 Btu per hour input	1 hour or provide automatic sprinkler system
Rooms with boilers where the largest piece of equipment is over 15 psi and 10 horsepower	1 hour or provide automatic sprinkler system
Refrigerant machinery room	1 hour or provide automatic sprinkler system
Hydrogen fuel gas rooms, not classified as Group H	1 hour in Group B, F, M, S and U occupancies; 2 hours in Group A, E, I and R occupancies.
Incinerator rooms	2 hours and provide automatic sprinkler system
Paint shops, not classified as Group H, located in occupancies other than Group F	2 hours; or 1 hour and provide automatic sprinkler system
In Group E occupancies, laboratories and vocational shops not classified as Group H	1 hour or provide automatic sprinkler system
In Group I-2 occupancies, laboratories not classified as Group H	1 hour and provide automatic sprinkler system
In <i>ambulatory care facilities</i> , laboratories not classified as Group H	1 hour or provide automatic sprinkler system
Laundry rooms over 100 square feet	1 hour or provide automatic sprinkler system
In Group I-2, laundry rooms over 100 square feet	1 hour
Group I-3 cells and Group I-2 patient rooms equipped with padded surfaces	1 hour
In Group I-2, physical plant maintenance shops	1 hour
In <i>ambulatory care facilities</i> or Group I-2 occupancies, waste and linen collection rooms with containers that have an aggregate volume of 10 cubic feet or greater	1 hour
In other than <i>ambulatory care facilities</i> and Group I-2 occupancies, waste and linen collection rooms over 100 square feet	1 hour or provide automatic sprinkler system
In <i>ambulatory care facilities</i> or Group I-2 occupancies, storage rooms greater than 100 square feet	1 hour
Electrical installations and transformers	See Sections 110.26 through 110.34 and Sections 450.8 through 450.48 of NFPA 70 for protection and separation requirements.
Lithium-ion and lithium metal battery storage	See Section 320 of the International Fire Code

For SI: 1 square foot = 0.0929 m², 1 pound per square inch (psi) = 6.9 kPa, 1 British thermal unit (Btu) per hour = 0.293 watts, 1 horsepower = 746 watts, 1 gallon = 3.785 L, 1 cubic foot = 0.0283 m³.

Reason Statement:

This proposal adds a new incidental use to table 509.1 to connect the Virginia Construction Code with the new construction provisions in the 2024 International Fire Code for storage of lithium-ion and lithium metal batteries (which have been removed from the SFPC in the base document). This link is critical to the proper function of the SFPC and VCC in Virginia and to the safety necessary for emerging technologies such as lithium-ion and lithium metal batteries. The ICC 2024 International Fire Code Significant Changes Document summarizes the changes as follows:

"CHANGE SIGNIFICANCE: Advancements in battery technologies have introduced a new generation of battery types, such as lithium-ion and flow batteries, each with advantages and potential hazards. Lithium-ion and lithium metal batteries can create challenging fires. The IFC intends to provide the necessary safety mechanisms to prevent and mitigate fires and explosions that can result due to the inherent hazards associated with the technologies. IFC Section 1207 addresses electrical energy storage systems (ESS), but other uses for lithium-ion and lithium metal batteries exist. This new section addresses storage of lithium-ion and lithium metal batteries. The provisions are intended to address all types of storage scenarios from manufacturing to warehouse operations to retail, and even the collection and recycling process. The requirements focus on mitigation of the significant impact thermal runaway and fires can have on facilities and public safety.

Section 320.1 states that the requirements cover storage of all lithium-ion and lithium metal batteries, which includes new, used, waste, recycling and refurbished batteries. There are five exceptions as follows:

1. New or refurbished batteries installed in the equipment, devices or vehicles they are designed to power.
2. New or refurbished batteries packed for use with the equipment, devices, or vehicles they are designed to power.
3. Batteries in original retail packaging that are rated at not more than 300 watt-hours for lithium-ion batteries or contain not more than 25 grams of lithium metal for lithium metal batteries.
4. Temporary storage of batteries or battery components during the battery manufacturing process prior to completion of final quality control checks.
5. Temporary storage of batteries during the vehicle manufacturing or repair process.

These exceptions identify situations where the regulations do not apply and allow retail and manufacturing operations to continue, provided they comply with the exceptions.

A permit is required for storage of batteries when the quantity of lithium-ion or lithium metal batteries exceeds 15 cubic feet. In a recycling or collection situation, a 55-gallon drum will hold 7.35 cubic feet. As such, three drums of lithium-ion or lithium metal batteries will exceed the limit. Keep in mind that the code is considering the quantity of lithium-ion or lithium metal batteries. Other batteries included in the mix do not count. For example, if the facility is collecting batteries and the battery types are not separated—all types of batteries are mixed in a container. If there are any lithium-ion or lithium metal in the container, the entirety should probably be treated as all lithium-ion or lithium metal batteries.

A fire safety and evacuation plan is required when the aggregate quantity exceeds 15 cubic feet. This plan should be required as part of the permit application/approval process.

There are several storage configurations considered in Section 320. The batteries can be in containers (Section 320.4.1), indoor storage rooms (Section 320.4.2), or outdoor storage (Section 320.4.3). When the batteries are stored in containers, the maximum quantity allowed is 15 cubic feet. This is primarily intended to cover the containers collecting used, or waste, batteries for recycling or disposal. These types of containers can be found in many establishments, including mercantile and office buildings. If the aggregate quantity of lithium-ion or lithium metal batteries exceeds 15 cubic feet, then the storage above 15 cubic feet must be in an indoor or outdoor storage area.

A fire detection and alarm system is required for indoor storage rooms and outdoor storage. The method of fire detection is either an air-aspirating system or a radiant-energy sensing system. These methods of detection provide an earlier warning than traditional smoke detectors. Other types of detection are currently being researched and developed, but they would need to be approved under an alternate method process as allowed in Section 104.2.3.

Indoor storage rooms are also required to be sprinklered and separated from the remainder of the occupancy by 2-hour fire barriers. There is an option for construction of an indoor storage room, and Section 320.4.2.2 refers to a prefabricated portable structure for battery storage. This structure must provide a 2-hour fire-resistance-rated enclosure and must have an automatic sprinkler system and detection system.

Batteries with a charge not exceeding 30 percent may be stored with fewer protections in place. Testing has shown that lithium-ion batteries not exceeding a 30 percent state of charge are less likely to undergo thermal runaway than fully charged batteries. The 30 percent state of charge is recognized by the U.S. Department of Transportation (DOT) and other transport agencies (e.g., Transport Canada, International Civil Aviation Organization) as providing an additional level of safety for shipping by air.

Typically, these batteries are coming from the manufacturer or refurbishing facility. If the batteries do not exceed a 30 percent state of charge, then 2-hour separation, explosion control, and a technical opinion and report are not required. These batteries will most likely not be the batteries collected at facilities as waste or in the recycling process."

Cost Impact: The code change proposal will increase the cost

This proposed change is simply to comply with the current model code regarding new hazards and protections for the storage of lithium-ion and lithium metal batteries. It may increase the cost of construction as compared to not providing any additional protection.

B906.1-24

VCC: [F] 906.1

Proponents: Morgan Hurley, Senez Consulting, Inc., representing Fire Equipment Manufacturers' Association (mhurley@senezco.com)

2021 Virginia Construction Code

Revise as follows:

[F] 906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

- ~~1. In Groups A, B, E, F, H, I, M, R-1, R-4, and S occupancies.~~

Exceptions:

- ~~1. In Groups A, B, and E occupancies equipped throughout with quick response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.~~
 - ~~2. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations and the access to such extinguishers shall be permitted to be locked.~~
 - ~~4. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations, and the access to such extinguishers shall be permitted to be locked.~~
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college *dormitory* occupancies.
 3. In areas where flammable or *combustible liquids* are stored, used or dispensed.
 4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3315.1 of the International Fire Code.
 5. Where required by the *International Fire Code* sections indicated in Table 906.1.
 6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the fire code official.

Exception: Portable fire extinguishers are not required at normally unmanned Group U occupancy buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.

Reason Statement:

The International Building Code/International Fire Code included an exception for portable fire extinguishers in A, B and E occupancies equipped throughout with quick response sprinklers through the 2009 edition. This exception was identical to current (2021) VCC/VSFPC 906.1, exception 1.

The exception for A, B and E occupancies equipped throughout with quick response sprinklers was removed from the IBC/IFC beginning with the 2012 editions. However, Virginia has maintained this exception as a state amendment. This proposal seeks to align the VCC/VSFPC requirement for portable fire extinguishers with that in the IBC/IFC. The code change proposal that removed this exception from the IBC (F94-09/10) stated, in part: "*Fire extinguishers have historically been the first line of defense for small, controllable fires. They are intended to be used for fires of limited size and easily controlled. If a fire is discovered in its early stages the most effective means of protecting life and preventing property loss is to sound an alarm and then to control and/or extinguish the incipient stage fire with a portable fire extinguisher. To simply wait for the fire to grow to size large enough for a sprinkler head to activate is contrary to lessons and guidance from the fire service and fire protection professionals. Since fire extinguishers provide a first line of defense vs. sprinklers, it remains unclear as to the justification for this exception. In that light, the Exception 1 to Section 906.1 should be deleted.*"

This code change would also require portable fire extinguishers in R-2 occupancies, which is required by the IBC, but is not required by the VCC (the VCC only requires portable fire extinguishers in R-1 and R-4 residential occupancies.) However, the IBC/IFC have exceptions (exception 1) that allow the extinguishers to be located in dwelling units.

Research conducted on behalf of the Fire Equipment Manufacturer's Association ("*A Review of the Impact of Fire Extinguishers in*

Reducing the Carbon Footprint of Building Fires", dated March 27, 2023) found that 4.5% of residential fires that were not reported to the fire department were extinguished by occupants who used portable fire extinguishers. In industrial occupancies, 38% of fires were suppressed using portable fire extinguishers. These statistics show that portable fire extinguishers can effectively be used to suppress small fires by building occupants. The current VCC/VSFPC 906.1, exception 2 (which allows portable fire extinguishers in I-3 occupancies to be located in locked staff areas) is proposed to be maintained as a new exception 4 to VCC/VSFPC 906.1.

Cost Impact: The code change proposal will increase the cost

This proposal would have a minor cost increase by requiring portable fire extinguishers in A, B, and E occupancies equipped throughout with quick response sprinklers and R-2 occupancies.

B917.1-24

VCC: SECTION 917, [F] 917.1, SECTION 202

Proponents: Gregg Black, representing George Mason University (gblack2@gmu.edu), Virginia Emergency Management Association
Institutions of Higher Education Caucus

2021 Virginia Construction Code

SECTION 917 MASS NOTIFICATION SYSTEMS

Revise as follows:

[F] 917.1 College and university campuses. Prior to construction of a new building requiring a fire alarm system on a multiple-building college or university campus having a cumulative building *occupant load* of 1,000 or more, a mass notification risk analysis shall be conducted in accordance with NFPA ~~72--72~~ and shall be approved by the Emergency Management Coordinator. Where the risk analysis determines a need for mass notification, an *approved* mass notification system shall be provided in accordance with the findings of the risk analysis.

SECTION 202 DEFINITIONS. Emergency Management Coordinator. The person appointed by their respective college or university to oversee Emergency Management for the college or university campus.

Reason Statement:

College and university campuses have long been required to have distributed recipient mass notification systems since the Jeanne Clery Act was passed by the federal government. Further, Virginia institutions are required by the Code of Virginia to have emergency broadcast systems on campus (23.1-803). This building code requirement for additional of mass notification does not take into account the other legal requirements and current mass notification systems that are already in place at institutions across the commonwealth. The risk assessment that is required for compliance with this code needs to be reviewed and approved by the emergency manager coordinator which every state institution is required to have per Executive Order 41 (2019), and private institutions have also appointed. With different architects being used on different projects, university's run the risk of risk assessments that don't align with each other or take into account the emergency planning that is done by the Emergency Managers at their respective institutions. This code modification would require that the risk assessments be approved by the experts at the various institutions who best understand the unique idiosyncrasies of emergency response at their particular institutions. If the risk assessment requires a mass notification system, then the Building Code Official would have oversight on the approval of the system and installation.

Cost Impact: The code change proposal will not increase or decrease the cost

This code modification only clarifies who should be reviewing the assessment. There is no expectation that it will change the cost of the building.

Attached Files

- **Code Change Letter of Support.docx**
<https://va.cdpassess.com/proposal/1411/2017/files/download/949/>

B1006.2.1-24

VCC: 1006.2.1, TABLE 1006.2.1

Proponents: Dan Willham, representing Fairfax County, VA

2021 Virginia Construction Code

Revise as follows:

1006.2.1 Egress based on occupant load and common path of egress travel distance. Two *exits* or *exit access doorways* from any space shall be provided where the design *occupant load* or the *common path of egress* travel distance exceeds the values *listed* in Table 1006.2.1. The cumulative *occupant load* from adjacent rooms, areas or spaces shall be determined in accordance with Section 1004.2.

Exceptions:

1. The number of *exits* from foyers, lobbies, vestibules or similar spaces need not be based on cumulative *occupant loads* for areas discharging through such spaces, but the capacity of the *exits* from such spaces shall be based on applicable cumulative *occupant loads*.
2. *Care suites* in Group I-2 occupancies complying with Section 407.4.
3. Unoccupied mechanical rooms and *penthouses* are not required to comply with the common path of egress travel distance measurement.
4. ~~In Group R-2 and R-3 occupancies, one means of egress is permitted within and from individual dwelling units with a maximum occupant load of 20 where the dwelling unit is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and the common path of egress travel does not exceed 125 feet (38 100 mm). This exception shall also apply to Group R-2 occupancies where Section 903.2.8, Exception 1 or 2 is applicable.~~

TABLE 1006.2.1 SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A ^c , E, M	50	75	75	75 ^a
B	50	100	75	100 ^a
F	50	75	75	100 ^a
H-1, H-2, H-3	3	NP	NP	25 ^b
H-4, H-5	10	NP	NP	75 ^b
I-1, I-2 ^d , I-4	10	NP	NP	75 ^a
I-3	10	NP	NP	100 ^a
R-1	10	NP	NP	75 ^a
R-2	20	NP ^{125^f}	NP	125 ^a
R-3 ^g	20	NP	NP	125 ^{a, g}
R-4 ^g	20	NP	NP	125 ^{a, g}
S ⁱ	29	100	75	100 ^a
U	50	100	75	75 ^a

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

- a. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.
- b. Group H occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.2.5.
- c. For a room or space used for assembly purposes having fixed seating, see Section 1030.8.

- d. For the travel distance limitations in Group I-2, see Section 407.4.
- e. The common path of egress travel distance shall only apply in a Group R-3 occupancy located in a mixed occupancy building.
- f. The length of common path of egress travel distance in a Group S-2 open parking garage shall be not more than 100 feet.
- g. For the travel distance limitations in Groups R-3 and R-4 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3, see Section 1006.2.2.6.
- h. In Group R-2 occupancies, only where Section 903.2.8 , Exception 1 or 2 is applicable.

Reason Statement: Exception 4 has the same occupant load and common path of travel limits as the general Table 1006.2.1. The occupant load limit was increased from 10 occupants to 20 in ICC code change E17-15. This Virginia amendment is no longer needed, except for just the Group R-2 occupancies where Section 903.2.8 , Exception 1 or 2 is applicable. Sprinklered R-2 and R-3 occupancies under this exception are the same as the Table. This change deletes the exception and adds a footnote to the table for the Group R-2 occupancies where Section 903.2.8 , Exception 1 or 2 is applicable.

Cost Impact: The code change proposal will not increase or decrease the cost

The change proposal does not change any technical requirements. It only reorganizes them and removes extraneous language.

B1006.2.1(1)-24

VCC: 1006.2.1, TABLE 1006.2.1

Proponents: Dan Willham, representing Fairfax County, VA

2021 Virginia Construction Code

Revise as follows:

1006.2.1 Egress based on occupant load and common path of egress travel distance. Two exits or exit access doorways from any space shall be provided where the design *occupant load* or the *common path of egress* travel distance exceeds the values *listed* in Table 1006.2.1. The cumulative *occupant load* from adjacent rooms, areas or spaces shall be determined in accordance with Section 1004.2.

Exceptions:

1. The number of *exits* from foyers, lobbies, vestibules or similar spaces need not be based on cumulative *occupant loads* for areas discharging through such spaces, but the capacity of the *exits* from such spaces shall be based on applicable cumulative *occupant loads*.
2. *Care suites* in Group I-2 occupancies complying with Section 407.4.
3. Unoccupied mechanical rooms and *penthouses* are not required to comply with the common path of egress travel distance measurement.
4. ~~In Group R-2 occupancies where Section 903.2.8, Exception 1 or 2 is applicable~~~~In Group R-2 and R-3 occupancies, one means of egress is permitted within and from individual dwelling units with a maximum occupant load of 20 where the dwelling unit is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and the common path of egress travel does not exceed 125 feet (38 100 mm). This exception shall also apply to Group R-2 occupancies where Section 903.2.8, Exception 1 or 2 is applicable.~~

TABLE 1006.2.1 SPACES WITH ONE EXIT OR EXIT ACCESS DOORWAY

OCCUPANCY	MAXIMUM OCCUPANT LOAD OF SPACE	MAXIMUM COMMON PATH OF EGRESS TRAVEL DISTANCE (feet)		
		Without Sprinkler System (feet)		With Sprinkler System (feet)
		Occupant Load		
		OL ≤ 30	OL > 30	
A ^c , E, M	50	75	75	75 ^a
B	50	100	75	100 ^a
F	50	75	75	100 ^a
H-1, H-2, H-3	3	NP	NP	25 ^b
H-4, H-5	10	NP	NP	75 ^b
I-1, I-2 ^d , I-4	10	NP	NP	75 ^a
I-3	10	NP	NP	100 ^a
R-1	10	NP	NP	75 ^a
R-2	20	NP	NP	125 ^a
R-3 ^e	20	NP	NP	125 ^{a, g}
R-4 ^e	20	NP	NP	125 ^{a, g}
S ^f	29	100	75	100 ^a
U	50	100	75	75 ^a

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

- a. Buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2. See Section 903 for occupancies where automatic sprinkler systems are permitted in accordance with Section 903.3.1.2.
- b. Group H occupancies equipped throughout with an automatic sprinkler system in accordance with Section 903.2.5.
- c. For a room or space used for assembly purposes having fixed seating, see Section 1030.8.

- d. For the travel distance limitations in Group I-2, see Section 407.4.
- e. The common path of egress travel distance shall only apply in a Group R-3 occupancy located in a mixed occupancy building.
- f. The length of common path of egress travel distance in a Group S-2 open parking garage shall be not more than 100 feet.
- g. For the travel distance limitations in Groups R-3 and R-4 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.3, see Section 1006.2.2.6.

Reason Statement: Exception 4 has the same occupant load and common path of travel limits as the general Table 1006.2.1. The occupant load limit was increased from 10 occupants to 20 in ICC code change E17-15. This Virginia amendment is no longer needed, except for just the Group R-2 occupancies where Section 903.2.8 , Exception 1 or 2 is applicable. Sprinklered R-2 and R-3 occupancies under this exception are the same as the Table. This change revises the exception to only include Group R-2 occupancies where Section 903.2.8 , Exception 1 or 2 is applicable.

Cost Impact: The code change proposal will not increase or decrease the cost

The change proposal does not change any technical requirements. It only removes extraneous language.

B1006.3.4-24

IBC: 1006.2.1, TABLE 1006.3.4(1), 1006.3.4.2 (New)

Proponents: Lyle Solla-Yates, representing Charlottesville Planning Commission (lyle.sollayates@gmail.com)

2024 International Building Code

Revise as follows:

1006.2.1 Egress based on occupant load and common path of egress travel distance. Two exits or exit access doorways from any space shall be provided where the design occupant load or the common path of egress travel distance exceeds the values listed in Table 1006.2.1. The cumulative occupant load from adjacent rooms, areas or spaces shall be determined in accordance with Section 1004.2.

Exceptions:

1. The number of exits from foyers, lobbies, vestibules or similar spaces need not be based on cumulative occupant loads for areas discharging through such spaces, but the capacity of the exits from such spaces shall be based on applicable cumulative occupant loads.
2. Care suites in Group I-2 occupancies complying with Section 407.4.
3. Unoccupied mechanical rooms and penthouses are not required to comply with the common path of egress travel distance measurement.
4. Single exit four-story buildings complying with Section 1006.3.4.2.

TABLE 1006.3.4(1) STORIES AND OCCUPIABLE ROOFS WITH ONE EXIT OR ACCESS TO ONE EXIT FOR R-2 OCCUPANCIES

STORY	OCCUPANCY	MAXIMUM NUMBER OF DWELLING UNITS	MAXIMUM EXIT ACCESS TRAVEL DISTANCE
Basement, first, second, or third, or fourth story above grade plane and occupiable roofs over the first, or second, or third story above grade plane	R-2 ^{a, b, c, d}	4 dwelling units	125 feet
Fourth Fifth story above grade plane and higher	NP	NA	NA

For SI: 1 foot = 304.8 mm.

NP = Not Permitted.

NA = Not Applicable.

- a. Buildings classified as Group R-2 equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and provided with emergency escape and rescue openings in accordance with Section 1031.
- b. This table is used for Group R-2 occupancies consisting of dwelling units. For Group R-2 occupancies consisting of sleeping units, use Table 1006.3.4(2).
- c. This table is for occupiable roofs accessed through and serving individual dwelling units in Group R-2 occupancies. For Group R-2 occupancies with occupiable roofs that are not accessed through and serving individual units, use Table 1006.3.4(2).
- d. 4-story buildings and 3-story buildings with an occupiable roof above the third story shall also comply with Section 1006.3.4.2.

Add new text as follows:

1006.3.4.2 Single exit four-story buildings with Group R-2 dwelling units. Four-story buildings with a single exit for Group R-2 dwelling units shall comply with Table 1006.3.4(1) and all of the following:1. The net floor area of each floor shall not exceed 4,000 square feet (418.5 m). 2. Doors opening into the exit stairway must open in the direction of egress travel.3. Electrical receptacles shall be prohibited in exit stairway.4. In addition to the requirements for emergency escape and rescue openings in Section 1031.2, sleeping rooms on the fourth story above grade plane shall have not fewer than one emergency escape and rescue opening in accordance with Section 1031. 5. For interior exit stairways: a. Openings to the interior exit stairway enclosure shall be limited to those required for exit access into the enclosure from normally occupied spaces, those required for egress from the enclosure, and openings to the exterior. Elevators shall not

open into the *interior exit stairway* enclosure. Dwelling unit doors shall not open into the interior exit stairway enclosure. b. A manual fire alarm system and automatic smoke detection system that activates the occupant notification system in accordance with Section 907.5 shall be provided. Smoke detectors shall be located in common spaces outside of dwelling units, including but not limited to gathering areas, laundry rooms, mechanical equipment rooms, storage rooms, interior corridors, *interior exit stairways*, and exit passageways.

c. Regardless of the stairway construction type, automatic sprinkler locations in *interior exit stairways* shall comply with the requirements of NFPA 13 for combustibile stairways.

6. *Exterior exit stairways* must be constructed of noncombustible materials or fire-retardant-treated wood framing and sheathing complying with Section 2303.2.

Reason Statement:

The 2024 International Building Code allows buildings up to three stories of R-2 occupancy to have up to four dwelling units at each story served by a single exit. This proposal acknowledges the rising demand for infill multifamily development and a growing movement in Virginia and across the United States and Canada to modify building codes for this purpose. We recommend enabling a single exit to serve up to four stories of R-2 occupancy above the grade plane.

The initial language was identical to the modified proposal marked "E24-24-SHAPIRO-MC1". That language was adapted from codes in Seattle, Honolulu, New York City, and in Western European countries.

Within the United States, Seattle, Honolulu, and New York City have allowed buildings with generally fewer restrictions, to no ill effect or local controversy, and no major fires.

Based on stakeholder feedback and international best practices, we have added a number of additional restrictions that we believe are a reasonable balance between safety, cost, and quality, for both interior exit stair and exterior exit stair designs for Virginia families. We have also added some changes to improve clarity based on feedback.

Cost Impact: The code change proposal will decrease the cost

The cost of constructing four story multifamily buildings on small lots will decrease by roughly 7 percent, in line with the reduction in circulation area required.

This size reduction enables multifamily development that would otherwise be physically impossible on the smallest sites, allowing for lower cost site options.

Attached Files

- **2024_RD845-Single-staircase_Advisory_Group_Findings_and_Recommendations_-_November_2024 (1).pdf**
<https://va.cdpassess.com/proposal/1273/1790/files/download/898/>

B1110.20-24

IBC: 1110.20 (New), 1110.20.1 (New), 1110.20.2 (New), 1110.20.3 (New), 1110.20.4 (New)

Proponents: Elizabeth Bennett-Parker, representing Virginia House of Delegates District 5 (delebennett-parker@house.virginia.gov)

2024 International Building Code

Add new text as follows:

1110.20 Baby and toddler changing stations.. Where provided, baby and toddler changing stations shall be accessible. Where required, baby and toddler changing stations shall be accessible and shall comply with Sections 1110.20.1 through 1110.20.4.

1110.20.1 Where required.

Not fewer than one baby and toddler changing station complying with ICC A117.1 shall be provided in the following locations that is accessible to both male and female occupants:

1. In Group A occupancies that require an aggregate of fewer than six male and female water closets. In buildings of mixed occupancy, only those water closets required for the assembly occupancy shall be used to determine this requirement.
2. In all Group B occupancies. For those occupancies providing educational facilities for students above the 12th grade, a changing station shall only be required where an aggregate of fewer than 12 male and female water closets are required to serve the classrooms and lecture halls.
3. In Group E occupancies, where a room or space used for assembly purposes requires an aggregate of fewer than six or more male and female water closets for that room or space.
4. In Group I occupancies.
5. In Group M occupancies that require an aggregate of fewer than six male and female water closets. In buildings of mixed occupancy, only those water closets required for the mercantile occupancy shall be used to determine this requirement.
6. In Group R-1 hotels and motels on each floor level containing a public toilet facility.
7. In highway rest stops and highway service plazas.

Public toilet facilities not providing a diaper changing station shall have signage providing directions to the nearest diaper changing station location. Where diaper changing stations are installed in toilet facilities containing multiple water closet compartments, the water closet compartment containing the diaper changing station shall be identified as such. Central directories, if provided, shall indicate the location(s) of the diaper changing stations. Signs shall meet the requirements of ICC A117.1.

1110.20.2 Room. Baby and toddler changing stations shall be located in public toilet facilities that include only one water closet and only one lavatory. Fixtures located in such rooms shall be included in determining the number of fixtures provided in an occupancy. The occupants shall have access to the required baby and toddler changing station at all times that the associated occupancy is occupied. Exception: Baby and toddler changing stations shall be permitted to be located in family or assisted public toilet facilities required in Section 1110.2.1.

1110.20.3 Prohibited location. The accessible route from separate-sex toilet or bathing rooms to a baby and toddler changing station shall not require travel through security checkpoints.

1110.20.4 Travel distance. The baby and toddler changing station shall be located on an accessible route such that a person is not more than two stories above or below the story with the changing station and the path of travel to such facility shall not exceed 2,000 feet (609.6 m).

Reason Statement: This proposal works in concert with the requirements for adult or universal diaper changing stations included in the 2024 International Construction Code Standards that Virginia plans to adopt in this code cycle. It would require new construction that is not otherwise required to have an adult changing station to provide baby changing stations in both men's and women's, or unisex, public toilet rooms, with the exception of highway rest stops and service plazas, where baby changing stations would also be required due to the high volume of patrons needing toilet facilities. A growing number of states including Arizona, Nevada, New Mexico, Utah, Wisconsin, Oregon, California, New York, Connecticut, Delaware, Illinois,

Rhode Island, and Washington, DC have already adopted similar requirements. Moving forward with this proposal would support families across the Commonwealth and align Virginia with national trends.

This is a matter of public health and safety, as the absence of changing stations often forces caregivers to resort to unsafe or unsanitary alternatives. Changing stations should be accessible in all types of restrooms, as caregivers are not always women. Finally, it benefits businesses, as families are more likely to visit and remain in establishments where changing facilities are reliably available.

Cost Impact: The code change proposal will increase the cost

This proposal may lead to very minimal cost increases for the construction of new buildings as it would require the addition of baby changing tables in restrooms in some occupancies.

B3002.4-24

IBC: 3002.4

Proponents: Lyle Solla-Yates, representing Charlottesville Planning Commission (lyle.sollayates@gmail.com); Jared Calfee, representing AARP Virginia (jkcalfee@aarp.org)

2024 International Building Code

Revise as follows:

3002.4 Elevator car to accommodate ambulance stretcher. Where elevators are provided in *buildings* four or more *stories* above, or four or more *stories* below, *grade plane*, not fewer than one elevator shall be provided for fire department emergency access to all floors. The elevator car shall be of such a size and arrangement to accommodate an ambulance stretcher 24 inches by 84 inches (610 mm by 2134 mm) with not less than 5-inch (127 mm) radius corners, in the horizontal, open position and shall be identified by the international symbol for emergency medical services (star of life). The symbol shall be not less than 3 inches (76 mm) in height and shall be placed inside on both sides of the hoistway door frame.

Exception: Elevator cars are not required to accommodate ambulance stretchers in buildings complying with the following:1. Only Group R-2 occupancies located above the level of exit discharge.

2. Not more than six stories in height above grade plane.

3. Each story above the level of exit discharge is not more than 4,000 net square feet (371.6 m2), and

4. Not a high-rise building.

Reason Statement:

The purpose here is to maximize the odds that an elevator will be provided in small buildings by reducing size and cost. This issue is more pressing as taller single-stair buildings become more widely permitted in Virginia. These buildings have few units to share the high cost of an elevator, and experience in Seattle and New York City has shown that it is not economically viable to add stretcher-sized elevators to small buildings without subsidy.

The IBC currently contains a perverse incentive around elevators: there is no requirement in any part of the code to install an elevator in an R-2 building, but if one is voluntarily provided, requirements become increasingly stringent as buildings get taller, acting as a disincentive to install an elevator. This is a particular problem in the United States, as elevators cost around three times as much to install as they do in peer high-income countries, and can cost even more to maintain, even after adjusting for cost-of-living differences.

There are also higher opportunity costs of the floor area used, due to the larger cabins required. The result is that the United States has fewer elevators per capita than any other high-income country. The lack of elevators here in Virginia becomes an increasing problem due to our aging population and our increasingly high housing costs.

Rules requiring two staircases in multifamily buildings over three stories result in relatively large floor plates and high costs. As a result, new four-story walk-ups in the United States are rare, but they are likely to become more common. Reforms to Chapter 1006 considered for the 2027 IBC and approved by the Egress Committee in 2024 would make single-exit four-story buildings with small floor plates more common, making this need more urgent.

Evidence from New York City and Seattle, where locally adopted versions of Chapter 1006 have long allowed single-exit buildings of four to six stories, suggests that many of these buildings would be built as walk-ups. New York City is one of the few jurisdictions in America to contain a building code requirement to install an elevator starting at five stories, and according to Stephen Smith's research, developers there attempt to avoid it – for example by creating bilevel apartments on the top two stories to skirt the requirement, or filing for vertical alterations of older structures under an older code that does not contain an elevator requirement. None of the above is true in America's peer high-income countries. Elevators are a standard feature of small three-story buildings in Western Europe, and are often provided even when not required, because the costs are low enough and cabin sizes are small enough that the benefits outweigh the costs.

Code requirements come with costs and benefits that must be weighed against each other. A cabin that can accommodate a fully flat 84-in. stretcher has

life safety benefits in certain emergency situations, but also costs. These costs come in dollars and square feet, but also in life safety and accessibility. If an elevator becomes too onerous to install, then there are much more severe life safety costs, both to occupants whose evacuation will be delayed by having to take the stairs, and to emergency responders who will have to carry them down the stairs. The building also becomes inaccessible to the 12 percent of the U.S. adult population that struggles with stairs.

Occupants of walk-ups are more likely to become one of the 1 million Americans treated in emergency rooms every year for stair-related injuries. There is no data on the number of Americans who die using stairs every year, but data from the UK extrapolated to our population suggests that it is in the thousands, exceeding the number of Americans who die in fires. There are countless situations where an elevator that can accommodate a wheelchair and a few people standing is useful, and many fewer situations where a patient must be evacuated in a fully flat stretcher.

Developers can avoid installing elevators of any size by building walk-up apartment buildings, but they can also – and often do – avoid building elevators by opting out of apartment buildings entirely and instead building townhouses, which never have elevators that can accommodate stretchers (and rarely have any elevator at all). In the economic analysis performed for the City of Charlottesville, it was found that [townhouses were dramatically more economically attractive](#) due to high cost barriers including high cost elevator mandates.

A recent apartment development in Albemarle County, Virginia gives a helpful example of how the private market is responding to the current size mandate. [Fifth Street Place](#) offers a number of amenities in their five residential buildings, including elevator service only in two of them.

Stephen Smith's analysis of buildings constructed in New York City since 2000 shows that the likelihood of installing an elevator in an apartment building exceeds 50 percent only when the building exceeds 24,000 sq. ft. of floor area. In other words, buildings below this size are at high risk of not having an elevator at all, and reasonable costs (both in dollars and square feet consumed) are especially important to ensuring that one is provided. This number forms the basis of this code proposal: 24,000 sq. ft. of total floor area in a six-story building equates to roughly 20,000 sq. ft. above the ground floor. This assumed floor plate also aligns with limits found in other high-income countries.

Beyond the accessibility benefits of elevators themselves, the installation of an elevator in a building that would otherwise be a walk-up or a series of townhouses also triggers further accessibility within units themselves, given how the Fair Housing Amendments Act guidelines treat elevatored buildings as compared to walk-ups.

This proposed exception applies only to multifamily buildings up to six stories. It also excludes high-rise buildings, to avoid applying to buildings with very tall ceilings or mezzanines. Virginia lawmakers are growing concerned about the large cost premium for elevators in Virginia, and legislators in Washington State have [introduced bills](#) to remove the stretcher requirement for multifamily buildings of roughly the size covered by this exception, supported by the state AARP chapter.

Bibliography: The support for the reason statement comes from Stephen Smith's 122-page comparative report on elevators in North America and high-income peer countries, found here: <https://bit.ly/3XRH4lj>

The issues discussed in the reason statement are addressed on the following pages:

- 15: Per-capita elevator stock by country
- 16-18: Rarity of new walk-up apartment buildings in Western Europe
- 19-23: Ubiquity of new walk-up buildings in the United States
- 35-36: Installation costs for elevators in new buildings in the U.S. vs. Western Europe
- 42: Life safety considerations in buildings without elevators
- 43-55: In-depth discussion of cabin sizes (history, U.S. and foreign practices, cost implications)

Bills introduced in Washington State and Connecticut

- [1183.pdf](#)
- [5156.pdf](#)
- [C G A - Connecticut General Assembly](#)

Cost Impact: The code change proposal will decrease the cost

Estimated Immediate Cost Impact:

Substantial in instances where developers opt for a smaller elevator (at least \$10,000)

Estimated Immediate Cost Impact Justification (methodology and variables):

Interviews with those in the elevator industry and review of dozens of proposals for installation. Thanks to Stephen Smith for that work.

Estimated Life Cycle Cost Impact:

Decrease, with an uncertain magnitude (larger equipment costs more to maintain).

B3500-24

IBC: CHAPTER 35, 35 ASCE/SEI, ASCE/SEI Chapter 35

Proponents: Mark Dreyer, Commonwealth of Virginia - Department of General Services, representing Division of Engineering and Buildings (mark.dreyer@dgs.virginia.gov)

2024 International Building Code

CHAPTER 35 REFERENCED STANDARDS

ASCE/SEI

American Society of Civil Engineers Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191

Revise as follows:

7—22 (Including Supplements 1 and 2)	Minimum Design Loads and Associated Criteria for Buildings and Other Structures
24—14 24—24	Flood Resistant Design and Construction

Reason Statement:

Adopting these code updates in the Virginia Construction Code (VCC) would ensure that Virginia remains in step with the latest code developments toward achieving flood resiliency. It will support the Virginia Flood Protection Master Plan initiative with up-to-date engineering criteria that ensure the safety and durability of structures in Virginia's floodplains.

The ASCE 24-24 (Flood Resistant Design and Construction) is a major update to the ASCE 24-14 and represents a significant upgrade in the nation's flood loss reduction standards. It is based on the ASCE 7-22 (Minimum Design Loads and Associated Criteria for Buildings and Other Structures), Supplement 2 (88 pages), which was issued in May 2023. In ASCE/SEI 7-22 Supplement 2, the Flood Hazard Area is increased from the 100-year flood plain to the 500-year flood plain for Risk Categories II, III, and IV structures to improve the performance of structures subjected to flood events and to meet the target reliabilities of the standard. This change in approach, along with revised loading equations, is a significant departure from previous versions of ASCE 7. In addition to other updates in this supplement, the majority of Chapter 5, Flood Loads, and its commentary have been updated. Elevation requirements in the ASCE 24-24 now include consideration of sea level rise. An online pilot tool called the ASCE 24-24 Minimum Required Elevation Calculator has also been developed by the LSU Ag Center, which may eventually be incorporated into the ASCE Hazard Tool.

The updated standards are developed by the ASCE, a premier professional organization which is at the forefront of establishing standards for civil engineering design and practice worldwide, each standard representing a broad consensus of the related professional community. These standards are aimed at reducing flood losses, reported at ~ 45 billion annually nationwide (<https://www.floods.org/news-views/flood-mitigation/asce-24-24-delivers-major-update-to-flood-resistant-design-standards/>). In Virginia's coastal areas alone (Virginia Coastal Resilience Master Plan website - <https://www.dcr.virginia.gov/crmp/plan>), between 2020 and 2080, the number of residential, public, and commercial buildings exposed to an extreme coastal flood is projected to increase by almost 150% from 140,000 to 340,000, while annualized flood damages increase by 1,300% from \$0.4 to \$5.1 billion.

With the increasing frequency of severe storms observed over the past decade, the updated design standards will protect against 500-year flood events, which is a significant improvement to the 100-year flood hazard referenced in the previous versions.

Cost Impact: The code change proposal will increase the cost

The updated standards are aimed at making buildings and structures more resilient to floods and reducing overall flood losses. However, due to consideration of the 500-year floodplain and factoring in sea level rise in the elevation requirements, as well as additional design requirements, the construction of buildings in the 100- year floodplain would be impacted by a marginal increase in cost. Additionally, new buildings and substantial improvement projects in the 500-year floodplain would also now be required to comply with the flood resistant design and construction standards. (According to a flood impact study conducted as part of the VFPMP process, the number of buildings exposed to flooding in 2020, was 260,351 buildings in the 100-year floodplain and

427960 buildings in the 500-year floodplain, with the numbers projected to increase to 314,835 and 491,193 respectively by 2060.)

In the ASCE 24-24, Flood Design Class 3 elevation is increased to Base Flood Elevation (BFE) + 2 feet or Design Flood Elevation (DFE) whichever is higher, instead of BFE +1 feet in the 2014 code version. The new ASCE 7-22 S-2 provisions require Risk Category II, III, and IV structures in the 500-year floodplain to use floods with the Mean Recurrence Interval (MRI) of 500, 750, and 1000 years respectively to determine flood loads. Risk Category II structures, the most commonly used category, include one- and two-family buildings, low to medium occupancy businesses, or recreational facilities. Risk Category I structures, including agricultural buildings such as barns and sheds, could still follow 100-year flood provisions. The supplement also introduces a new requirement for relative sea level change as it relates to each individual structure. The sea level rise estimated over the service life of the structure must be added to the design's flood mitigation plans. (<https://www.structuremag.org/article/major-changes-to-asce-7-22-flood-loads/>)

Foundations walls, footings, columns, piles, connections are to be designed for sustained flood loads and erosion/scour using the newly specified flood design loads and load combinations. Existing slabs on the ground are not permitted to be elevated unless evaluated and strengthened.

From the perspective of ASCE codes, the average cost of constructing a building in the floodplain compared to buildings that are not in the floodplain can be higher by 10% to 30% depending on: elevation, structural design for flood loads, materials and design for floodproofing, with approximately 5% to 10% incremental cost attributable to the updated standards for buildings in the 100-year floodplain. At the lower range of these costs would be Risk Category I and II buildings with relatively lower elevation and structural design criteria, with Risk Category III and IV buildings occupying the higher end of the cost spectrum.

Attached Files

- **asce-24-24-guidance-structural-safety-flood-introduction.pdf**
<https://va.cdpaccess.com/proposal/1349/1963/files/download/939/>
- **asce 7-22.sup2.pdf**
<https://va.cdpaccess.com/proposal/1349/1963/files/download/938/>
- **2024 code cycle ASCE.docx**
<https://va.cdpaccess.com/proposal/1349/1963/files/download/929/>

EB202-24

VEBC: SECTION 202

Proponents: Eric Mays, representing Prince William County (emays@pwcgov.org)

2021 Virginia Existing Building Code

Revise as follows:

CHANGE OF OCCUPANCY. Either of the following shall be considered a *change of occupancy* where the current VCC requires a greater degree of structural strength, fire protection, means of egress, electrical scope, ventilation or sanitation than is existing in the current *building* or *structure*:

1. Any change in the occupancy classification of a *building* or *structure*.
2. Any change in the purpose of, or a change in the level of activity within, a *building* or *structure*.

Note: The use and occupancy classification of a *building* or *structure*, shall be determined in accordance with Chapter 3 of the VCC.

Reason Statement:

The Existing Building Code, Chapter 7 Change of Occupancy, Section 708 Electrical and Lighting, acknowledges the scope of electrical life safety requirements for special occupancies:

“708.1 Special occupancies.

Where a *building* undergoes a *change of occupancy* to one of the following special occupancies as described in NFPA 70, the electrical wiring and equipment of the *building* that contains the proposed occupancy shall comply with the applicable requirements of NFPA 70:

1. Hazardous locations.
2. Commercial garages, repair, and storage.
3. Aircraft hangars.
4. Gasoline dispensing and service stations.
5. Bulk storage plants.
6. Spray application, dipping, and coating processes.
7. Health care facilities.
8. Places of assembly.
9. Theaters, audience areas of motion picture and television studios, and similar locations.
10. Motion picture and television studios and similar locations.
11. Motion picture projectors.
12. Agricultural *buildings*.”

However, the Change of Occupancy definition does not currently include when the VCC requires a greater degree of electrical scope. Omitting electrical scope from the Change of Occupancy definition prevents the application of 708.1 Special Occupancies, which can create a potential life safety threat.

Two real world examples are:

- A general office space (Business Use) is converted to a doctor's office with multiple patient care rooms (Business Use). Based on a Code analysis, the proposed doctor's office is compliant with all current VCC requirements except for the electrical scope. However, electrical scope is not included in the Change of Occupancy definition. The result is the Code is allowing an office to be converted to patient care room without the critical life safety provisions for redundant grounding. An electrical micro-shock from 10 milliamps to 100 milliamps can cause ventricular fibrillation and may be fatal.
- A general warehouse space (Storage Use) is converted to a major repair garage (Storage Use). If the proposed scope of work for the alteration/repair permit application for the major repair garage does not raise to the level of the Change of Occupancy definition, the critical electrical scope and safety requirements can be omitted. Thereby allowing the creation of a hazardous unsafe condition.

Adding "electrical scope" to the Change of Occupancy definition will prevent the creation of unsafe electrical conditions that can result in injury and the loss of life.

Cost Impact: The code change proposal will increase the cost

The Virginia Existing Building Code is intended to provide the minimum life safety requirements for occupants. Omitting the electrical scope and safety

requirements from the Change of Occupancy definition fails to provide for minimum life safety and puts occupants at risk of injury or death.

EB601.5-24

VEBC: 601.5 (New)

Proponents: Dennis Hart, Fairfax County, representing VPMIA/VBCOA (dennis.hart@fairfaxcounty.gov)

2021 Virginia Existing Building Code

Add new text as follows:

601.5 Fuel Gas Piping. Where non-arc-resistant corrugated stainless steel tubing (CSST) is altered the piping system shall be bonded in accordance with the manufacturer's installation instructions and ANSI LC 1/CSA 6.26 Annex C.

Reason Statement: This proposal clarifies that when an existing fuel gas piping system containing non-arc-resistant corrugated stainless steel tubing (CSST) is altered, it must be bonded in accordance with the manufacturer's installation instructions. Many legacy installations of CSST predate current bonding requirements, and alterations to such systems present an opportunity to mitigate potential fire hazards associated with lightning-induced arcing. Requiring bonding during alterations ensures improved safety in accordance with manufacturer recommendations and aligns with current industry best practices, without imposing retroactive requirements on unaltered systems.

Cost Impact: The code change proposal will not increase or decrease the cost

This proposal will not decrease the cost of construction. Manufacturers of non-arc resistant CSST already require that non-arc resistant CSST be bonded.

EB601.6-24

VEBC: 601.6 (New)

Proponents: Elizabeth Bennett-Parker, representing Virginia House of Delegates District 5 (delebennett-parker@house.virginia.gov)

2021 Virginia Existing Building Code

Add new text as follows:

601.6 Baby and Toddler Diaper Changing Stations. For a level II alteration that includes renovations or alterations to a restroom or for a level I alteration, a baby and toddler diaper changing station shall also be provided as required by 1110.20. **Exception: Where the existing space is too small or insufficient to accommodate the installation of a changing station and the restroom size is not being changed as part of the alteration.**

Reason Statement: This proposal requires diaper changing stations be added when restrooms are already being renovated or altered, ensuring accessibility improvements are incorporated as part of planned construction rather than requiring retrofits later. This approach minimizes costs, since facilities are already undergoing upgrades, and ensures that improvements keep pace with modern standards. It also helps create more consistent access across older and newer buildings, rather than limiting availability to only newly constructed spaces. By aligning Virginia with a growing number of states including California, Illinois, Nevada, Arizona, Connecticut, Delaware, Oregon, Rhode Island, New Mexico, New York, Utah, Wisconsin, and Washington, DC that have adopted similar standards, the proposal supports families and improves public health and safety by reducing reliance on unsanitary or unsafe alternatives.

Cost Impact: The code change proposal will increase the cost

This proposal may lead to very minimal cost increases for the renovation or alteration of existing buildings as it would require the addition of baby changing tables in restrooms in some occupancies.

PM602.2(1)-24

VPMC: 602.2, 602.4

Proponents: Honore Tchou, representing Myself and fellow tenants (hwt2@georgetown.edu)

2021 Virginia Property Maintenance Code

Revise as follows:

602.2 Heat ~~Heating and cooling~~ supply. Every owner and operator of a Group R-2 apartment *building* or other residential *building* who rents, leases, or lets one or more *dwelling unit*, rooming unit, dormitory, or guestroom on terms, either expressed or implied, to furnish heat ~~heating or cooling~~ to the *occupants* thereof shall supply heat during the period from October 15 to May 1 to ~~heating or cooling~~ to maintain a temperature of not less than ~~68°F (20°C)~~ 65°F (18°C) and no more than 75°F (24°C) in all habitable rooms, bathrooms, and toilet rooms. ~~The code official may also consider modifications as provided in Section 104.5.2 when requested for unusual circumstances or may issue notice approving building owners to convert shared heating and cooling piping HVAC systems 14 calendar days before or after the established dates when extended periods of unusual temperatures merit modifying these dates.~~ Exception rooms throughout the year.

Exception: When the outdoor temperature is higher than the summer design temperature or below the winter outdoor design temperature for the locality, maintenance of the minimum room temperature shall not be required provided ~~that the heating or cooling~~ system is operating at its full design capacity. The winter outdoor design temperature for the locality shall be as indicated in Appendix D of the IPC. The summer design temperature for the locality shall be as indicated in the IECC.

Delete without substitution:

602.4 Cooling supply. ~~Every owner and operator of a Group R-2 apartment *building* who rents, leases, or lets one or more *dwelling units*, rooming units, or guestrooms on terms, either expressed or implied, to furnish cooling to the *occupants* thereof shall supply cooling during the period from May 15 to October 1 to maintain a temperature of not more than 77°F (25°F) in all habitable rooms. The code official may also consider modifications as provided in Section 104.5.2 when requested for unusual circumstances or may issue notice approving building owners to convert shared heating and cooling piping HVAC systems 14 calendar days before or after the established dates when extended periods of unusual temperatures merit modifying these dates.~~

Exceptions: ~~When the outdoor temperature is higher than the summer design temperature for the locality, maintenance of the room temperature shall not be required provided that the cooling system is operating at its full design capacity. The summer outdoor design temperature for the locality shall be as indicated in the IECC.~~

Reason Statement:

The reasoning for this proposal is three fold: (1) reduce ambiguities and misunderstandings in interpreting the current code, (2) align heating and cooling requirements to new realities of today's climate change, and (3) apply new scientific evidence that show the positive affects of cooler temperatures inside homes for tenant health and overall energy cost savings.

1. The proposal seeks to integrate and streamline the heating (602.2) and cooling code (602.4) while doing away with set dates to clarify and simplify the code. As currently written the code establishes two variables that create confusion for building operators and tenants. To illustrate, the heating code says, "... shall supply heat during the period from October 15 to May 1 to maintain a temperature of not less than 68F (20C) ..." This sentence creates confusion because there are two variables at play that can be at cross purposes with each other. Readers may also cherry pick the variable out of fear of being in non-compliance. For example, imagine it is April 10, and the temperature inside the building is 82F (exceedingly hot and uncomfortable). The operator may interpret the code to say that they must keep the heat on from October 15 to May 1 regardless of how hot it may be inside the building for tenants. Surely it cannot be the intention of the code to create a possible situation where operators keep running the heat regardless of whether their tenants could faint out of heat and exhaustion? And yet this is, in fact, happening in my very building where the operator refuses to turn off the heating system in April despite the temperatures being extremely elevated inside the building (see attachment - the inside of the building reached 82 while it was 74 degrees outside due to the continued use of the heating system). In addition, it is quite arbitrary that the heating system would be maintained all through April 30 at which point, at the stroke of midnight, the AC would be turned on as if the

weather transformed from winter cold to summer hot within one night. Finally, another reading of the sentence could argue that the dates should not be read as the operative part of the intent of the code in so far as it is the temperature inside the building that matters (whether it is achieved through heating, cooling, or other). If so, why not remove the dates? As such, the proposal recommends integrating the heat and cooling code and simplifying and clarifying the code by removing the dates and focusing on one variable -- the temperature range.

2. Recent weather patterns are becoming more erratic and seasons no longer adhere to traditional timetables. The current code handcuffs building operators with set dates that are no longer reflective of today's climate change. For example, the heating code says that heat must be maintained until May 1. However, as seen recently the weather turned excessively warm starting in early April, reaching over 80 degrees for many days. Yet heating continued to be deployed leading to a tremendous waste of money and gas, while making tenants uncomfortable and increasing the carbon footprint. As such, the proposal (in line with rationale 1) recommends removing the set dates to provide flexibility for operators to use either heating, cooling, or no system to maintain a general temperature range within the building of 65-75 degrees.

3. Recent scientific evidence shows that excessive heat particular at night while sleeping can be detrimental to health. See the attached files, "The Best Temperature for Sleep" and "How Your Home Temperature Can Affect Your Health." As such, this proposal recommends lowering the minimum floor to 65F degrees and the maximum ceiling to 75F for more positive health effects for tenants while also saving costs in heating bills.

If accepted, the proposal will provide flexibility for building operators to stop blindly following preset dates and be more responsive to tenants and their comfort and health based on weather forecasts and changing patterns. A plausible outcome for a building operator could be that during the winter months an operator would turn on the heating system; during shoulder season, the operator would turn off the heating system; and during the summer months turn on the cooling system, as long as the temperature range is achieved. This way year to year variations can be taken into account by an increasingly empowered building operator freed from a preset timetable.

Cost Impact: The code change proposal will decrease the cost

I do not have statistics to back this up, but common sense would say that heating and cooling bills should go down as building operators are more empowered to turn off the heating or cooling system when it is no longer desirable.

Attached Files

- **Attachment - Excessive Heat.pdf**
<https://va.cdpaccess.com/proposal/1272/1849/files/download/923/>
- **Turn off boilers.pdf**
<https://va.cdpaccess.com/proposal/1272/1849/files/download/922/>
- **The Best Temperature for Sleep.pdf**
<https://va.cdpaccess.com/proposal/1272/1849/files/download/920/>
- **How Your Home Temperature Can Affect Your Health.pdf**
<https://va.cdpaccess.com/proposal/1272/1849/files/download/919/>

PM602.2(2)-24

VPMC: 602.2, 602.3, 602.4; VCC: 104.1, 2801.1.1, 2801.1.2

Proponents: Gregg Fields, representing the City of Alexandria (Gregg.Fields@alexandriava.gov), Earl Weaver, representing VBCOA (Earl.Weaver@rva.gov), Delegate Elizabeth Bennett-Parker, House District 5 (DelEBennett-Parker@house.virginia.gov)

2021 Virginia Property Maintenance Code

Revise as follows:

602.2 Heat supply. Every *owner* and *operator* of a Group R-2 apartment *building* or other residential *building* who rents, leases, or lets one or more *dwelling unit*, rooming unit, dormitory, or guestroom on terms, either expressed or implied, to furnish heat to the *occupants* thereof shall supply heat during the period from October 15 to ~~May 1~~ April 15 to maintain a temperature of not less than 68°F (20°C) in all habitable rooms, bathrooms, and toilet rooms. The *code official* may also consider modifications as provided in Section 104.5.2 when requested for unusual circumstances or may issue notice approving *building owners* to convert shared heating and cooling piping HVAC systems ~~14 calendar days~~ before or after the established dates when extended periods of unusual temperatures merit modifying these dates.

Exception: When the outdoor temperature is below the winter outdoor design temperature for the locality, maintenance of the minimum room temperature shall not be required provided that the heating system is operating at its full design capacity. The winter outdoor design temperature for the locality shall be as indicated in ~~Appendix D of the IPC~~ the applicable building code.

602.3 Occupiable work spaces. Indoor occupiable work spaces shall be supplied with heat during the period from October 1 ~~15~~ to ~~May~~ April 15 to maintain a minimum temperature of 65°F (18°C) during the period the spaces are occupied.

Exceptions:

1. Processing, storage, and operation areas that require cooling or special temperature conditions.
2. Areas in which persons are primarily engaged in vigorous physical activities.

602.4 Cooling supply. Every *owner* and *operator* of a Group R-2 apartment *building* who rents, leases, or lets one or more *dwelling units*, rooming units, or guestrooms on terms, either expressed or implied, to furnish cooling to the *occupants* thereof shall supply cooling during the period from May ~~15~~ 1 to October 1 to maintain a temperature of not more than 77°F (25°F) in all habitable rooms. The *code official* may also consider modifications as provided in Section 104.5.2 when requested for unusual circumstances or may issue notice approving *building owners* to convert shared heating and cooling piping HVAC systems ~~14 calendar days~~ before or after the established dates when extended periods of unusual temperatures merit modifying these dates.

Exceptions: When the outdoor temperature is higher than the summer design temperature for the locality, maintenance of the room temperature shall not be required provided that the cooling system is operating at its full design capacity. The summer outdoor design temperature for the locality shall be as indicated in the ~~ICC~~ applicable building code.

2021 Virginia Construction Code

Revise as follows:

104.1 Scope of enforcement. This section establishes the requirements for enforcement of the USBC in accordance with § 36-105 of the Code of Virginia. Enforcement of the provisions of the USBC for *construction* and rehabilitation shall be the responsibility of the *local building department*. Whenever a county or municipality does not have such a building department, the *local governing body* shall enter into an agreement with the *local governing body* of another county or municipality or with some other agency, or a state agency approved by DHCD for such enforcement. For the purposes of this section, towns with a population of less than 3,500 may elect to administer and enforce the USBC; however, where the town does not elect to administer and enforce the code, the county in which the town is situated shall administer and enforce the code for the town. In the event such town is situated in two or more counties, those counties shall administer and enforce the USBC for that portion of the town situated within their respective boundaries.

However, upon a finding by the *local building department*, following a complaint by a tenant of a residential dwelling unit that is the

subject of such complaint, that there may be a violation of the unsafe *structures* provisions of Part III of the *Virginia Uniform Statewide Building Code*, also known as the “ *Virginia Property Maintenance Code* ,” or the “ VPMC ,” the *local building department* shall enforce such provisions.

If the *local building department* receives a complaint that a violation of the VPMC exists that is an immediate and imminent threat to the health or safety of the owner, tenant, or occupants of any *building or structure*, or the owner, occupant, or tenant of any nearby *building or structure*, and the owner, occupant, or tenant of the building or structure that is the subject of the complaint has refused to allow the local building official or his agent to have access to the subject *building or structure*, the local building official or his agent may make an affidavit under oath before a magistrate or a court of competent jurisdiction and request that the magistrate or court grant the local building official or his agent an inspection warrant to enable the building official or his agent to enter the subject building or structure for the purpose of determining whether violations of the VPMC exist. After issuing a warrant under this section, the magistrate or judge shall file the affidavit in the manner prescribed by § 19.2-54 of the Code of Virginia. After executing the warrant, the local building official or his agents shall return the warrant to the clerk of the circuit court of the city or county wherein the inspection was made. The local building official or his agent shall make a reasonable effort to obtain consent from the *owner*, occupant, or tenant of the subject *building or structure* prior to seeking the issuance of an inspection warrant under this section.

The *local governing body* shall, however, inspect and enforce the provisions of the VPMC for elevators, escalators, and related conveyances, except for elevators in single-family and two-family homes and townhouses. Such inspection and enforcement shall be carried out by an agency or department designated by the *local governing body*. The local governing body shall also enforce the provisions of the VPMC regarding heating and cooling supply if the local governing body has elected not to enforce the VPMC, pursuant to subdivision C of Section 36-105 of the Code of Virginia.

Delete without substitution:

~~**2801.1.1 Required heating in dwelling units.** Heating facilities shall be required in every dwelling unit or portion thereof which is to be rented, leased or let on terms, either expressed or implied, to furnish heat to the occupants thereof. The heating facilities shall be capable of maintaining the room temperature at 65°F (18°C) during the period from October 15 to May 1 during the hours between 6:30 a.m. and 10:30 p.m. of each day and not less than 60°F (16°C) during other hours when measured at a point 3 feet (914 mm) above the floor and 3 feet (914 mm) from the exterior walls. The capability of the heating system shall be based on the outside design temperature required for the *locality* by this code.~~

~~**2801.1.2 Required heating in nonresidential structures.** Heating facilities shall be required in every enclosed occupied space in nonresidential structures. The heating facilities shall be capable of producing sufficient heat during the period from October 1 to May 15 to maintain a temperature of not less than 65°F (18°C) during all working hours. The required room temperature shall be measured at a point 3 feet (914 mm) above the floor and 3 feet (914 mm) from the exterior walls.~~

~~Processing, storage and operation areas that require cooling or special temperature conditions and areas in which persons are primarily engaged in vigorous physical activities are exempt from these requirements.~~

Reason Statement:

The Department of Housing and Development convened a stakeholder advisory group to evaluate temperature regulations in the Uniform Statewide Building Code (USBC), particularly the Virginia Property Maintenance Code (VPMC) provisions related to the temperatures required and the dates the temperatures are required to be maintained in tenant occupied dwelling units. The primary issue at hand is the transition from heating to cooling in the spring. There are increasing concerns that hotter weather is arriving earlier and building owners are not able to switch over to cooling soon enough. The problems appear to be common in older buildings. While newer buildings typically have systems that can quickly and easily switch from heating to cooling, older buildings with two-pipe and four-pipe systems are not able to quickly or easily switch between heating and cooling making it difficult for building owners to meet the minimum requirements and maintain comfortable temperatures for residents. This proposal was developed based on discussions and feedback during a meeting of the Heating and Cooling Study Group and was submitted in cdpVA on behalf of the members of the study group that support the proposal.

Summary of changes in the proposal:

- Moves the end of the heating period back two weeks from May 1st to April 15th and the beginning of the cooling period back from

May 15th to May 1st. Many stakeholders have commented that localities are experiencing warmer outdoor temperatures in late April and early May than in previous years and indoor temperatures in residential units are becoming unmanageable due to lack of cooling.

- Eliminates the set transitional period of 14 days, giving code officials the flexibility, utilizing the existing USBC code modification process, to approve building owners to convert shared heating and piping HVAC systems as needed for both heating and cooling supply. This added flexibility eliminates the challenges of a "one size fits all" approach that has not shown to work due to Virginia's diverse climates and geography.
- Marries the requirements for heating of occupiable workspaces to the same heating periods as residential units.
- Adds language to Chapter 1 of Part I of the USBC that clarify that the building official has the authority to enforce the (VPMC) requirements related to heating and cooling in rental units, regardless of whether or not the locality has chosen to enforce the VPMC.
- The references in the exceptions to "Appendix D of the IPC" and to the "IECC", related to the winter and summer outdoor design temperatures, were replaced with "the applicable building code" recognizing varying design conditions and equipment that may have been installed in existing buildings at the time of construction based on what the code required at that time.
- Removes unenforceable language in Chapter 28 of the Virginia Construction Code related to heating requirements in dwelling units and nonresidential structures. The intent of these requirements is covered by the changes proposed to Section 104.1

Cost Impact: The code change proposal will not increase or decrease the cost

The code change proposal will not increase or decrease the cost of construction.

FP405.5-24

SFPC: 405.5

Proponents: Elizabeth Bennett-Parker, representing Virginia House of Delegates District 5 (delebennett-parker@house.virginia.gov)

2021 Virginia Statewide Fire Prevention Code

Revise as follows:

405.5 Time. Drills shall be held at unexpected times and under varying conditions to simulate the unusual conditions that occur in case of fire.

Exceptions:

1. In severe climates, the *fire code official* shall have the authority to modify the emergency evacuation drill termination points and frequency.
2. In Groups I-1, I-2, I-3 and R-4, where staff-only emergency evacuation drills are conducted after visiting hours or where care recipients are expected to be asleep, a coded announcement shall be an acceptable alternative to audible alarms.
3. **Prior notification of emergency evacuation drills shall be given by building management to tenants in Group R-2 occupancies no less than 3 days and no more than 14 days in advance of any scheduled fire drill.**

Reason Statement: This proposal ensures that building management provides tenants with advance notice (between 3 and 14 days) of planned emergency evacuation drills. Advance notification is critical for residents with disabilities, including those with autism and related sensory sensitivities, who may experience distress or disorientation from loud alarms and unexpected disruptions. Clear notice helps tenants prepare appropriately, promotes equitable participation in safety procedures, and supports the overall effectiveness of emergency preparedness.

Cost Impact: The code change proposal will not increase or decrease the cost

The proposal provides a very minor additional requirement for when building management must notify tenants, as they already often do in this circumstance and are required to do in other circumstances. It will not lead to cost changes.

FP601.2-24

IFC: 601.2; SFPC: 110.1; IFC: SECTION 202 (New)

Proponents: Gerry Maiatico, County of Warren & Virginia Fire Prevention Association, representing Virginia Fire Prevention Association (gmaiatico@warrencountyfire.com); Austin Cucciardo, Warren County Dept of Fire and Rescue Services, representing Virginia Fire Prevention Association (acucciardo@warrencountyfire.com)

2024 International Fire Code

Revise as follows:

601.2 Hazard abatement. Operations or conditions deemed unsafe or hazardous by the *fire code official* shall be abated. Equipment, appliances, materials and systems that are modified or damaged and constitute an electrical shock or fire hazard shall not be used. When in the fire code official's opinion, there is actual or potential danger to the occupants or extreme risk of fire to the property due to the improper installation, use and/or maintenance of equipment, appliances, or the building *utilities* and violations of this code have been found, the fire code official may order the *utilities* service to be disconnected or terminated to the affected equipment, appliance, building or portions thereof. Abatement of hazards, repairs or reconnection of *utilities* to the affected equipment, appliance, building or portions thereof shall be done in accordance with the applicable building code.

2021 Virginia Statewide Fire Prevention Code

Revise as follows:

110.1 General. The fire official shall order the following dangerous or hazardous conditions or materials found to be noncompliant with provisions found within the subsequent sections of this code to be removed or remedied in accordance with the SFPC:

1. Dangerous conditions which are liable to cause or contribute to the spread of fire in or on said premises, *building* or structure, or to endanger the occupants thereof.
2. Conditions which would interfere with the efficiency and use of any fire protection equipment.
3. Obstructions to or on fire escapes, stairs, passageways, doors or windows, which are liable to interfere with the egress of occupants or the operation of the fire department in case of fire.
4. Accumulations of dust or waste material in air conditioning or ventilating systems or grease in kitchen or other exhaust ducts.
5. Accumulations of grease on kitchen cooking equipment, or oil, grease or dirt upon, under or around any mechanical equipment.
6. Accumulations of rubbish, waste, paper, boxes, shavings, or other combustible materials, or excessive storage of any combustible material.
7. Hazardous conditions arising from defective or improperly used or installed ~~electrical wiring, equipment~~ equipment, appliances or ~~appliances~~ any portion of a building's utilities.
8. Hazardous conditions arising from defective or improperly used or installed equipment for handling or using combustible, explosive or otherwise hazardous materials.
9. Dangerous or unlawful amounts of combustible, explosive or otherwise hazardous materials.
10. All equipment, materials, processes or operations which are in violation of the provisions and intent of this code.

2024 International Fire Code

Add new text as follows:

New Definition. Utilities. The essential services that enable a building, equipment or an appliance to function effectively.

Reason Statement:

Section 110.1 (7) of the SFPC provides language to render a unsafe condition due to *hazardous conditions arising from defective or improperly used or installed electrical wiring, equipment, or appliances*. There are no immediate actions outside of section "601.2 Hazard Abatement" and "601.2.1 Correction of Unsafe Condition" that provides provisions for immediate safety actions such as securing and/or terminating power or other essential services to the equipment, appliance, building or portions thereof. Only the language "shall not be used".

This proposal will afford the Fire Code Official to cause for the immediate termination and/or disconnection of a buildings utilities for the effected equipment, appliance, building or portions thereof.

This proposal defines "utilities" while amending the unsafe structure 110.1 (7) to include all the buildings utilities and not limited this provision to electrical in nature.

Similar language is included in section 111.1 if the IFC, which is deleted and replaced with VA Chapter 1. This proposal also ensures that all corrective actions and/or reconnection of the utilities is done so in accordance with the applicable building code.

Cost Impact: The code change proposal will not increase or decrease the cost

No impact forseen

FP807.2-24

SFPC: 807.2, 807.3

Proponents: Andrew Milliken, representing Stafford County Fire Marshal's Office (amilliken@staffordcountyva.gov)

2021 Virginia Statewide Fire Prevention Code

Revise as follows:

807.2 Combustible decorative materials. In Groups A, B, E, I, M and R-1 and in dormitories in Group R-2, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from doors, walls or ceilings shall comply with Section 807.3 and shall not exceed 10 percent of the specific door, wall or ceiling area to which such materials are attached.

Fixed or movable walls and partitions, paneling, wall pads and crash pads applied structurally or for decoration, acoustical correction, surface insulation or other purposes shall be considered to be *interior finish*, shall comply with Section 803 and shall not be considered *decorative materials* or furnishings.

Exceptions:

1. In auditoriums in Group A, the permissible amount of curtains, draperies, fabric hangings, and similar combustible decorative materials suspended from walls or ceilings shall not exceed 75 percent of the aggregate wall area where the *building* is equipped throughout with an *approved* automatic sprinkler system in accordance with the applicable NFPA 13 standard and where the material is installed in accordance with the *applicable building code*.
2. In Group R-2 dormitories, within sleeping units and dwelling units, the permissible amount of curtains, draperies, fabric hangings, and similar decorative materials suspended from walls or ceilings shall not exceed 50 percent of the aggregate wall areas where the *building* is equipped throughout with an *approved* automatic sprinkler system installed in accordance with the applicable NFPA 13 standard.
3. In Group B and M occupancies, the amount of combustible fabric partitions suspended from the ceiling and not supported by the floor shall comply with Section 807.3 and shall not be limited.
4. The 10-percent limit shall not apply to curtains, draperies, fabric hangings and similar combustible decorative materials used as window coverings.
5. In occupancies equipped throughout with an approved automatic sprinkler system installed in accordance with the applicable NFPA 13 standard, combustible decorative materials on exit access doorways shall not exceed 50% of the surface area of the door and shall not obstruct the door operation.

807.3 Acceptance criteria and reports. Where required to exhibit improved fire performance, curtains, draperies, fabric hangings and other similar combustible decorative materials suspended from doors, walls or ceilings shall be tested by an *approved* agency and meet the flame propagation performance criteria of Test Method 1 or Test Method 2, as appropriate, of NFPA 701 or exhibit a maximum rate of heat release of 100 kW when tested in accordance with NFPA 289, using the 20 kW ignition source. Reports of test results shall be prepared in accordance with the test method used and furnished to the *fire code official* upon request.

Reason Statement: This proposal is to provide clarification regarding the limits of combustible decorative materials on doors. It makes it clear that combustible decorative materials on doors are subject to the same regulations and limitations applied to walls and ceilings. It also provides a new exception for exit access doors that is consistent with the existing exception in SFPC 807.4 allowing up to 50% of a door to be covered with combustible artificial decorative vegetation when the facility is provided with an approved fire sprinkler system.

Cost Impact: The code change proposal will not increase or decrease the cost

This proposal is a clarification that doors are included in the requirements for combustible decorative materials on walls and does not increase costs.

FP901.6.3-24

SFPC: 901.6.3

Proponents: Andrew Milliken, representing Stafford County Fire Marshal's Office (amilliken@staffordcountyva.gov)

2021 Virginia Statewide Fire Prevention Code

Revise as follows:

901.6.3 Records. Records of all system inspections, tests and maintenance required by the referenced standards shall be maintained. Records shall be maintained on the premises or other *approved* location for not less than 3 years, or a different period of time where specified in this code or referenced standards. Records shall be made available for inspection by the *fire code official*, and a copy of the records shall be provided to the *fire code official* on request.

Reason Statement: The proposed change is restore language from the model code that was removed from the SFPC in the 2015 edition. The change clarifies the minimum duration that records are to be retained and that they are to be made available to the Fire Official upon request. The added language is identical to the language outlined in section 110.3 of the 2024 International Fire Code.

Cost Impact: The code change proposal will not increase or decrease the cost

The proposal addresses how existing records are to be retained and made available to the Fire Official so there is no cost impact.

FP906.1-24

SFPC: 906.1

Proponents: Morgan Hurley, Senez Consulting, Inc., representing Fire Equipment Manufacturers' Association (mhurley@senezco.com)

2021 Virginia Statewide Fire Prevention Code

Revise as follows:

906.1 Where required. Portable fire extinguishers shall be installed in all of the following locations:

- ~~1. In Groups A, B, E, F, H, I, M, R-1, R-4, and S occupancies.~~

Exceptions:

- ~~1. In Groups A, B, and E occupancies equipped throughout with quick response sprinklers, portable fire extinguishers shall be required only in locations specified in Items 2 through 6.~~
 - ~~2. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations and the access to such extinguishers shall be permitted to be locked.~~
 4. In Group I-3 occupancies, portable fire extinguishers shall be permitted to be located at staff locations, and the access to such extinguishers shall be permitted to be locked.
2. Within 30 feet (9144 mm) distance of travel from commercial cooking equipment and from domestic cooking equipment in Group I-1; I-2, Condition 1; and R-2 college dormitory occupancies.
 3. In areas where *flammable* or *combustible liquids* are stored, used or dispensed.
 4. On each floor of structures under construction, except Group R-3 occupancies, in accordance with Section 3316.1.
 5. Where required by the sections indicated in Table 906.1.
 6. Special-hazard areas, including but not limited to laboratories, computer rooms and generator rooms, where required by the *fire code official*.

Exception: Portable fire extinguishers are not required at normally unmanned Group U occupancy buildings or structures where a portable fire extinguisher suitable to the hazard of the location is provided on the vehicle of visiting personnel.

Note: In existing buildings, whether fire extinguishers are needed is determined by the *USBC* or other code in effect when such buildings were constructed.

Reason Statement:

The International Building Code/International Fire Code included an exception for portable fire extinguishers in A, B and E occupancies equipped throughout with quick response sprinklers through the 2009 edition. This exception was identical to current (2021) VCC/VSFPC 906.1, exception 1.

The exception for A, B and E occupancies equipped throughout with quick response sprinklers was removed from the IBC/IFC beginning with the 2012 editions. However, Virginia has maintained this exception as a state amendment. This proposal seeks to align the VCC/VSFPC requirement for portable fire extinguishers with that in the IBC/IFC. The code change proposal that removed this exception from the IBC (F94-09/10) stated, in part: "*Fire extinguishers have historically been the first line of defense for small, controllable fires. They are intended to be used for fires of limited size and easily controlled. If a fire is discovered in its early stages the most effective means of protecting life and preventing property loss is to sound an alarm and then to control and/or extinguish the incipient stage fire with a portable fire extinguisher. To simply wait for the fire to grow to size large enough for a sprinkler head to activate is contrary to lessons and guidance from the fire service and fire protection professionals. Since fire extinguishers provide a first line of defense vs. sprinklers, it remains unclear as to the justification for this exception. In that light, the Exception 1 to Section 906.1 should be deleted.*"

This code change would also require portable fire extinguishers in R-2 occupancies, which is required by the IBC, but is not required by the VCC (the VCC only requires portable fire extinguishers in R-1 and R-4 residential occupancies.) However, the IBC/IFC have exceptions (exception 1) that allow the extinguishers to be located in dwelling units.

Research conducted on behalf of the Fire Equipment Manufacturer's Association ("*A Review of the Impact of Fire Extinguishers in Reducing the Carbon Footprint of Building Fires*", dated March 27, 2023) found that 4.5% of residential fires that were not reported to the fire department were extinguished by

occupants who used portable fire extinguishers. In industrial occupancies, 38% of fires were suppressed using portable fire extinguishers. These statistics show that portable fire extinguishers can effectively be used to suppress small fires by building occupants. The current VCC/VSFPC 906.1, exception 2 (which allows portable fire extinguishers in I-3 occupancies to be located in locked staff areas) is proposed to be maintained as a new exception 4 to VCC/VSFPC 906.1.

Cost Impact: The code change proposal will increase the cost

This proposal would have a minor cost increase by requiring portable fire extinguishers in A, B, and E occupancies equipped throughout with quick response sprinklers and R-2 occupancies.

FP1208-24

SFPC: 1208 (New), 1208.1 (New), 1208.2 (New), 1208.3 (New), 1208.4 (New)

Proponents: Ernest Little, Retired Prince William County Department of Fire and Rescue, representing Myself (prwmfm4@aol.com)

2021 Virginia Statewide Fire Prevention Code

Add new text as follows:

1208 Electric Vehicle Charging Stations

1208.1 General. Where provided emergency shutoffs shall be provided or required by the applicable building code shall be maintained.

1208.2 Emergency Shutoff. Where provided emergency shutoffs shall be provided as required by the applicable building code shall be maintained.

1208.3 Impact Protection. Electric vehicle charging stations shall be protected against physical damage, in an approved manner, and be maintained in accordance with Section 312 where charging stations are located in areas near parking areas, multiple charging stations, or other areas where there is a potential for vehicle impacts.

1208.4 Emergency Procedures. Approved emergency procedures shall be maintained on a sign at an approved and conspicuous location of the charging station(s). The sign shall read: IN CASE OF EMERGENCY

1. IF POSSIBLE, DISABLE THE VEHICLE TO PREVENT MOVEMENT
2. USE THE ELECTRIC VEHICLE EMERGENCY SHUT OFF
3. REPORT THE INCIDENT TO THE FIRE DEPARTMENT
4. FIRE DEPARTMENT PHONE NUMBER: _____
5. FACILITY ADDRESS: _____

Reason Statement:

The Virginia Construction (VCC) and Virginia Statewide Fire Prevention Code (SFPC) lack an emergency disconnecting requirement similar to that required by NFPA 30A at motor fuel dispensing facilities. Charging stations supplying DC power to electric vehicles (EVs) are available to the general public along major highways and have become more available in public parking garages, public parking lots, and workplace parking lots. When an emergency occurs at one of these EV charging stations, first responders need a quick means to disconnect power in order to mitigate the emergency safely. The proposed amendments are intended to correct a previously unknown existing hazard. The proposed amendments intend to offer the public a benefit that would lessen a recognized (known) hazard or ameliorate a continuing dangerous condition or situation.

The 2024 International Fire Code references the National Fire Protection Association (NFPA) 2023 National Electrical Code (NEC) which had a tentative interim amendment (TIA) regarding vehicle impact protection and emergency shutoffs. This TIA was considered by the National Fire Protection Association in development of the 2026 NEC) and emergency disconnects for electric vehicle charging stations were added to the code requirements. The 2026 NEC will be published in October of 2025. The impact protection provision of the amendments brings an existing requirement of the NEC for electrical equipment exposed to vehicle impact into the VCC to make the requirement easier to access for installers of electric vehicle charging equipment.

Currently, shutdown controls are required for both refueling stations and DC charging stations; however, access to these shutdowns is quite different and create unnecessary and potentially lethal intervention hazard delays for first responders who are called to address emergencies at DC charging stations.

Concerns:

- (1) First responders, who respond to emergencies at DC Charging stations do so in an electrical energy environment that can exceed normal household voltages. These first responders are not trained, nor equipped, to operate in electrical hazard areas without a shut off or lock out device being available.
- (2) First responders do not have tools capable of ensuring that the DC energy hazard has been controlled. Unlike AC hazards, where tools have been made available to first responders that allow them to gather some information about the energy status of electrical equipment, there are very few tools available to first responders for ascertaining DC energy status.
- (3) While not required at EV charging stations, some vendors are installing emergency shut offs and they are being installed in locations that are not safe or readily accessible for first responders. Some are being installed at the actual charging device location rather than at a safe location away from the hazard area. While well intended, the installation of these devices requires first responders to work in the hazard area to operate them. NFPA 30A requires that the e-stop be located at least 20 feet away from the hazard.
- (4) EV Charging station electrical shut offs are not labelled and are not readily accessible and Energy disconnects (per code) are allowed to be in locked cabinets which are often not labeled. This creates confusion and frustration for first responders attempting to address the electrical hazards present. Since emergency shut offs have been present at refueling stations since 1984, first responders look for emergency shut offs where they have seen at refueling stations.

Cost Impact: The code change proposal will increase the cost

There will be cost associated with the installation of impact protection, disconnecting means, and the required materials. The cost could be offset by the reduction in damaged components due to vehicle impact and the possible injury to first responders due to exposure to live electrical components in mitigating events associated with malfunction or misuse of electric vehicle charging equipment.

FP4101.9-24

IFC: 4101.9, 4101.9.1 (New), 4104.1, 4104.3, 4104.4, 4104.5, 4104.5.1

Proponents: Andrew Milliken, representing Stafford County Fire Marshal's Office (amilliken@staffordcountyva.gov)

2024 International Fire Code

4101.9 Cooking operations. Portable cooking equipment using combustible oils or solids shall comply with all of the following:

1. A noncombustible lid shall be immediately available. The lid shall be of sufficient size to cover the cooking well completely.
2. Equipment shall be placed on a noncombustible surface.
3. A portable fire extinguisher for protection appropriate to the cooking media shall be provided at a location *approved* by the *fire code official*.

Add new text as follows:

4101.9.1 Separation From Tents or Structures. Cooking appliances or devices that produce sparks or grease-laden vapors or flying embers (firebrands) shall not be used within 10 feet (3048 mm) of a tent or structure.

Exceptions:

1. Designated cooking tents not occupied by the public when approved by the fire code official.
2. Tents or structures where cooking appliances are protected with an automatic fire-extinguishing system in accordance with the applicable building code.

Revise as follows:

4104.1 Portable fuel-fired cooking appliances. Portable fuel-fired cooking appliances shall be permitted to be used in ~~all occupancies in accordance with this section.~~

4104.3 Indoor cooking. ~~Portable fuel-fired cooking appliances used indoors shall not be used indoors.~~ Portable fuel-fired cooking appliances in tents and membrane structures shall not be located within 10 feet (3048 mm) of exits or combustible materials.

Exception: Cooking operations in accordance with section 4104.6.

4104.4 Cooking operations Venting. ~~Cooking that produces sparks or grease-laden vapors shall not be performed within 10 feet (3048 mm) of a tent or membrane structure except where the following conditions are met:~~

- ~~1- Cooking devices shall be isolated from the public.~~
- ~~2- Cooking devices shall be maintained and used according to the manufacturer's instructions.~~

Exception: ~~Designated cooking tents with an automatic sprinkler system installed in accordance with Section 903.3.1.1.~~

Gas, liquid, and solid fuel-burning equipment designed to be vented shall be vented to the outside air as specified by the applicable building code and shall be approved. Such vents shall be equipped with approved spark arresters where required. Where vents or flues are used, all portions of the tent or membrane structure shall be not less than 12 inches (305 mm) from the flue or vent.

4104.5 Separation of cooking tents. ~~Tents with sidewalls or drops~~ where cooking is performed shall be separated from other non-cooking tents or membrane structures by not less than 10 feet (3048 mm).

Exception: Small tents limited to 100 square feet (9.3 m²) that are accessory to the cooking operations of the cooking tent and are not occupied by the public.

4104.5.1 Groups of cooking tents.. Cooking tents shall be permitted to be placed side by side where the following conditions are met:

1. The area of the cooking tents has a maximum area of 700 square feet (65 m²).
2. Each grouping of tents shall have a fire break clearance of at least 12 feet (3658 mm).
- ~~3. A fire access aisle separating rows of cooking tents has a minimum width of 16 feet (4877 mm) clear.~~

Reason Statement:

The purpose of this proposal is to revise six sections of the new Chapter 41 in the 2024 International Fire Code to improve the implementation and transition to this chapter for Virginia.

Section 4101.9 is provided for context and no changes are proposed.

Section 4101.9.1 is proposed as a new section that restores the content from section 3106.5.1 and 3107.12.6 from the current 2021 Virginia Statewide Fire Prevention Code. This proposal does reduce the required separation distance from 20ft to 10ft for consistency with similar requirements in section 4104 but keeps the exceptions consistent with those in the current 2021 Virginia Statewide Fire Prevention Code. This section is proposed to be located in 4101.9 since it applies to cooking operations beyond just those regulated by section 4104.

Section 4104.1 is revised to simplify the scope of this section and avoid confusion arising from interpreting the phrase, "shall be permitted to be used in all occupancies" as permission to use any portable fuel-fired cooking appliances inside of all occupancies. As noted below, section 4104 provides no requirements for carbon monoxide detection or ventilation making the indoor use of most portable fuel-fired cooking appliances particularly hazardous and dangerous for occupants.

Section 4104.3 is revised to restore the language to the context that it was derived from in section 3107.12.3 of the 2021 Virginia Statewide Fire Prevention Code which only applies to tents and membrane structures. The proposal also emphasizes that the use of portable fuel-fired cooking appliances are prohibited inside of buildings. Similar to how using portable generators or other portable fuel-fire equipment inside buildings is hazardous to occupants, permitting the use of a portable fuel-fired grills, turkey fryers, or other fuel-fire cooking appliances inside of a building is dangerous and should not be suggested as acceptable by this section. This change is particularly important for section 4104 since there are no additional requirements to ensure proper ventilation and protections for carbon monoxide detection for the indoor use of portable fuel-fire cooking appliances. The proposal also includes a new exception highlighting acceptable indoor cooking arrangements when authorized by 4104.6 (approved arrangements for warming of food, cooking demonstrations or similar operations that use solid flammables, butane, or other similar devices that do not pose an ignition hazard).

Section 4104.4 is replaced by the language in section 3107.12.2 of the 2021 Virginia Statewide Fire Prevention Code which has been deleted for portable appliances in the 2024 International Fire Code. Since the original content of 4104.4 will now be addressed by 4101.9.1, the original language is deleted and this section has been selected as the location to restore the important language regarding the appropriate arrangement of ventilation where required for portable fuel-fired cooking appliances.

Section 4104.5 and 4104.5.1 are proposed to replace the current Virginia amendment to provide the added flexibility for cooking tents as provided in the 2024 International Fire Code. This additional flexibility is important for arrangements such as fairs or events where tents are often in rows or are grouped together. The proposal keeps the Virginia amendment language to allow this section to apply to all cooking tents - with or without sides or drops. It also does not include item 3 from 4104.5.1 which would create a conflict with section 503 for the minimum width of fire access routes. Fire apparatus access routes for tents are already regulated by 3103.7.1 and section 503.

Cost Impact: The code change proposal will not increase or decrease the cost

The proposal restores current 2021 Virginia Statewide Fire Prevention Code language in the transition to a new Chapter and does not impact cost.

FP4106.1.3-24

SFPC: 4106.1.3 (New); IFC: SECTION 202 (New)

Proponents: Gerry Maiatico, County of Warren & Virginia Fire Prevention Association, representing Virginia Fire Prevention Association (gmaiatico@warrencountyfire.com)

2021 Virginia Statewide Fire Prevention Code

Add new text as follows:

4106.1.3 Mobility . Mobile food preparation vehicles shall be moveable, easily transported, or relocated without excessive effort. Mobile food preparation vehicles shall not be utilized as permanent structures by removing wheels, surrounded by decks/porches, permanently affixing to *utilities* or placing the mobile food preparation vehicle in such a manner as to prohibit the mobility of the device. Exception: Mobile food preparation vehicles that have been modified or connected to *utilities* in accordance with the applicable building code.

2024 International Fire Code

Add new text as follows:

New Definition. *Utilities.* The essential services that enable a building, equipment or an appliance to function effectively.

Reason Statement:

Chapter 2 of the SFPC defines the MFPV as a “vehicles, covered trailers, carts, and enclosed trailers, **or other moveable devices**”. This provides the intent that a MFPV is intended to be moveable. Localities throughout the Commonwealth have experienced the MFPV being placed in a situation where the vehicle is no longer “movable”. This has been discovered as the wheels being removed, placing the vehicle up on blocks, surrounding the vehicle with decks/porches and even attaching the vehicle to a buildings electrical system or plumbing systems in a permanent in nature arrangement.

This proposal also includes a definition of *utilities*. This mirrors a proposal submitted to the termination and reconnection of a utilities system.

This proposal provides an exception where the mobile food preparation vehicle arrangement and/or connection to utilities has been permitted and inspected in accordance with the applicable building code.

Cost Impact: The code change proposal will not increase or decrease the cost

No change

FP5001.7-24

SFPC: 5001.7, 5001.7.1, 5001.7.2, 5001.7.3, 5001.7.4, 5001.7.5, 5001.7.6, 5001.7.7, 5001.7.8, 5001.7.9, 5001.7.10, 5001.7.11, 3803.2.2

Proponents: Andrew Milliken, representing Stafford County Fire Marshal's Office (amilliken@staffordcountyva.gov)

2021 Virginia Statewide Fire Prevention Code

Delete without substitution:

5001.7 Operational requirements for Group B teaching and research laboratories. ~~Teaching and research laboratories in Group B educational occupancies above the 12th grade utilizing Section 428 of the USBC, Part I, Construction, or Section 306.1 of the USBC, Part II, Existing Buildings, shall comply with this section and other applicable requirements of this code. In the case of conflicts between the requirements of Section 428 of the USBC, Part I, Construction, or Section 306.1 of the USBC, Part II, Existing Buildings, and provisions of this code other than those set out in this section, Section 428 of the USBC, Part I, Construction, or Section 306.1 of the USBC, Part II, Existing Buildings, as applicable, shall govern.~~

5001.7.1 Chemical safety reviews. ~~Operating and emergency procedures planning and documentation shall be as set out in Sections 5001.3.3.11 through 5001.3.3.17. Such documentation shall be prepared by laboratory safety personnel or special experts and shall be made available in the workplace for reference and review by employees. Copies of such documentation shall be furnished to the fire code official for review upon request.~~

5001.7.2 Hazardous materials handling. ~~Receiving, transporting on-site, unpacking, and dispensing of hazardous materials shall be carried out by persons trained in proper handling of such materials and shall be performed in accordance with Chapters 50 through 67, as applicable.~~

5001.7.3 Hazard identification signage. ~~Warning signs for other than building components shall be provided in accordance with Section 5003.5.~~

5001.7.4 Maintenance of equipment, machinery, and processes. ~~Maintenance of equipment, machinery, and processes used with hazardous materials shall comply with Section 5003.2.6.~~

5001.7.5 Time sensitive materials. ~~Containers of materials that have the potential to become hazardous during prolonged storage shall be dated when first opened and shall be managed in accordance with NFPA 45, Section 8.2.4.4.1.~~

5001.7.6 Maintenance of storage, dispensing, use, and handling requirements. ~~Storage, dispensing, use, and handling requirements in the USBC, Part I, Construction, or the USBC, Part II, Existing Buildings, shall be maintained. Operational requirements not affecting the manner of construction shall comply with this chapter and Chapters 51 through 67, as applicable.~~

5001.7.7 Hazardous wastes. ~~Storage, dispensing, use, and handling of hazardous waste shall comply with this chapter and Chapters 51 through 67, as applicable.~~

5001.7.8 Container size. ~~The maximum container size for all hazardous materials shall be 5.3 gallons (20 L) for liquids, 50 pounds (23 kg) for solids, 100 cubic feet (2.8 m³) for health hazard gases and 500 cubic feet (14 m³) for all other gases.~~

Exception: ~~Hazardous waste collection containers, for other than Class I and Class II flammable liquids, are permitted to exceed 5.3 gallons (20 L) where approved.~~

5001.7.9 Density. ~~Quantities of Classes I, II, and IIIA combustible or flammable liquids in storage and use within control areas or laboratory suites shall not exceed 8 gallons per 100 square feet (30 L/9.3 m²) of floor area, with not more than 4 gallons per 100 square feet (15 L/9.3 m²) being in use. Quantities of Class I flammable liquids in storage and use shall not exceed 4 gallons per 100 square feet (15 L/9.3 m²) of floor area with not more than 2 gallons (7.5 L) being in use. The maximum in use in open systems is limited to 10 percent of these quantities. Densities shall be reduced by 25 percent on the 4th floor through 6th floor levels above grade plane of the building~~

and 50 percent above the 6th floor level. The density is to be reduced to 50 percent of these values for *buildings* that are not protected throughout with an *approved* automatic fire sprinkler system. Regardless of the density, the maximum allowable quantity per control area or *laboratory suite* shall not be exceeded.

Exception: Density limits may be exceeded in designated hazardous waste collection areas or rooms within a control area or *laboratory suite*, but stored quantities shall not exceed the maximum allowable quantity per *laboratory suite* or control area.

5001.7.10 Restricted materials in storage. Storage of pyrophorics and Class 4 oxidizers prohibited in existing *buildings* not equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *USBC*, Part I, Construction, shall be allowed within a control area at 25 percent of the limits for a *building* equipped throughout with an automatic sprinkler system, with no additional increases allowed, provided that such materials are stored in accordance with all of the following:

1. Containers shall be completely sealed and stored according to the manufacturer's recommendations.
2. Storage shall be within *approved* hazardous materials storage cabinets in accordance with Section 5003.8.7 or shall be located in an inert atmosphere glove box in accordance with NFPA 45, Section 7.11.
3. The storage cabinet or glove box shall not contain any storage of incompatible materials.

5001.7.11 Restricted materials in use. Use of pyrophorics and Class 4 oxidizers prohibited in existing *buildings* not equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 of the *USBC*, Part I, Construction, shall be allowed within a control area at 25 percent of the limits for *buildings* equipped throughout with an automatic sprinkler system, with no additional increases allowed, provided that such materials are used in accordance with all of the following:

1. Use shall be within an *approved* chemical fume hood listed in accordance with UL 1805, or in an inert atmosphere glove box in accordance with NFPA 45, Section 7.11, or other *approved* equipment designed for the specific hazard of the material.
2. Combustible materials shall be kept at least 2 feet (610 mm) away from the work area, except for those items directly related to the research.
3. A portable fire extinguisher appropriate for the specific material shall be provided within 20 feet (6096 mm) of the use in accordance with Section 906.

Revise as follows:

3803.2.2 Density. Quantities of Class I, Class II and Class IIIA combustible or *flammable liquids* in storage and use shall not exceed 8 gallons (30 L) per 100 square feet (9.29 m²) of floor area. Densities shall be reduced to 25 percent of these values for buildings not equipped with an approved automatic fire sprinkler system. Quantities of Class I flammable liquids in storage and use shall not exceed four gallons per 100 square feet (15L/9.3m²) being in use. Quantities of Class I flammable liquids in storage and use shall not exceed four gallons per 100 square feet (15L/9.3m²) of floor area with not more than two gallons (7.5L) being in use. The maximum in use in open systems is limited to 10% of these quantities. Densities shall be reduced by 25 percent on the 4th through 6th floors of the building, and by 50 percent above the 6th floor. The density is to be reduced to 50% of these values for buildings that are not equipped with an approved automatic fire sprinkler system. Regardless of the density, the *maximum allowable quantity per control area or laboratory suite* in accordance with this chapter, shall not be exceeded.

Exception: Designated hazardous waste collection areas or rooms within a *laboratory suite* or *control area* are not limited, but such materials shall not exceed the maximum allowable quantity per *laboratory suite* or *control area*.

Reason Statement:

This proposal removes duplicated code sections from SFPC 5001.7 that are now in Chapter 38. The requirements in this section were added for the 2015 SFPC as an early adoption of regulations for high education laboratories prior to Chapter 38 existing in the code. Since Chapter 38 is now part of the SFPC, these sections are no longer needed and could create confusion as they duplicate requirements from Chapter 38. An item by item list is provided below to illustrate where the requirement remains in Chapter 38. The

language from 5001.7.9 is proposed to be relocated to 3803.2.2.

5001.7 - 3801 and Chapter 1 (administrative)

5001.7.1 - 3803.1.1

5001.7.2 - 3803.1.2

5001.7.3 - 3803.1.3

5001.7.4 - 3803.1.4

5001.7.5 - 3803.1.5

5001.7.6 - 3801.2 and 3803.2

5001.7.7 - 3803.1.6

5001.7.8 - 3803.2.1

5001.7.9 - Language proposed to be relocated to 3803.2.2

5001.7.10 - 3805.2.1

5001.7.11 - 3805.2.2

Cost Impact: The code change proposal will not increase or decrease the cost
This change is administrative and will not impact cost.

FP6112-24

SFPC: 6112 (New), 6112.1 (New), 6112.2 (New), 6112.3 (New), 6112.4 (New), 6112.4.1 (New), 6112.4.2 (New), 6112.4.3 (New), 6112.5 (New), 6112.6 (New), 6112.6.1 (New), 6112.7 (New), 6112.8 (New)

Proponents: Lee Stoermer, representing Loudoun County Fire Rescue Fire Marshal Office (lee.stoermer@loudoun.gov)

2021 Virginia Statewide Fire Prevention Code

Add new text as follows:

6112 **LP Gas Vendor Requirements**

6112.1 Emergency Notifications Required. All reports of an odor or leak shall be documented and maintained within the customer's record, and shall be available for review by the Fire Official upon request. This record should include at a minimum the date, time, caller's name, address of suspected leak, phone number, and a description of the problem/complaint along with resolution. Records shall be maintained for the life of the LP-gas container.

6112.2 Notification of flaring operations. . Any flaring operations that are being conducted at a location other than at the LP-gas vendor's facility, shall be approved by the Fire Code Official prior to the flaring operation.

6112.3 Customer Records. Individual records for each customer shall be maintained by the LP-gas vendor for the life of the customer's LP-gas container of any fixed site LPG tank. If a customer transfers LP-gas service to another vendor, customer records shall be transferred upon request to the new LP-gas vendor. This shall apply to all ASME aboveground LP-gas storage containers and ASME underground or mounded LP-gas storage containers. Records shall be maintained as hard copy or electronically. Records shall be available for review by the Fire Official upon request. **Customer files shall, at a minimum, include container data plate information, installation date, inspection records, maintenance records, testing records, and transfer history.

6112.4 Notification for Impaired or Out-of-Service LP-gas Containers. Within 7 days of becoming aware of an impaired or out-of-service LPG container, the LPG Company shall notify the Fire Official in writing or through IROL if available in that jurisdiction. Information shall include physical location (address) of the LPG container, type of LPG container

(aboveground, underground, or mounded), size (gallage) of LPG container, description of problem, testing records, and current volume (%) reading at time of discovery.

6112.4.1 LP-Gas Operational Status Verification . Where damage is noted to a container and/or appurtenances during inspection, further operations shall be stopped until operational status is confirmed. Emergency conditions (odor or leak) shall be reported using notifications as listed in 6112.1.

6112.4.2 Identification of Out-of-Service LP-Gas Containers . LP-gas containers that are impaired or out-of-service shall be clearly identified at the fill connection(s) by using out-of-service tags and/or a lock out/tag out system with hazard/danger tag; a copy of the out-of-service tag shall be provided to the customer, and a copy of the out-of-service tag shall be placed in the customer's file.

6112.4.3 Returning an LP-gas Container to service . Any repairs shall be completed as per the applicable Building Code. When returning an out-of-service container to normal operation, the operational status shall be approved by no less than two (2) qualified personnel that agree the service is completed properly. Out of Service tags shall be removed from the LP-gas container and all repair/maintenance performed shall be documented and provided to the customer; documentation shall be completed within the customer's file after the LP-gas container is returned to normal operational status. Copies of these documents shall be forwarded to the Fire Official.

6112.5 Cathodic Testing. Cathodic testing shall follow NFPA 58 Liquefied Petroleum Gas Code. Records of cathodic protection testing

shall be maintained by the LP-gas vendor and be available for review by the Fire Official upon request.

6112.6 Atmospheric Monitoring Requirements. Anytime an LP gas vendor is investigating a gas odor or gas leak emergency involving an underground LP-gas container or an aboveground LP-gas container, atmospheric monitoring(metering) devices shall be utilized to ensure a safe working environment and for identifying a safe area for workers, emergency service personnel, and the community.

6112.6.1 Atmospheric Monitoring. Combustible gas instruments (“CGI’s”) shall be used to help pinpoint the source of a leak, however, an atmospheric monitoring device capable of identifying the following shall also be utilized: Oxygen (%), Hydrogen Sulfide (PPM), Carbon Monoxide (PPM), and Lower Explosive Limit (LEL) of LPG (%).

6112.7 Container pressure and leak testing. Following any empty LP-gas condition, no more than 5% of the tank’s volume shall be filled until required leak and pressure testing is complete, per NFPA 58.

6112.8 LP-gas vendor identification labels. LP-gas vendor information shall be attached to the container, on the dome assembly or other conspicuous location. This information shall contain the vendor’s name and a 24-hour emergency contact number. Identification labels shall be readily visible.

Reason Statement:

Reason statement:

2024 Virginia Statewide Fire Prevention Code

Chapter 61 Section 12 addition

On February 16th, 2024, in Loudoun County, Virginia, an explosion occurred as the result of a leak from a 500-gallon underground Liquefied Petroleum Gas (LPG) storage tank. This explosion injured ten (10) first responders and resulted in the death of Firefighter Trevor Brown, from the Sterling Volunteer Fire Company (SVFC).

During the investigation it was identified that an LPG provider (retailer, vendor, distributor, maintenance/service provider, etc.) could become complacent with their knowledge of Fire Code requirements, to include tracking inspection, maintenance, and repair records, testing documents, and appropriately identifying an out-of-service or impaired LPG system

An independent, multijurisdictional committee completed an after-action report of this incident to identify respective education, training, and response recommendations to reduce the risk of similar types of events occurring in the future. A separate Fire Prevention Code Investigation was conducted that identified perceived gaps in existing Fire Codes, which should also be addressed to reduce associated risk to members of the community, members of the LPG industry, and first responders.

The new fire code sections presented here highlight issues identified during those investigations and are intended to reduce risk, strengthen requirements, and provide additional enforcement tools to support overall safety. While most LPG providers are already following these procedures, failure to consistently follow Fire Code requirements could result in another catastrophic explosion, injuries, or death.

These additions support a culture of safety and transparency which requires LPG providers to maintain appropriate service records and provide accurate information and documentation to customers; these actions allow access to vital information that can be shared with first responders in an emergency, and to the Fire Code Official when needed. While additional documentation may be required, respective effort and personnel costs associated with time or labor should be minimal. LPG providers should already be routinely utilizing leak detection equipment, so no additional costs should be expected; the multi-gas atmospheric monitoring requirements can be fulfilled by requesting assistance from fire and rescue resources if an LPG provider does not have access to multi-gas atmospheric monitoring equipment.

In closing, these recommendations support the promise that was made to the family of Firefighter Trevor Brown (SVFC) to identify why the explosion occurred, and to take the steps necessary to help reduce the likelihood of similar events from occurring in the future so that his

loss was not in vain.

Cost Impact: The code change proposal will not increase or decrease the cost

Costs associated with these code section changes should be minimal, if any, as these are items that vendors should already be performing if currently properly following NFPA 58 standards.

Attached Files

- **Silver Ridge afteraction report doc link.pdf**
<https://va.cdpaccess.com/proposal/1365/1953/files/download/937/>
- **LP Gas SFPC 2024 changes.pdf**
<https://va.cdpaccess.com/proposal/1365/1953/files/download/934/>

EC-C402.1.6-24

VCC: 1301.1.1.1

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the *International Energy Conservation Code (IECC)*. (Portions of code section not shown remain unchanged.) The following changes shall be made to the IECC :

1. Add Section C402.1.6 to the IECC to read:

C402.1.6 Groups F, S, and U. Appendix CD may be used as an alternative to the *building thermal envelope* provisions of this code for Groups F, S, and U.

13. Add Appendix CD to the IECC to read:

APPENDIX CD BUILDING ENVELOPE REQUIREMENTS

CD101 Scope

CD101.1 General. These provisions shall be permitted as an alternative to building thermal envelope requirements for *building* areas containing uses that are classified as Group F, S or U.

CD102 Building Envelope Requirements

CD102.1 Insulation and fenestration criteria. The building thermal envelope shall meet the requirements of Tables CD102.2(1) and CD102.3 based on the climate zone specified in Chapter 3CE. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table CD102.3 shall comply with the building envelope provisions of ASHRAE/IESNA 90.1.

CD102.2 Specific insulation requirements. Opaque assemblies shall comply with Table CD102.2(1).

CD102.2.1 Roof assembly. The minimum thermal resistance (*R*-value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table CD102.2(1), based on *construction* materials used in the roof assembly.

Exception: Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25.4 mm) or less and where the area weighted *U* factor is equivalent to the same assembly with the *R*-value specified in Table CD102.2(1).

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

CD102.2.2 Classification of walls. Walls associated with the building envelope shall be classified in accordance with Section CD102.2.2.1 or CD102.2.2.2.

TABLE CD102.2(1) OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, *R*-VALUE^a METHOD

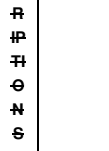
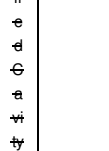
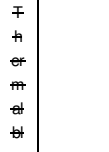

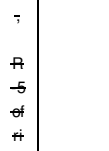
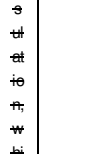
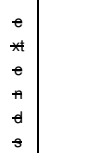
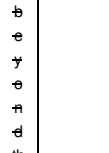
CLIMATE ZONE	3	4 F X C E P T M A R T N E	5 AND MARINE 4
Roofs			
Insulation entirely above roof deck	R - + 5 0	R - + 5 0	R-15ei
Metal buildings (with R-5 thermal blocks) ^{a, b}	R - + 0	R - + 0	R-10
Attic and other	R - 0 0	R - 0 0	R-30
Walls, above grade			
Mass	R - 5 7 0 0	R - 5 7 0 0	R-7.6ei
Metal buildings	R - + 0	R - + 0	R-13 + R-13ei
Metal-framed	R - + 0	R - + 0	R-13 + R-9.8ei
Wood-Framed and other	R - + 0	R - + 0	R-10
Walls, below grade			
Below-grade wall/d	N R	N R	NR
Floors			
Mass	R - 5 0	R - + 0 0	R-10ei
Joists/framing	R - + 0	R - + 0	R-10

CLIMATE ZONE	3	4 E X C E P T M A R I N E	5 AND MARINE 4
Slab-on-grade floors			
Unheated slabs	NR	NR	NR
Heated slabs	R-7.5 to R-12	R-7.5 to R-12	R-7.5 for 24" below
Opaque Doors			
Swinging	U-0.70	U-0.70	U-0.70
Roll-up or sliding	U-1.45	U-1.45	U-1.45




For SI: 1 inch = 25.4 mm, 1 pound per square foot = 4.88 kg/m², 1 pound per cubic foot = 16 kg/m³. ci = Continuous Insulation, NR = No Requirement

- a. Thermal blocks are a minimum R-5 of rigid insulation which extends 1 inch beyond the width of the purlin on each side, perpendicular to the purlin.
- b. Assembly description can be found in Table GD102.2(2).
- c. R-5.7ci is allowed to be substituted with concrete block walls complying with ASTM C90, ungrouted or partially grouted at 32 inches or less on center vertically and 48 inches or less on center horizontally, with ungrouted cores filled with materials having a maximum thermal conductivity of 0.44 Btu-in/h-ft²-°F.
- d. Where heated slabs are below grade, below grade walls shall comply with the exterior insulation requirements for perimeter insulation according to the heated slab on grade construction.
- e. Insulation is not required for mass walls in Climate Zone 3A located below the "Warm Humid" line, and in Zone 3B.

TABLE GD102.2(2) METAL BUILDING ASSEMBLY DESCRIPTIONS

	<div style="text-align: center;">  <p>وزارت آموزش، علوم و فناوری</p> </div>	
<div style="text-align: center;">  <p>مرکز سنجش آموزشی</p> </div>	<div style="text-align: center;">  <p>انستیتو ملی توسعه آموزشی</p> </div>	<div style="text-align: center;">  <p>انستیتو ملی تحقیقات آموزشی</p> </div>
		<div style="text-align: center;">  <p>انستیتو ملی مدیریت آموزشی</p> </div>
		<div style="text-align: center;">  <p>انستیتو ملی سیاست آموزشی</p> </div>
		<div style="text-align: center;">  <p>انستیتو ملی اطمینان از کیفیت آموزشی</p> </div>
		<div style="text-align: center;">  <p>انستیتو ملی نوآوری آموزشی</p> </div>

<div>Figure 9.9</div>	<div>Figure 9.9</div>	<div>REFERENCE</div>
	<div>Figure 9.9</div>	
<div>Figure 9.9</div>	<div>Figure 9.9</div>	<div>ASHRAE/IESNA 90.1-2004 Table A2.9</div>

<p>  </p>	
<p>  </p>	
<p>  </p>	<p>REFERENCE</p>

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<div>REFERENCE</div>	

<p>Figure 10</p>	<p>Figure 10</p>	<p>REFERENCE</p>
	<p>Figure 10</p>	
<p>Wells</p>		
<p>Figure 10</p>	<p>Figure 10</p>	<p>ASHRAE/IESNA 90.1-2004 Table A2.9</p>

<p>Figure 99</p>	
	<p>REFERENCE</p>
<p>Figure 100</p>	<p>ASHRAE/IESNA 99-1 2004 Table A2-3</p>

<div>Figure 1</div>	
<div>Figure 1: A line graph showing the relationship between the concentration of a solution (x-axis) and the rate of reaction (y-axis). The x-axis ranges from 0 to 100, and the y-axis ranges from 0 to 10. The curve starts at the origin (0,0) and rises steeply, then levels off as it approaches a maximum rate of approximately 10. The curve is labeled 'Rate of Reaction' and 'Concentration of Solution'.</div>	<div>REFERENCE</div>

<p> ၁ ၂ ၃ ၄ ၅ ၆ ၇ ၈ ၉ ၁၀ ၁၁ ၁၂ ၁၃ ၁၄ ၁၅ ၁၆ ၁၇ ၁၈ ၁၉ ၂၀ ၂၁ ၂၂ ၂၃ ၂၄ ၂၅ ၂၆ ၂၇ ၂၈ ၂၉ ၃၀ ၃၁ ၃၂ ၃၃ ၃၄ ၃၅ ၃၆ ၃၇ ၃၈ ၃၉ ၄၀ ၄၁ ၄၂ ၄၃ ၄၄ ၄၅ ၄၆ ၄၇ ၄၈ ၄၉ ၅၀ ၅၁ ၅၂ ၅၃ ၅၄ ၅၅ ၅၆ ၅၇ ၅၈ ၅၉ ၆၀ ၆၁ ၆၂ ၆၃ ၆၄ ၆၅ ၆၆ ၆၇ ၆၈ ၆၉ ၇၀ ၇၁ ၇၂ ၇၃ ၇၄ ၇၅ ၇၆ ၇၇ ၇၈ ၇၉ ၈၀ ၈၁ ၈၂ ၈၃ ၈၄ ၈၅ ၈၆ ၈၇ ၈၈ ၈၉ ၉၀ ၉၁ ၉၂ ၉၃ ၉၄ ၉၅ ၉၆ ၉၇ ၉၈ ၉၉ ၁၀၀ </p>	<p> ၁ ၂ ၃ ၄ ၅ ၆ ၇ ၈ ၉ ၁၀ ၁၁ ၁၂ ၁၃ ၁၄ ၁၅ ၁၆ ၁၇ ၁၈ ၁၉ ၂၀ ၂၁ ၂၂ ၂၃ ၂၄ ၂၅ ၂၆ ၂၇ ၂၈ ၂၉ ၃၀ ၃၁ ၃၂ ၃၃ ၃၄ ၃၅ ၃၆ ၃၇ ၃၈ ၃၉ ၄၀ ၄၁ ၄၂ ၄၃ ၄၄ ၄၅ ၄၆ ၄၇ ၄၈ ၄၉ ၅၀ ၅၁ ၅၂ ၅၃ ၅၄ ၅၅ ၅၆ ၅၇ ၅၈ ၅၉ ၆၀ ၆၁ ၆၂ ၆၃ ၆၄ ၆၅ ၆၆ ၆၇ ၆၈ ၆၉ ၇၀ ၇၁ ၇၂ ၇၃ ၇၄ ၇၅ ၇၆ ၇၇ ၇၈ ၇၉ ၈၀ ၈၁ ၈၂ ၈၃ ၈၄ ၈၅ ၈၆ ၈၇ ၈၈ ၈၉ ၉၀ ၉၁ ၉၂ ၉၃ ၉၄ ၉၅ ၉၆ ၉၇ ၉၈ ၉၉ ၁၀၀ </p>
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~~For SI: 1 inch = 25.4 mm.~~

CD102.2.2.1 Above-grade walls. Above-grade walls are those walls covered by Section CD102.2.3 on the exterior of the *building* and completely above grade or walls that are more than 15 percent above grade.

CD102.2.2.2 Below-grade walls. Below-grade walls covered by Section CD102.2.4 are basement or first story walls associated with the exterior of the *building* that are at least 85 percent below grade.

CD102.2.2.3 Above-grade walls. The minimum thermal resistance (R value) of the insulating material(s) installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table CD102.2(1), based on framing type and construction materials used in the wall assembly. The R value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table CD102.2(1). "Mass walls" shall include walls weighing at least (1) 35 pounds per square foot (170 kg/m^2) of wall surface area or (2) 25 pounds per square foot (120 kg/m^2) of wall surface area if the material weight is not more than 120 pounds per cubic foot ($1,900 \text{ kg/m}^3$).

GD102.2.4 Below-grade walls. The minimum thermal resistance (*R* value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table GD102.2(1) and shall extend to a depth of 10 feet (3048 mm) below the outside finish ground level, or to the level of the floor, whichever is less.

GD102-2.5 Floors over outdoor air or unconditioned space. The minimum thermal resistance (*R* value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table GD102-2(1), based on construction materials used in the floor assembly. “Mass floors” shall include floors weighing at least (1) 35 pounds per square foot (170 kg/m²) of floor surface area or (2) 25 pounds per square foot (120 kg/m²) of floor surface area if the material weight is not more than 12 pounds per cubic foot (1900 kg/m³).

GD102.2.6 Slabs on grade. The minimum thermal resistance (*R* value) of the insulation around the perimeter of unheated or heated slab on grade floors shall be as specified in Table GD102.2(1). The insulation shall be placed on the outside of the foundation or on the inside of a foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table.

GD102.3 Fenestration. Fenestration shall comply with Table GD102.3.

GD102.2.7 Opaque doors. Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors as specified in Table GD102.2(1) and be considered as part of the gross area of above-grade walls that are part of the building envelope.

TABLE GD102.3 BUILDING ENVELOPE REQUIREMENTS: FENESTRATION			
CLIMATE ZONE	3	4	5 AND MARINE-4
Vertical fenestration (40% maximum of above-grade wall)			
U-factor			
Framing materials other than metal or without metal reinforcement or cladding			
U-Factor	0.165	0.140	0.35
Metal framing with or without thermal break			
Curtain Wall/Storefront U-factor	0.160	0.150	0.45
Entrance Door U-factor	0.160	0.150	0.80
All Other U-factor ^a	0.165	0.150	0.55
SHGC All Frame Types			
SHGC: PF < 0.25	0.150	0.140	0.40
SHGC: 0.25 < PF < 0.5	0.030	0.040	NR
SHGC: ≥ 0.5	0.040	0.040	NR
Skylights (0% maximum)			
Glass			

CLIMATE ZONE	3	4 E X E P T M A R T H E	SAND MARINE-4
U-Factor	0 - 0 0	0: 6 0	0.60
SHGC	0 - 4 0	0: 4 0	0.40
Plastic			
U-Factor	1 - 0 0	1: 0 0	1.00
SHGC	0 - 0 5	0: 6 2	0.62

NR = No Requirement, PF = Projection Factor (See Section CD102.3.2)

a. All others includes operable windows, fixed windows and non-entrance doors.

CD102.3.1 Maximum area. The vertical fenestration area (not including opaque doors) shall not exceed the percentage of the gross wall area specified in Table CD102.3. The skylight area shall not exceed the percentage of the gross roof area specified in Table CD102.3.

CD102.3.2 Maximum U-factor and SHGC. For vertical fenestration, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table CD102.3, based on the window projection factor. For skylights, the maximum U-factor and solar heat gain coefficient (SHGC) shall be as specified in Table CD102.3. The window projection factor shall be determined in accordance with Equation CD-1.

$$PF = A/B$$

$$PF = A/B$$

where:

(Equation CD-1)

PF = Projection factor (decimal); *A* = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing; *B* = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different PF values, they shall each be evaluated separately, or an area-weighted PF value shall be calculated and used for all windows and glass doors.

GD102.4 Air leakage.

GD102.4.1 Window and door assemblies. The air leakage of window and sliding or swinging door assemblies that are part of the building envelope shall be determined in accordance with AAMA/WDMA/CSA 101/I.S.2/A440, or NFRC 400 by an accredited, independent laboratory, and labeled and certified by the manufacturer and shall not exceed the values in Section 402.4.2 of the 2006 IECC.

Exception: Site-constructed windows and doors that are weatherstripped or sealed in accordance with Section GD102.4.3.

GD102.4.2 Curtain wall, storefront glazing and commercial entrance doors. Curtain wall, storefront glazing and commercial glazed swinging entrance doors and revolving doors shall be tested for air leakage at 1.57 pounds per square foot (psf) (75 Pa) in accordance with ASTM E283. For curtain walls and storefront glazing, the maximum air leakage rate shall be 0.3 cubic foot per minute per square foot (cfm/ft²) (5.5 m³/h × m²) of fenestration area. For commercial glazed swinging entrance doors and revolving doors, the maximum air leakage shall be 1.00 cfm/ft² (18.3 m³/h × m²) of door area when tested in accordance with ASTM E283.

GD102.4.3 Sealing of the building envelope. Openings and penetrations in the building envelope shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and location. Joints and seams shall be sealed in the same manner or taped or covered with a moisture vapor permeable wrapping material. Sealing materials spanning joints between construction materials shall allow for expansion and contraction of the construction materials.

GD102.4.4 Outdoor air intakes and exhaust openings. Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a maximum leakage rate of 4 cfm per square foot (6.8 L/s — C m²) at 1.0 inch water gauge (w.g.) (1250 Pa) when tested in accordance with AMCA 500D.

Exception: Gravity (nonmotorized) dampers are permitted to be used in *buildings* less than three stories in height above grade.

GD102.4.5 Loading dock weather seals. Cargo doors and loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in the doorway.

GD102.4.6 Vestibules. A door that separates conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

Exceptions:

1. *Buildings* in Climate Zones 1 and 2 as indicated in Figure C301.1 and Table C301.1.
2. Doors not intended to be used as a *building* entrance door, such as doors to mechanical or electrical equipment rooms.
3. Doors opening directly from a sleeping unit or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m²) in area.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

~~CD102.4.7 Recessed luminaires.~~ When installed in the building envelope, recessed luminaires shall meet one of the following requirements:

- ~~1. Type IC rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity and sealed or gasketed to prevent air leakage into the unconditioned space.~~
- ~~2. Type IC or non-IC rated, installed inside a sealed box constructed from a minimum 0.5-inch thick (12.7 mm) gypsum wallboard or constructed from a preformed polymeric vapor barrier, or other airtight assembly manufactured for this purpose, while maintaining required clearances of not less than 0.5 inch (12.7 mm) from combustible material and not less than 3 inches (76 mm) from insulation material.~~
- ~~3. Type IC rated, in accordance with ASTM E283 admitting no more than 2.0 cubic feet per minute (cfm) (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. The luminaire shall be tested at 1.57 psf (75 Pa) pressure difference and shall be labeled.~~

~~CD102.5 Moisture control.~~ All framed walls, floors and ceilings not ventilated to allow moisture to escape shall be provided with an approved vapor retarder having a permeance rating of 1 perm ($5.7 \times 10^{-11} \text{ kg/Pa} \cdot \text{s} \cdot \text{m}^2$) or less, when tested in accordance with the desiccant method using Procedure A of ASTM E96. The vapor retarder shall be installed on the warm-in-winter side of the insulation.

Exceptions:-

- ~~1. Buildings located in Climate Zones 1 through 3 as indicated in Figure C301.1 and Table C301.1.~~
- ~~2. In construction where moisture or its freezing will not damage the materials.~~
- ~~3. Where other approved means to avoid condensation in unventilated framed wall, floor, roof and ceiling cavities are provided.~~

Reason Statement:

This proposal would remove an unsupported rollback of minimum envelope energy efficiency standards for commercial Categories F, S and U. That rollback, which was granted over strong objections in the 2021 Code Cycle, is contained in 1301.1.1.1, C402.1.6 and Appendix CD. [The proposal was called Appendix CB when introduced. It also did not include some references to the “2004” ASHRAE, which the draft 2024 Base Document appears to have added.]

Removing the rollback is required because applicable law requires Virginia’s building code to be consistent with or at least as stringent as the IECC. Appendix CD moves the code backwards by more than 15 years overriding multiple Board-approved and IECC-approved updates since 2006. Failing to eliminate Appendix CD would waste energy, raise occupancy costs, potentially harm employees, increase air pollution, including climate pollution, and harm the “health, safety and welfare” of the residents of Virginia both now and for the decades these inefficient buildings are operated.

Moreover, the record underlying the rollback proposal showed that (a) no substantive evidence was submitted, in the 2021 cycle, that would support the decade-plus rollback for the 120+ types of buildings covered by the proposal; (b) builders successfully implemented Board-approved IECC standards for 2009, 2012, 2015 and 2018, and ASHRAE standards for every update since 2006; (c) U.S. DOE and PNNL had found that full implementation of the 2021 IECC standards and each update of IECC or ASHRAE efficiency standards from 2009-2018 would save energy and money; (d) far from suffering under unreasonable burdens, the warehouse market was booming under the then-effective 2018 IECC; and (e) there were no findings or analysis by either the proponent or the Board to support approving the non-consensus proposal.

1. Virginia Law Requires Consistency with Model Building Codes

Section 36-99A requires implementation of building code standards that “protect the health, safety and welfare of the residents of the Commonwealth, and that minimize costs “consistent with” recognized national standards, which in Virginia means the IECC.

The provisions of the Building Code and modifications thereof shall be such as to protect the health, safety and welfare of the residents of the Commonwealth, provided that buildings and structures should be permitted to be constructed, rehabilitated and maintained at the least possible cost consistent with recognized standards of health, safety, energy conservation and water conservation, including provisions necessary to prevent overcrowding, rodent or insect infestation, and garbage accumulation; and barrier-free provisions for the physically handicapped and aged.

As recognized by the 2021 NOPR, keeping the code up to date with “recognized standards of health, safety, energy conservation and

water conservation” is critical. Construction costs should be reduced where possible, but only to the extent “consistent with” the IECC’s “energy conservation” standards. Backtracking to weaker, out-of-date standards is not permissible.

Pursuant to 2021 legislation, VIRGINIA ACTS OF ASSEMBLY – 2021 SPECIAL SESSION I, CHAPTER 425, Section 1 (“H2227”), the Board was directed to “consider adopting Building Code standards that are at least as stringent as those contained in the new version of the IECC.” Factors to be considered are “the public health, safety, and welfare benefits of adopting standards that are at least as stringent as those contained in the IECC, including potential energy savings and air quality benefits over time compared to the cost of initial construction.” Nothing in H227 authorized approval of less stringent standards.

In 2022, at the request of certain builders, the GA adopted HB1289, which directed the Board “to consider during the next code development cycle, revising the Uniform Statewide Building Code...to provide an exemption from any requirements in the energy efficiency ... for the following use and occupancy classifications pursuant to Chapter 3 of the 2018 Virginia Construction Code: (i) Section 306, Factory Group F; (ii) section 311, Storage Group S; and (iii) Section 312, Utility and Miscellaneous Group U.”^[1]

HB1289 called for consideration of an exemption, but it did not alter the statutory standards for building codes prescribed by 36-99A and H2227. Since the legislature did not change the applicable legal standards, its direction “to consider” is bound by otherwise applicable laws, which require adoption of code standards that protect the “health, safety and welfare” of Virginians, minimize costs “consistent with” national model codes, and be “at least as stringent” as the IECC.

2. No credible support was provided the rollback of code standards.

The proponent’s supporting statement for the rollback proposed in the last cycle was very brief and conclusory. Neither the proponent nor any other participant provided any reasonable basis for rolling back conservation standards for any type of building. While Appendix CD would reduce some builders’ construction costs, nothing demonstrated that the proposal would meet the relevant statutory standards of serving Virginians’ “health, safety and welfare” or minimizing costs “consistent with” energy conservation standards or achieving energy efficiency “at least as stringent” as the latest IECC.

Since the 2006 IECC, the IECC adjusted and the Board repeatedly approved updated standards to recognize new industry developments and public needs. Nothing presented in the 2021 Cycle plausibly justified overturning all those decisions by the IECC and the Board.

In support of cutting back standards for dozens of types of buildings within the 3 broad categories Groups F, S and U, the proposal’s Reason Statement and Cost Impact statement provided (a) two, sketchy examples of hypothetical buildings’ compliance costs with no information about energy or energy cost savings; (b) a few generalized statements that some builders find compliance challenging and that some the affected buildings are “not heated or cooled to normal heating and cooling temperatures” or are “vacant” some of the time or might have “open doors” part of the time (which the IECC already addresses by exempting or reducing efficiency standards for buildings with such characteristics). There are absolutely no details about the energy usage, efficiency, costs, and characteristics of any 120+ types of buildings that are covered by the efficiency rollback.

Section 306 Factory Group F identifies over 50 types of factories; Section 311 Storage Group S lists over 60 types of storage facilities; and Section 312 Utility and Miscellaneous Group U identifies over a dozen categories. Some of the facilities store products (e.g., food) that are temperature sensitive and require a great deal of energy (lessened only by energy efficiency) to achieve temperature goals. Other buildings involve manufacturing, greenhouses and other operations, which have still different energy and energy-efficiency profiles. Yet, apart scant information about two hypothetical warehouses, the proposal for the rollback provided no details or analysis of any other types of buildings or their energy footprints, available technologies, employee and customer needs, compliance costs, energy cost savings, pollution reductions or other factors relevant to the extreme, multi-group proposal.

The proposal provided no contextual information about its two hypothetical warehouses while omitting critical information. For example, it failed to disclose the huge volume of air to be heated and cooled in the two illustrations of warehouses: roughly 2.5 million cubic feet for the 100,000 Sf warehouse, and 144,000 cubic feet for the 7500 SF warehouse. Even the building claiming to heat only 60 degrees (assuming that temperature is not raised *after* the building is inspected) would require a huge amount of energy to achieve and maintain the targeted 60 degrees for 2.5 million cubic feet of space. Nor did the proponent address the huge, overall energy cost and use increases (waste) or pollution increases from rolling back established and new efficiency standards for multiple categories of buildings.

The proposal to return to 2006 standards claimed harms that ignored the 2021 IECC’s flexibility provisions which exempt unheated and low-conditioned buildings and permitted buildings to be subdivided into an exempt unheated portion and a separate heated portion if, for example, heating for an office or other work area is needed. It also ignored ASHRAE’s flexibility for low energy buildings.^[2] The 2024 IECC also provides flexibility.

The proponent failed to compare the impact of its proposed standards to the many IECC standards it would override or to ASHRAE efficiency standards, which Appendix CD also undercuts.

Nor did the proponent provide data contradicting the many findings by DOE and PNNL that updates since 2006 would save energy and energy costs. The proponent's brief assertions about possible implementation being more difficult and possibly less attractive are too vague or irrelevant to support the extreme proposal. Had there been legitimate technical implementation problems, they would have been raised in the IECC and ASHRAE processes in each cycle from 2009 through 2018.

The proposal did not address or explain how Virginia had successfully implemented the higher conservation standards embodied in IECC updates from 2009-2018 or explain why the 2021 standards are unreasonable.

In fact, the evidence presented showed that the warehouse business was booming in the years the 2018 IECC standards were in effect. See, for example:

- o **“Need for speed: Developers race to build warehouses amid site shortage,”**
<https://www.virginiabusiness.com/article/need-for-speed/> (Dec. 31, 2021) (“Geoff Poston [of Hampton Roads] likens the current market for building, buying and leasing warehouses and distribution centers to the mid-1800s California Gold Rush: Everybody wants in.” The problem is land, not demand or ability to construct.);
- o **“Making it rain: Increased e-commerce fuels wave of distribution centers,”**
<https://www.virginiabusiness.com/article/making-it-rain/> (April 29, 2021) (“For Hanover County Economic Development Director Linwood Thomas, things couldn’t get much better. ‘It’s really been a perfect storm,’ Thomas says. That storm — the good type — is a deluge of distribution centers and warehouses that have opened recently or are currently in the pipeline for the county of about 108,000 residents, located about 20 miles north of Richmond.... Over the past two years or so, Hanover has added about 1.5 million square feet of new space and about 80% of that has been leased. ‘Then, we’ve got another almost 4 million square feet proposed in the next 24 months. These are tangible products that will put us over 5.5 million square feet of new space, which is huge,’ says Thomas, noting that the new space will represent a nearly VASE% increase over the county’s existing stock of 13.8 million square feet of industrial/warehouse space.”);
- o **“Industrial boom: Virginia continues to see more warehouses and distribution centers,”**
<https://www.virginiabusiness.com/article/industrial-boom/> (July 27, 2018) (“While Hampton and Southwest Virginia area also benefiting, Richmond’s industrial warehouse market is currently undergoing a “golden age” in the distribution sector, according to a recent report from CBRE.”)
- o And, more recently, according to a Cushman and Wakefield survey, the Northern Virginia market for warehouse/distribution stayed strong in 2023, but weakened in 2024 – after the rollback took effect. https://assets.cushmanwakefield.com/-/media/cw/marketbeat-pdfs/2024/q1/us-reports/industrial/nova_americas_marketbeat_industrial_q1-2024.pdf?rev=6c6aad03f7024473b0a153e7bad3b0ca

Other considerations that require deleting Appendix CD and Section 402.1.6 which operationalizes Appendix CD, thereby returning to full compliance with the latest IECC, include:

The IECC’s code provisions are built upon the hard work, expertise and negotiations of hundreds of industry and efficiency experts, architects, engineers, trade associations, environmental experts, government bodies and public review processes. They consider technological developments, costs, benefits and practicality. Nothing in the IECC standards was arbitrarily arrived at. It makes accommodations are made for different types of buildings and usage patterns, including low-energy building, through different standards, exemptions and performance alternatives.

DOE and PNNL have consistently found that ASHRAE and IECC standards save money for building users through energy savings compared to initial construction costs. https://www.energycodes.gov/sites/default/files/2021-07/Cost-effectiveness_of_ASHRAE_Standard_90-1-2019-Virginia.pdf (The Commercial Energy Efficiency chapter of the 2021 IECC (International Code Council, ICC 2021) allows users to either follow the provisions in the IECC or use Standard 90.1-2019 as an alternative compliance path.) In its 2023 Report "Impacts of Model Energy Codes" (PNNL-33251), PNNL found that, if fully implemented from 2010-2040, IECC's 2009-2021 commercial energy codes would save 8.16 Quads of energy and \$78.22 billion (2021 dollars).

In its report “Energy and Energy Cost Savings Analysis of the 2021 IECC for Commercial Buildings” (September 2022)(PNNL-32816), PNNL found that full implementation the 2021 edition of the IECC for commercial buildings would result in site energy savings of 12.1% at the aggregate national level compared to the 2018 IECC edition. In addition, on a national weighted average basis, the 2021 IECC is 6.5% more efficient for site energy use than Standard 90.1-2019. The 2021 commercial IECC also provides a nationally aggregated energy cost savings of 10.6% and greenhouse gas emissions savings of 10.2% as compared to the 2018 edition. Warehouses were projected to save 8.4% energy on-site, with a 6.9% (energy cost index) savings and a 7.1% emissions reduction. (See also

<https://www.energycodes.gov/determinations> for recent and past determinations.)

In its report “Energy and Energy Cost Savings Analysis of the 2018 IECC for Commercial Buildings December 2018” (December 2018) (PNNL-28125), PNNL found that compared to the 2015 IECC, implementing the 2018 IECC would cause warehouses to save energy (11.1% EUI reduction) and energy costs (16.7% ECI reduction). That is more than was projected for commercial buildings generally.

In its report “Energy and Energy Cost Savings Analysis of the IECC for Commercial Buildings (August 2013) (PNNL-22760)”, PNNL found that commercial buildings generally and warehouses specifically would save energy and energy costs by implementing the 2012 IECC compared to the 2006 and 2009 IECC. “On a weighted national basis, the 2009 IECC results in 8.7% energy savings over the 2006 IECC, and the 2012 IECC results in 18.6% energy savings over the 2006 IECC.” For warehouses, the EUI savings from 2012 over 2006 would be 36.9% (with plug-and-process loads) to 41.1% (without plug-and-process loads), and 40.5% energy cost savings (without plug-and-process loads).

The proponent’s supporting statement did not address energy savings or energy cost increases, over time, to building users or the impacts of rising energy costs, which are likely to occur as climate change drives up ambient temperatures.

The proponent provided no evidence on how the public, including building occupants, communities and residents of the Commonwealth – would be affected by exempting these three large categories of buildings from all energy conservation requirements. DOE has found, for example, that energy use reductions, under updated IECC standards, would reduce GHG emissions impacts and climate impacts. By reducing peak and off-peak energy demands, keeping up with the latest IECC would reduce pressure on utilities to raise rates charged to all customers to cover higher priced energy resources.

Despite short-term appeals to builders of reducing construction costs, continuing implementation of the rollback would increase the risk that the buildings would become obsolete more quickly as energy operating costs go up for occupants. Lower rents and vacancies could follow just as they have for older office buildings in many areas.

In sum, C402.1.6. and Appendix CD should be deleted from Virginia’s building code, and the code should be restored to being “consistent with” the latest IECC. No substantive information has ever been presented to support rolling back envelope efficiency standards to the 2006 level for three broad categories of buildings.

[1] In the 2021 Cycle, the initial proposal for an exemption was Appendix CB [later changed Appendix CD] was replaced by a proposal for an appendix to rollback building envelope standards to 2006 for F, S and U, which was adopted without discussion even though it was a non-consensus proposal to be approved. The Staff presented a proposal for an exemption simply to assure that that concept was considered as called for by HB 1289. Staff presented no evidence or arguments in support, and that proposal was rejected by the Board.

Cost Impact: The code change proposal will increase the cost

Obviously, there would be cost increases from restoring compliance from the 2006 standards to the latest IECC. The changes in costs are justified by changes in technology, building techniques, energy savings and energy costs, all of which have been reviewed by the IECC, DOE, PNNL and even the Board, which approved updated standards from 2009 - 2018 IECCs, before approving a rollback for 3 groups of buildings.

Although construction costs to builders would go up compared to the 2006 IECC standards in Appendix CD, builders managed to successfully and profitably construct new structures under the IECCs for 2009, 2012, 2015 and 2018. As discussed in the Reason Statement, building warehouses was a booming business under the 2018 IECC commercial envelope standards, which had been adopted in full by the Board. (Warehouse building starts declined, according to a survey, after the rollback took effect in January 2024.)

DOE and PNNL have repeatedly found that implementing updated IECC and ASHRAE standards since 2006 and 2004 would save energy and energy costs for building occupants. Builders can choose to implement either the IECC or ASHRAE. In its 2023 Report “Impacts of Model Energy Codes” (PNNL-33251), PNNL found that, if fully implemented from 2010-2040, IECC’s 2009-2021 commercial energy codes would save 8.16 Quads of energy and \$78.22 billion of energy costs (2021 dollars).

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The scanty cost claims that were presented in support of the Section 402.1.6 and Appendix CD (then called Appendix CB) described two hypothetical warehouses (presumably in Group F) with a square footage and alleged cost savings from reducing insulation in ceilings and walls. There was no information about (a) any of costs or benefits for the many other types of buildings covered by Appendix CD, (b) the energy and energy cost savings that would result from the higher efficiency standards in either the 2021 or 2018 IECC, (c) any justifications for the many other changes embedded in Appendix CD, (d) how the so-called complications of construction had been successfully and profitably complied with for well over a decade, (e) why ASHRAE standards should be rolled back, (f) impacts on climate and other forms of air pollution, or any other issue relevant to the rollback of 8 single-spaced changes of standards. There was no plausibility for the proponent’s assertion that a \$42,984 cost savings from weaker insulation would save a project: “That is enough to keep this project from being built.” In fact, weakening building code standards would lower construction cost for competitors, too, giving no advantage to anyone. Indeed, one point of building codes is to prevent builders from trying to undercut their competitors with poorly built buildings -- achieving savings at the expense of meeting recognized standards.

In short, under Virginia law, Section C402.1.6 and Appendix CD should be deleted. Repeated findings by PNNL and DOE show that energy use and energy costs are significantly reduced by implementing updated IECC (and ASHRAE) standards. No meaningful cost-benefit evidence supported the rollback in Appendix CD to standards that are demonstrably less stringent than and not “consistent with” modern IECC and ASHRAE standards. The rollback was entirely based on vague cost reduction claims without consideration of the other factors required by law. It fails to minimize costs to the extent “consistent with” the latest IECC’s standards and to adopt standards at least as stringent as the latest IECC when considering benefits, including user-cost savings over time and pollution reductions, not just costs. If the only issue was how to cut costs for builders then there would be no building codes or building code updates.

EC-C403.7.4.1-24

VECC: C403.7.4.1

Proponents: Joseph Willis, representing Prince William County (jwillis@pwcgov.org); Donna Rubino, Prince William County, representing Prince William County Building (drubino@pwcgov.org)

2021 Virginia Energy Code

Revise as follows:

C403.7.4.1 Nontransient dwelling units. Nontransient dwelling units shall be provided with outdoor air energy recovery ventilation systems with an *enthalpy recovery ratio* of not less than 50 percent at cooling design condition and not less than 60 percent at heating design condition.

Exceptions:

1. Nontransient dwelling units in Climate Zone 3C.
2. Nontransient dwelling units with not more than 500 square feet (46 m^2) of *conditioned floor area* in Climate Zones 0, 1, 2, 3, 4C and 5C.
3. *Enthalpy recovery ratio* requirements at heating design condition in Climate Zones 0, 1 and 2.
4. *Enthalpy recovery ratio* requirements at cooling design condition in Climate Zones 4, 5, 6, 7 and 8.
5. **Nontransient dwelling units where the ratio of required outdoor air to supply air is less than 10 percent.**

Reason Statement:

Individual HVAC systems for condos and apartments tend to range from 2-3 tons cooling capacity. The required ventilation air is typically 5% or less of the supply airflow. The mechanical code permits options to achieve this through inexpensive means (connect to the return air side of the air handler or mechanical exhaust).

Prior to the 2015 Mechanical Code, natural ventilation was permitted through operable windows. Since then, only mechanical ventilation is permitted for this application.

An enthalpy recovery ratio for an ERV of 50%, means that 50% of the energy difference between the outside air and the return air is recovered and used to precondition the supply air. I'm assuming that the enthalpy recovery ratio at cooling design will be less than 50% for these types of units, so I use Exception 4. (Is that what the exception means? It's not clear.)

Cost Impact: The code change proposal will decrease the cost

Requiring these systems to use individual energy recovery is an added expense (~\$600 - \$1000 per unit) that doesn't seem necessary at these low airflows. There are better options available when using energy recovery for outdoor air, such as large dedicated outdoor air units with energy recovery to provide fresh air to multiple units or corridors.

EC-C405.17-24

VECC: C405.17 (New), C405.17.1 (New), TABLE C405.17.1 (New), C405.17.2 (New), C405.17.3 (New), C405.17.4 (New), C405.17.5 (New), C405.17.5.1 (New), C405.17.5.2 (New), C405.17.5.3 (New), C405.17.5.3.1 (New), C405.17.5.3.2 (New), C405.17.6 (New)

Proponents: Joseph Wages, representing National Electrical Manufacturers Association (NEMA) (joseph.wages@nema.org)

2021 Virginia Energy Code

Add new text as follows:

C405.17 Electric Vehicle Power Transfer Infrastructure. Parking facilities shall be provided with electric vehicle power transfer infrastructure in accordance with Sections C405.14.1 through C405.14.6.

C405.17.1 Quantity. The number of required EV spaces, EV capable spaces and EV ready spaces shall be determined in accordance with this Section and Table C405.14.1 based on the total number of automobile parking spaces and shall be rounded up to the nearest whole number. For R-2 buildings, the Table requirements shall be based on the total number of dwelling units or the total number of automobile parking spaces, whichever is less.

- 1.Where more than one parking facility is provided on a building site, the number of required automobile parking spaces required to have EV power transfer infrastructure shall be calculated separately for each parking facility.
- 2.Where one shared parking facility serves multiple building occupancies, the required number of spaces shall be determined proportionally based on the floor area of each building occupancy.
- 3.Installed EVSE spaces that exceed the minimum requirements of this section may be used to meet minimum requirements for EV ready spaces and EV capable spaces.
- 4.Installed EV ready spaces that exceed the minimum requirements of this section may be used to meet minimum requirements for EV capable spaces.
- 5.Where the number of EV ready spaces allocated for R-2 occupancies is equal to the number of dwelling units or to the number of automobile parking spaces allocated to R-2 occupancies, whichever is less, requirements for EVSE spaces for R-2 occupancies shall not apply.
- 6.Requirements for a Group S-2 parking garage shall be determined by the occupancies served by that parking garage. Where new automobile spaces do not serve specific occupancies, the values for Group S-2 parking garage in Table C405.14.1 shall be used.

TABLE C405.17.1 Required EV Power Transfer Infrastructure. |

Occupancy	EVSE Spaces	EV Ready Spaces	EV Capable Spaces
Group A	10%	0%	10%
Group B	15%	10%	30%
Group E	15%	10%	30%
Group F	2%	0%	5%
Group H	1%	0%	0%
Group I	15%	0%	30%
Group M	15%	10%	30%
Group R-1	20%	10%	70%
Group R-2	20%	10%	70%
Group R-3 and R-4	2%	0%	5%
Group S exclusive of parking garages	1%	0%	0%
Group S-2 parking garages	25%	10%	30%

C405.17.2 EV Capable Spaces. Each EV capable space used to meet the requirements of Section C405.14.1 shall comply with the following:

- 1.A continuous raceway or cable assembly shall be installed between an enclosure or outlet located within 3 feet (914 mm) of the EV capable space and electrical distribution equipment.

- 2.Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with Section C405.14.5.
- 3.The electrical distribution equipment to which the raceway or cable assembly connects shall have dedicated overcurrent protection device space and spare electrical capacity to supply a calculated load in accordance with Section C405.14.5.
- 4.The enclosure or outlet and the electrical distribution equipment directory shall be marked: "For electric vehicle supply equipment (EVSE)."

C405.17.3 EV Ready Spaces. Each branch circuit serving EV ready spaces used to meet the requirements of Section C405.14.1 shall comply with the following:

- 1.Terminate at an outlet or enclosure, located within 3 feet (914 mm) of each EV ready space it serves.
- 2.Have a minimum system and circuit capacity in accordance with C405.14.5.
- 3.The electrical distribution equipment directory shall designate the branch circuit as "For electric vehicle supply equipment (EVSE)" and the outlet or enclosure shall be marked "For electric vehicle supply equipment (EVSE)."

C405.17.4 EVSE Spaces. An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE spaces. Each EVSE installed to meet the requirements of Section C405.14.1, serving either a single EVSE space or multiple EVSE spaces, shall comply with the following:

- 1.Have a minimum system and circuit capacity in accordance with Section C405.14.5.
- 2.Have a nameplate rating not less than 6.2kW.
- 3.Be located within 3 feet (914 mm) of each EVSE space it serves.
- 4.Be installed in accordance with Section C405.14.6.

C405.17.5 System and circuit capacity. The system and circuit capacity shall comply with C405.14.5.1 and C405.14.5.2.

C405.17.5.1 System capacity. The electrical distribution equipment supplying the branch circuit(s) serving each EV capable space, EV ready space, and EVSE space shall comply with one of the following:

- 1.Have a calculated load of 7.2 kVA or the nameplate rating of the equipment, whichever is larger, for each EV capable space, EV ready space, and EVSE space.
- 2.Meets the requirements of Section C405.14.5.3.1

C405.17.5.2 Circuit Capacity. The branch circuit serving each EV capable space, EV ready space, and EVSE space shall comply with one of the following:

- 1.Have a rated capacity not less than 50 amperes or the nameplate rating of the equipment, whichever is larger.
- 2.Meets the requirements of Section C405.14.5.3.2.

C405.17.5.3 System and circuit capacity management. Where system and circuit capacity management is selected in Section C405.14.5.1(2) or Section C405.14.5.2(2), the installation shall comply with Sections C405.14.5.3.1 and C405.14.5.3.2.

C405.17.5.3.1 System capacity management. The maximum equipment load on the electrical distribution equipment supplying the branch circuits(s) serving EV capable spaces, EV ready spaces, and EVSE spaces controlled by an energy management system shall be the maximum load permitted by the energy management system, but not less than 3.3 kVA per space.

C405.17.5.3.2 Circuit Capacity Management. Each branch circuit serving multiple EVSE spaces, EV ready spaces or EV capable spaces controlled by an energy management system, shall comply with one of the following:

- 1.Have a minimum capacity of 25 amperes per space.
- 2.Have a minimum capacity of 20 amperes per space for R-2 occupancies when all automobile parking spaces are EV ready spaces or EVSE spaces.

C405.17.6 EVSE Installation. EVSE shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 or UL 2594. EVSE shall be accessible in accordance with Virginia Construction Code Section 1107.

Reason Statement:

This proposal adds a new section covering Electric Vehicle Power Transfer Infrastructure as a mandatory requirement in Chapter 4 similar to Appendix CG in the 2024 IECC. These requirements were approved by the ICC appointed commercial energy code consensus committee by a two-thirds majority vote during the 2024 IECC development cycle. Adding EV ready requirements to the 2024 VECC-C ensures new commercial parking facilities have the electrical infrastructure necessary for the installation of EV charging equipment at time of construction or any time in the future. This will provide a significant cost and labor savings.

Cost Impact: The code change proposal will increase the cost

The code change proposal will increase the cost of premises-wiring systems and parking facilities for commercial projects. However, the initial cost of EV ready infrastructure is considerably less expensive compared to retrofitting and altering the electrical system and parking facility in the future. The actual cost associated with this proposal is heavily dependent on the scale and scope of the commercial project.

It should be noted NEMA proposals are developed by a member consensus process where both our bylaws and federal regulations prohibit us from discussing prices, costs, and other financial details of electrical products.

EC-C405.17(1)-24

IECC: C405.17 (New), C405.17.1 (New), C405.17.2 (New), C405.17.2.1 (New), C405.17.2.2 (New), C405.17.2.3 (New), C405.17.2.4 (New), C405.17.2.5 (New), C405.17.2.5.1 (New), C405.17.2.5.2 (New), C405.17.2.5.3 (New), C405.17.2.5.3.1 (New), C405.17.2.5.3.2 (New), C405.17.2.6 (New)

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2024 International Energy Conservation Code [CE Project]

Add new text as follows:

C405.17 ELECTRIC VEHICLE POWER TRANSFER.

C405.17.1 Definitions. AUTOMOBILE PARKING SPACE. A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office and work areas, for the parking of an automobile.

ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, electric vehicle supply equipment (EVSE), a rechargeable storage battery, a fuel cell, a photovoltaic array or another source of electric current.

ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE). A designated automobile parking space that is provided with electrical infrastructure such as, but not limited to, raceways, cables, electrical capacity, a panelboard or other electrical distribution equipment space necessary for the future installation of an EVSE.

ELECTRIC VEHICLE READY SPACE (EV READY SPACE). An automobile parking space that is provided with a branch circuit and an outlet, junction box or receptacle that will support an installed EVSE.

ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). Equipment for plug-in power transfer, including ungrounded, grounded and equipment grounding conductors; electric vehicle connectors; attached plugs; any personal protection system; and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE SPACE). An automobile parking space that is provided with a dedicated EVSE connection.

C405.17.2 Electric vehicle power transfer infrastructure. Parking facilities shall be provided with electric vehicle power transfer infrastructure in accordance with Sections C405.17.2.1 through C405.17.2.6.

C405.17.2.1 Quantity. The number of required electric vehicle (EV) spaces, EV capable spaces and EV ready spaces shall be determined in accordance with this section and Table C405.17.2.1 based on the total number of automobile parking spaces and shall be rounded up to the nearest whole number. For R-2 buildings, the C405.17.2.1 requirements shall be based on the total number of dwelling units or the total number of automobile parking spaces, whichever is less.

1. Where more than one parking facility is provided on a building site, the number of required automobile parking spaces required to have EV power transfer infrastructure shall be calculated separately for each parking facility.
2. Where one shared parking facility serves multiple building occupancies, the required number of spaces shall be determined proportionally based on the floor area of each building occupancy.
3. Installed electric vehicle supply equipment installed spaces (EVSE spaces) that exceed the minimum requirements of this section may be used to meet the minimum requirements for EV ready spaces and EV capable spaces.
4. Installed EV ready spaces that exceed the minimum requirements of this section may be used to meet the minimum requirements for EV capable spaces.
5. Where the number of EV ready spaces allocated for R-2 occupancies is equal to the number of dwelling units or to the number of

automobile parking spaces allocated to R-2 occupancies, whichever is less, requirements for EVSE spaces for R-2 occupancies shall not apply.

6. Requirements for a Group S-2 parking garage shall be determined by the occupancies served by that parking garage. Where new automobile spaces do not serve specific occupancies, the values for Group S-2 parking garage in Table C405.17.2.1 shall be used

Exception: Parking facilities serving occupancies other than R2 with fewer than 10 automobile parking spaces.

TABLE C405.17.2.1—REQUIRED EV POWER TRANSFER INFRASTRUCTURE

<u>OCCUPANCY</u>	<u>EVSE SPACES</u>	<u>EV READY SPACES</u>	<u>EV CAPABLE SPACES</u>
Group A	10%	0%	10%
Group B	15%	0%	30%
Group E	15%	0%	30%
Group F	2%	0%	5%
Group H	1%	0%	0%
Group I	15%	0%	30%
Group M	15%	0%	30%
Group R-1	20%	5%	75%
Group R-2	20%	5%	75%
Groups R-3 and R-4	2%	0%	5%
Group S exclusive of parking garages	1%	0%	0%
Group S-2 parking garages	15%	0%	30%

C405.17.2.2 EV Capable Spaces. Each EV capable space used to meet the requirements of Section C405.17.2.1 shall comply with the following:

1. A continuous raceway or cable assembly shall be installed between an enclosure or outlet located within 3 feet (914 mm) of the EV capable space and electrical distribution equipment.
2. Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with Section C405.17.2.5.
3. The electrical distribution equipment to which the raceway or cable assembly connects shall have dedicated overcurrent protection device space and electrical capacity to supply a calculated load in accordance with Section C405.17.2.5.
4. The enclosure or outlet and the electrical distribution equipment directory shall be marked: "For electric vehicle supply equipment (EVSE)."

C405.17.2.3 EV Ready Spaces. Each branch circuit serving EV ready spaces used to meet the requirements of Section C405.17.2.1 shall comply with the following:

1. Terminate at an outlet or enclosure located within 3 feet (914 mm) of each EV ready space it serves.
2. Have a minimum system and circuit capacity in accordance with Section C405.17.2.5.
3. The electrical distribution equipment directory shall designate the branch circuit as "For electric vehicle supply equipment (EVSE)" and the outlet or enclosure shall be marked "For electric vehicle supply equipment (EVSE)."

C405.17.2.4 EVSE Spaces. An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE spaces. Each EVSE installed to meet the requirements of Section C405.17.2.1, serving either a single EVSE space or multiple EVSE spaces, shall comply with the following:

1. Have a minimum system and circuit capacity in accordance with Section C405.17.2.5.
2. Have a nameplate rating not less than 6.2 kW.
3. Be located within 3 feet (914 mm) of each EVSE space it serves.
4. Be installed in accordance with Section C405.17.2.6.

C405.17.2.5 System and circuit capacity. The system and circuit capacity shall comply with Sections C405.17. 2.5.1 and C405.17.2.5.2.

C405.17.2.5.1 System capacity. The electrical distribution equipment supplying the branch circuit(s) serving each EV capable space, EV ready space and EVSE space shall comply with one of the following:

1. Have a calculated load of 7.2 kVA or the nameplate rating of the equipment, whichever is larger, for each EV capable space, EV ready space and EVSE space.

2. Meets the requirements of Section C405.17.2.5.3.1.

C405.17.2.5.2 Circuit capacity. _

The branch circuit serving each EV capable space, EV ready space and EVSE space shall comply with one of the following:

1. Have a rated capacity not less than 50 amperes or the nameplate rating of the equipment, whichever is larger.

2. Meets the requirements of Section C405.17.2.5.3.2.

C405.17.2.5.3 System and circuit capacity management. Where system and circuit capacity management is selected in Section C405.17.2.5.1 or C405.17.2.5.2, the installation shall comply with Sections C405.17. 2.5.3.1 and C405.17.2.5.3.2.

C405.17.2.5.3.1 System capacity management. The maximum equipment load on the electrical distribution equipment supplying the branch circuits(s) serving EV capable spaces, EV ready spaces and EVSE spaces controlled by an energy management system shall be the maximum load permitted by the energy management system, but not less than 3.3 kVA per space.

C405.17.2.5.3.2 Circuit capacity management. Each branch circuit serving multiple EVSE spaces, EV ready spaces or EV capablespaces controlled by an energy management system shall comply with one of the following:

1. Have a minimum capacity of 25 amperes per space.

2. Have a minimum capacity of 20 amperes per space for R-2 occupancies where all automobile parking spaces are EV ready spaces or EVSE spaces.

C405.17.2.6 EVSE installation. EVSE shall be installed in accordance with NFPA 70 and shall be listed and labeled in accordance with UL 2202 (2009 with revisions through February 2018) or UL 2594 (2016). EVSE shall be accessible in accordance with Section 1107 of the International Building Code.

Reason Statement:

The purpose of this proposal is to incorporate into Virginia's residential building code the substance of 2024 IECC's Appendix CG, which spells out requirements to install electric vehicle charging infrastructure in connection with new commercial construction. AppendixCG comes with the 2024 IECC, but activation of Appendix CG requires inserting language into the Virginia Construction Code for residential construction, which this proposal would do by adding a new Section C405.17.

Adoption of this proposal would benefit occupants and users of new commercial building—whether owners, employees, customers, or visitors—by facilitating convenient electric vehicle charging, which can readily be expanded as the need grows. Implementation would

benefit residents and the public with cost savings, pollution reduction (including greenhouse gases, ozone and carbon monoxide) and more equitable access to EVs and EV charging for residents. It would avoid the much higher costs of having to retrofit parking areas and building electrical systems.

Under the proposed Section C405.17, builders would have to provide basic levels of EV charging readiness: EV Capable Space (basic infrastructure for future installation of a branch circuit and charger); or EV Ready Space (basic infrastructure plus a branch circuit, outlet, junction box or receptacle); or EVSE Space (includes actual charging). The number of each type of EV space depends upon the type of building for which parking is provided. The numbers are tailored to reflect expected times for users to stay at a building and the fact that, while most EV charging now occurs at home, many people do not have access to EV charging where they live. Under the proposal, the greatest number of EV-related spaces are required in multifamily residential buildings, but lesser levels are required in other types of buildings. The three types of EV spaces are designed to minimize future EV charging installation costs, since retrofits are much more costly than incorporating EV infrastructure into initial construction.

By agreement among members of the ICC's committee to develop the 2024 IECC, these EV charging requirements were to have been included in the main body of the 2024 IECC (as proposed here). It was shifted to an appendix on appeal. Activating an appendix requires text in the code itself, which is the purpose of this proposal.

Virginians would benefit from a requiring minimum levels of EV charging infrastructure in new construction. EVs have many economic and health benefits for vehicle users. EVs are cheaper to use and maintain compared to vehicles with internal combustion engines (ICE). While most charging currently occurs at home, many EV owners and potential buyers do not have EV infrastructure at their dwellings or even the potential to install charging in the future. Locating at least a minimum number of chargers at places of work and business, will help to alleviate this barrier to EV adoption and afford residents of older buildings access to the benefits of EVs.

Growing EV usage is very important to Virginia for additional reasons. As explained in the ICC commentary accompanying the 2024 IECC, "The U.S. transportation sector accounted for 29 percent of the nation's greenhouse gas (GHG) emissions in 2019." That is specifically due to the traditional predominance of vehicles with internal combustion engines (ICE). Greenhouse gases from charging and operating EVs are less than 30% of GHG emissions from fueling and operating ICE vehicles. <https://theicct.org/why-evs-are-already-much-greener-than-combustion-engine-vehicles-jul25/> EVs are also far more energy efficient than burning fuels in vehicle engines.

Reducing GHG emissions is a stated policy goal in Virginia law because climate change is a current and growing danger for Virginians. (See., e.g., § 45.2-1706.1. Commonwealth Clean Energy Policy. "A. The Commonwealth recognizes that effectively addressing climate change and enhancing resilience will advance the health, welfare, and safety of the residents of the Commonwealth. The Commonwealth further recognizes that addressing climate change requires reducing greenhouse gas emissions across the Commonwealth's economy sufficient to reach net-zero emission by 2045 in all sectors, including the electric power, transportation, industrial, agricultural, building, and infrastructure sectors....") Virginia faces growing threats, including more heat-illnesses, disruption of outdoor work, worsening storms, flooding, sea level rise, supply-chain disruption, damage to crops, trees and natural resources, arrival of diseases and pests, etc.

Bringing on EVs will also reduce other air pollutants that also threaten Virginian's health and welfare. ICE vehicles are a major source of ozone and other pollutants, including carbon monoxide risks in homes with garages.

Providing EV electric infrastructure as part of new construction is no different from the building code's requiring electrical infrastructure for HVAC, machinery and appliances likely to be used in the future or from the code's requiring more efficient equipment and lighting in new buildings.

Facilitating adoption of EVs requires that drivers have access to convenient, cost-effective EV charging. That can most easily be provided as part of new construction. As recognized in the IECC commentary on Appendix CG, it is very costly and complicated to renovate EV charging infrastructure into existing buildings.

The importance of incorporating EV charging into new construction is particularly great in the case of buildings whose parking is governed by condominium or common-interest-area boards, which divergent interests can use high retrofit costs to block EV adoption by some occupants.

Cost Impact: The code change proposal will increase the cost

The cost of installing infrastructure would depend on which of the three types of EV infrastructure is involved. The costs would be lower for an EV Capable Space and not much more for the EV Ready Space option if the electrical room or panel is close to the chosen spaces. Since electricity will be installed anyway (e.g. for garage or parking lighting, fans etc.), it would not be difficult or very costly to go the extra steps during building construction when an electrician is on site.

EC-1301-24

VCC: SECTION 1301, [E] 1301.1, [E] 1301.1.1, 1301.1.1.1

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2021 Virginia Construction Code

SECTION 1301 GENERAL

[E] 1301.1 Scope. This chapter governs the design and construction of buildings for energy efficiency.

[E] 1301.1.1 Criteria. Buildings shall be designed and constructed in accordance with the *International Energy Conservation Code*.

Revise as follows:

1301.1.1.1 Changes to the *International Energy Conservation Code* (IECC). The following changes shall be made to the IECC :

-Proposal Note: While some content in items 1-5, 13-20, and 22-25 is not shown or may appear unstricken, these items are proposed to be deleted entirely. Other items in the list (6-12, 21, and 26-33) that are not shown remain unchanged.

- 1- Add Section C402.1.6 to the IECC to read:

~~C402.1.6 Groups F, S, and U.~~ Appendix CD may be used as an alternative to the *building thermal envelope* provisions of this code for Groups F, S, and U.

- 2- Add an exception to the first paragraph of Section C403.7.7 of the IECC to read:

~~Exception:~~ Where a grease duct serving a Type I hood is installed in accordance with Section 506.3 of the *International Mechanical Code*, motorized or gravity dampers shall not be installed.

- 3- Add Section C403.2.2.1 to the IECC to read:

~~C403.2.2.1 Dwelling unit mechanical ventilation.~~ Mechanical ventilation shall be provided for dwelling units in accordance with the *International Mechanical Code*.

- 4- Delete Section C403.7.5 and Table C403.7.5 of the IECC.

- 5- Delete Sections C404.5 through C404.5.2.1 of the IECC, including Tables.

- 13- Add Appendix CD to the IECC to read: (DELETE ENTIRE APPENDIX CD, INCLUDING ITEMS NOT SHOWN IN APPENDIX)

APPENDIX CD

BUILDING ENVELOPE REQUIREMENTS

CD101 Scope

~~CD101.1 General.~~ These provisions shall be permitted as an alternative to building thermal envelope requirements for *building areas containing uses that are classified as Group F, S or U.*

CD102 Building Envelope Requirements

~~CD102.1 Insulation and fenestration criteria.~~ The building thermal envelope shall meet the requirements of Tables CD102.2(1) and CD102.3 based on the climate zone specified in Chapter 3CE. Buildings with a vertical fenestration area or skylight area that exceeds that allowed in Table CD102.3 shall comply with the building envelope provisions of ASHRAE/IESNA 90.1.

CD102.2 Specific insulation requirements. Opaque assemblies shall comply with Table CD102.2(1).

CD102.2.1 Roof assembly. The minimum thermal resistance (R value) of the insulating material installed either between the roof framing or continuously on the roof assembly shall be as specified in Table CD102.2(1), based on construction materials used in the roof assembly.

Exception: Continuously insulated roof assemblies where the thickness of insulation varies 1 inch (25.4 mm) or less and where the area weighted U factor is equivalent to the same assembly with the R value specified in Table CD102.2(1).

Insulation installed on a suspended ceiling with removable ceiling tiles shall not be considered part of the minimum thermal resistance of the roof insulation.

CD102.2.2 Classification of walls. Walls associated with the building envelope shall be classified in accordance with Section CD102.2.2.1 or CD102.2.2.2.

TABLE CD102.2(1) OPAQUE THERMAL ENVELOPE INSULATION COMPONENT MINIMUM REQUIREMENTS, R-VALUE METHOD

TABLE CD102.2(2) METAL BUILDING ASSEMBLY DESCRIPTIONS

CD102.2.2.1 Above-grade walls. Above-grade walls are those walls covered by Section CD102.2.3 on the exterior of the building and completely above grade or walls that are more than 15 percent above grade.

CD102.2.2.2 Below-grade walls. Below-grade walls covered by Section CD102.2.4 are basement or first story walls associated with the exterior of the building that are at least 85 percent below grade.

CD102.2.2.3 Above-grade walls. The minimum thermal resistance (R value) of the insulating material(s) installed in the wall cavity between the framing members and continuously on the walls shall be as specified in Table CD102.2(1), based on framing type and construction materials used in the wall assembly. The R value of integral insulation installed in concrete masonry units (CMU) shall not be used in determining compliance with Table CD102.2(1). "Mass walls" shall include walls weighing at least (1) 35 pounds per square foot (170 kg/m^2) of wall surface area or (2) 25 pounds per square foot (120 kg/m^2) of wall surface area if the material weight is not more than 120 pounds per cubic foot ($1,900 \text{ kg/m}^3$).

CD102.2.4 Below-grade walls. The minimum thermal resistance (R value) of the insulating material installed in, or continuously on, the below-grade walls shall be as specified in Table CD102.2(1) and shall extend to a depth of 10 feet (3048 mm) below the outside finish ground level, or to the level of the floor, whichever is less.

CD102.2.5 Floors over outdoor air or unconditioned space. The minimum thermal resistance (R value) of the insulating material installed either between the floor framing or continuously on the floor assembly shall be as specified in Table CD102.2(1), based on construction materials used in the floor assembly. "Mass floors" shall include floors weighing at least (1) 35 pounds per square foot (170 kg/m^2) of floor surface area or (2) 25 pounds per square foot (120 kg/m^2) of floor surface area if the material weight is not more than 12 pounds per cubic foot (1900 kg/m^3).

CD102.2.6 Slabs on grade. The minimum thermal resistance (R value) of the insulation around the perimeter of unheated or heated slab-on-grade floors shall be as specified in Table CD102.2(1). The insulation shall be placed on the outside of the foundation or on the inside of a foundation wall. The insulation shall extend downward from the top of the slab for a minimum distance as shown in the table or to the top of the footing, whichever is less, or downward to at least the bottom of the slab and then horizontally to the interior or exterior for the total distance shown in the table.

CD102.2.7 Opaque doors. Opaque doors (doors having less than 50 percent glass area) shall meet the applicable requirements for doors specified in Table CD102.2(1) and be considered as part of the gross area of above-grade walls that are part of the building envelope.

GD102.3 Fenestration. Fenestration shall comply with Table CD102.3.

TABLE CD102.3 BUILDING ENVELOPE REQUIREMENTS: FENESTRATION

GD102.3.1 Maximum area. The vertical fenestration area (not including opaque doors) shall not exceed the percentage of the gross wall area specified in Table CD102.3. The skylight area shall not exceed the percentage of the gross roof area specified in Table CD102.3.

GD102.3.2 Maximum U-factor and SHGC. For vertical fenestration, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table CD102.3, based on the window projection factor. For skylights, the maximum *U*-factor and solar heat gain coefficient (SHGC) shall be as specified in Table CD102.3. The window projection factor shall be determined in accordance with Equation CD-1.

$$PF = A/B$$

$$PF = A/B$$

where:

(Equation CD-1)

PF = Projection factor (decimal); *A* = Distance measured horizontally from the furthest continuous extremity of any overhang, eave, or permanently attached shading device to the vertical surface of the glazing; *B* = Distance measured vertically from the bottom of the glazing to the underside of the overhang, eave, or permanently attached shading device.

Where different windows or glass doors have different *PF* values, they shall each be evaluated separately, or an area-weighted *PF* value shall be calculated and used for all windows and glass doors.

GD102.4 Air leakage.

GD102.4.1 Window and door assemblies. The air leakage of window and sliding or swinging door assemblies that are part of the building envelope shall be determined in accordance with AAMA/WDMA/CSA 1014.1.S.2/A440, or NFRC 400 by an accredited, independent laboratory, and labeled and certified by the manufacturer and shall not exceed the values in Section 402.4.2 of the 2006 IECC.

Exception: Site-constructed windows and doors that are weatherstripped or sealed in accordance with Section GD102.4.3.

GD102.4.2 Curtain wall, storefront glazing and commercial entrance doors. Curtain wall, storefront glazing and commercial glazed swinging entrance doors and revolving doors shall be tested for air leakage at 1.57 pounds per square foot (psf) (75 Pa) in accordance with ASTM E283. For curtain walls and storefront glazing, the maximum air leakage rate shall be 0.3 cubic foot per minute per square foot (cfm/ft²) (5.5 m³/h × m²) of fenestration area. For commercial glazed swinging entrance doors and revolving doors, the maximum air leakage shall be 1.00 cfm/ft² (18.3 m³/h × m²) of door area when tested in accordance with ASTM E283.

GD102.4.3 Sealing of the building envelope. Openings and penetrations in the building envelope shall be sealed with caulking materials or closed with gasketing systems compatible with the construction materials and location. Joints and seams shall be sealed in the same manner or taped or covered with a moisture-vapor permeable wrapping material. Sealing materials spanning joints between construction materials shall allow for expansion and contraction of the construction materials.

GD102.4.4 Outdoor air intakes and exhaust openings. Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the building envelope shall be equipped with not less than a Class I motorized, leakage-rated damper with a maximum leakage rate of 4 cfm per square foot (6.8 L/s — C m²) at 1.0 inch water gauge (w.g.) (1250 Pa) when tested in accordance with AMCA 500D.

Exception: Gravity (nonmotorized) dampers are permitted to be used in *buildings* less than three stories in height above grade.

GD102.4.5 Loading dock weather seals. Cargo doors and loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in the doorway.

CD102.4.6 Vestibules. A door that separates conditioned space from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

Exceptions:

1. *Buildings* in Climate Zones 1 and 2 as indicated in Figure C301.1 and Table C301.1.
2. Doors not intended to be used as a *building* entrance door, such as doors to mechanical or electrical equipment rooms.
3. Doors opening directly from a sleeping unit or dwelling unit.
4. Doors that open directly from a space less than 3,000 square feet (298 m²) in area.
5. Revolving doors.
6. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

CD102.4.7 Recessed luminaires. When installed in the building envelope, recessed luminaires shall meet one of the following requirements:

1. Type IC-rated, manufactured with no penetrations between the inside of the recessed fixture and ceiling cavity and sealed or gasketed to prevent air leakage into the unconditioned space.
2. Type IC or non-IC-rated, installed inside a sealed box constructed from a minimum 0.5-inch-thick (12.7 mm) gypsum wallboard or constructed from a preformed polymeric vapor barrier, or other airtight assembly manufactured for this purpose, while maintaining required clearances of not less than 0.5-inch (12.7 mm) from combustible material and not less than 3 inches (76 mm) from insulation material.
3. Type IC-rated, in accordance with ASTM E283 admitting no more than 2.0 cubic feet per minute (cfm) (0.944 L/s) of air movement from the conditioned space to the ceiling cavity. The luminaire shall be tested at 1.57 psf (75 Pa) pressure difference and shall be labeled.

CD102.5 Moisture control. All framed walls, floors and ceilings not ventilated to allow moisture to escape shall be provided with an approved vapor retarder having a permeance rating of 1 perm (5.7 × 10⁻¹¹ kg/Pa · s · m²) or less, when tested in accordance with the desiccant method using Procedure A of ASTM E96. The vapor retarder shall be installed on the warm-in-winter side of the insulation.

Exceptions:

1. *Buildings* located in Climate Zones 1 through 3 as indicated in Figure C301.1 and Table C301.1.
2. In *construction* where moisture or its freezing will not damage the materials.
3. Where other approved means to avoid condensation in unventilated framed wall, floor, roof and ceiling cavities are provided.

14. Change the wood frame wall *R* value categories for Climate Zones 3A, 4A and 5A in Table R402.1.3 to read:

			Wood Frame Wall <i>R</i> Value
			15 or 13, 1 st

15. Change the frame wall *U* factor categories for Climate Zones 3A, 4A and 5A in Table R402.1.2 to read:

			Frame Wall <i>U</i> Factor
			0.079

16. Add an exception to Section R401.3 of the IECC to read:

Exception: Where approved, certificates for multifamily dwelling units shall be permitted to be located off site at an identified location.

17. Change Section R402.2.4 of the IECC to read:

R402.2.4 Access hatches and doors. Access doors from conditioned spaces to unconditioned spaces (e.g., attics and crawl spaces) shall be weatherstripped and insulated in accordance with the following values:

1. Hinged vertical doors shall have a minimum overall R-5 insulation value.
2. Hatches and scuttle hole covers shall be insulated to a level equivalent to the insulation on the surrounding surfaces.
3. Pull down stairs shall have a minimum of 75 percent of the panel area having R-5 rigid insulation.

Access shall be provided to all equipment that prevents damaging or compressing the insulation. A wood framed or equivalent baffle or retainer is required to be provided when loose fill insulation is installed, the purpose of which is to prevent the loose fill insulation from spilling into the living space when the attic access is opened and to provide a permanent means of maintaining the installed R-value of the loose fill insulation.

18. Change the title of the "Insulation Installation Criteria" category of Table R402.4.1.1 ; change the "Shower/tub on exterior wall" category of Table R402.4.1.1 , and add footnotes "c" and "d" to Table R402.4.1.1 to read: (PROPOSAL NOTE: Delete remainder of item #18, including changes to Tables)

19. Change Section R402.4.1.2 of the IECG to read:

R402.4.1.2 Testing. The *building* or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hour. Testing shall be conducted in accordance with RESNET/IGC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be conducted by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia *registered design professional*, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater. The party conducting the test shall have been trained on the equipment used to perform the test. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

Note: Should additional sealing be required as a result of the test, consideration may be given to the issuance of a temporary certificate of occupancy in accordance with Section 116.1.1.

During testing:

1. Exterior windows and doors and fireplace and stove doors shall be closed, but not sealed beyond the intended weatherstripping or other infiltration control measures.
2. Dampers, including exhaust, intake, makeup air, backdraft and flue dampers, shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.

20. Change Section R402.4.1.3 of the IECG to read:

R402.4.1.3 Leakage rate. When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 3 through 5, when tested in accordance with Section R402.4.1.2.

22. Change the last paragraph of Section R403.3.5 of the IECG to read:

A written report of the results of the test shall be signed by the party conducting the test and provided to the code official. The licensed mechanical contractor installing the mechanical system shall be permitted to perform the duct testing. The contractor shall have been trained on the equipment used to perform the test.

23. Change Section R403.3.7 of the IECG to read:

R403.3.7 Building cavities. *Building* framing cavities used as ducts or plenums shall comply with IRC Section M1601.1.1.

24. Change Section R403.7 of the IECC to read:

R403.7 Equipment and appliance sizing. Heating and cooling equipment and appliances shall be sized in accordance with ACCA Manual S or other approved sizing methodologies based on building loads calculated in accordance with ACCA Manual J or other approved heating and cooling calculation methodologies.

Exception: Heating and cooling equipment and appliance sizing shall not be limited to the capacities determined in accordance with Manual S or other approved sizing methodologies where any of the following conditions apply:

1. The specified equipment or appliance utilizes multi-stage technology or variable refrigerant flow technology and the loads calculated in accordance with the approved heating and cooling methodology fall within the range of the manufacturer's published capacities for that equipment or appliance.
2. The specified equipment or appliance manufacturer's published capacities cannot satisfy both the total and sensible heat gains calculated in accordance with the approved heating and cooling methodology and the next larger standard size unit is specified.
3. The specified equipment or appliance is the lowest capacity unit available from the specified manufacturer.

25. Change Section R406.3.2 to read:

Section N1106.3.2 (R406.3.2) Onsite renewables are included. When onsite renewable energy is included for compliance using the Energy Rating Index (ERI) analysis per Section N1106.4 (R406.4), the building thermal envelope shall be greater than or equal to levels of energy efficiency and solar heat gain coefficient in Table N1102.1.2 (R402.1.2), with a ceiling U factor of 0.026 and a frame wall U factor of 0.060, or Table N1102.1.3 (R402.1.3), with a ceiling R value of 49 and a wood frame wall R value of 20 or 13+5.

Reason Statement:

The purpose of this proposal is to make Virginia's energy efficiency standards for new construction "at least as stringent as" the latest IECC for new commercial and residential construction. It would remove past weakening amendments to the IECC for new construction. (Efficiency standards for construction involving existing buildings are left for separate consideration.)

Virginia's residential building code has been behind the IECC's energy efficiency standards for over a decade -- since the 2012 IECC update. Virginia is even farther behind today since it failed to strengthen code standards for key building efficiency measures in the cycles that have followed. To make matters worse, in the 2021 cycle, it rolled back standards to 2006 levels for several broad categories of commercial buildings (F, S & U) which appear may include some data centers -- the largest users of electricity in the state which threaten to upend rates for all Virginians. That rollback was not supported by any substantial evidence concerning the many types of buildings; nor has there been any substantial evidence for any of the other weakening amendments that would be eliminated by this proposal. Each weakening amendment is allowed to roll forward cycle after cycle, despite the IECC being reaffirmed or made even more stringent.

The IECC has repeatedly tightened energy efficiency standards over the past 20 years. Apart from a relaxation of ceiling insulation standards for some zones between the 2021 and 2024 cycles, the IECC has resisted pleas to weaken efficiency standards. Evidence of practical experience and new technologies has supported the IECC's continued enhancement of efficiency standards.

On the other hand, in the 2024 cycle the IECC introduced new levels of design and equipment flexibility to give builders a greater

variety of ways to meet the overall levels of efficiency required. The increase in energy efficiency options while still improving overall efficiency strongly undercuts arguments to retain past weakening amendments. Indeed, retaining those outdated amendments would undercut the overall efficiency targets set by the IECC as weaker prescriptive standards would undermine Simulated Performance and ERI energy savings targets.

Improving energy efficiency in new buildings is important to occupants and users —whether owners or tenants or employees or producers of goods or services --, since it would help them save money and energy, increase indoor comfort, make for healthier buildings, and improve workplaces for decades. Greater energy efficiency will also serve the public by reducing pressure on utilities to raise rates in order to build and operate more energy delivery capabilities, and by reduce the air pollution that drives climate impacts and other harms to Virginia's health, property and economy.

Importantly, the U.S. Department of Energy and the Pacific Northwest National Laboratories have analyzed energy efficiency standards for residential and commercial building codes for more than 20 years. They have consistently found that full adoption of the IECC and ASHRAE updates so far this century will save energy and money. They have also found that, by reducing building energy usage, these model code updates will reduce pollution, including climate pollution.

Adoption of this proposal is vital to properly implementing Virginia law. Sections 36-99A and 36-99B of the Virginia Code states that building codes are required to "protect the health, safety and welfare of the residents of the Commonwealth" and that adjustments to reduce construction costs must nevertheless be "consistent with recognized standards of health, safety, energy efficiency and water efficiency." VIRGINIA ACTS OF ASSEMBLY – 2021 SPECIAL SESSION I, CHAPTER 425, Section 1 (referred to herein as "H2227"), which was enacted in 2021, calls for adoption of energy efficiency standards that are "at least as stringent" as the latest IECC considering factors such as consumer costs "over time" and air pollution. The accumulated evidence from DOE and PNNL leave no doubt that weakening amendments should be removed from the energy efficiency standards applicable to new residential and commercial construction.

This proposal attempts to delete only standards that are not "at least as stringent" as the latest IECC. If any of the proposed deletions are beneficial and "at least as stringent" as the latest IECC, we would discuss amending this proposal.

Cost Impact: The code change proposal will increase the cost

Fully implementing the latest IECC will add to construction costs. However, as DOE and PNNL have shown, building owners, residents and users will save money and energy for decades after the buildings are constructed. Thus, the net costs will be reduced.

Further, as discussed in the Reason section, Virginia law states that construction costs should be minimized "consistent with" the latest model codes and that cost considerations must reflect the cost savings over time, not just initial costs. Further, building codes must be designed to serve the public's health, safety and welfare, including the benefits from reducing air pollution.

REC-R402.1.2-24

VRC: TABLE N1102.1.2 (R402.1.2), TABLE N1102.1.3 (R402.1.3); IRC: TABLE N1102.1.3 (R402.1.3)

Proponents: DeAnthony Pierce, City of Roanoke, representing Virginia Building & Code Officials Association
(deanthony.pierce@roanokeva.gov)

2021 Virginia Residential Code

Revise as follows:

TABLE N1102.1.2 (R402.1.2) MAXIMUM ASSEMBLY *U*-FACTORS^a AND FENESTRATION REQUIREMENTS

Portions of table not shown remain unchanged.

CLIMATE ZONE	FRAME WALL <i>U</i> -FACTOR
3	0.079 0.060
4 except Marine	0.079 0.060
5 and Marine 4	0.079 0.060

For SI: 1 foot = 304.8 mm.

- Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.
- Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U*-factor shall not exceed 0.360.
- The SHGC column applies to all glazed fenestration.
Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
- There are no SHGC requirements in the Marine Zone.
- A maximum *U*-factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - Above 4,000 feet in elevation above sea level, or
 - In windborne debris regions where protection of openings is required by Section R301.2.1.2.

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

Portions of table not shown remain unchanged.

CLIMATE ZONE	WOOD FRAME WALL <i>R</i> -VALUE ⁹
3	15 or 13¹⁰ 20 or 13&5ci or 15&2.9ci ⁹

CLIMATE ZONE	WOOD FRAME WALL R-VALUE
4 except Marine	15 or 13+5 20 or 13&5ci or 15&2.9ci ^a
5 and Marine 4	15 or 13+5 20 or 13&5ci or 15&2.9ci ^a

For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
- c. “5ci or 13” means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “10ci or 13” means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “15ci or 19 or 13&5ci” means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs, as indicated in the table. The slab-edge insulation for heated slabs shall not be required to extend below the slab.
- e. There are no SHGC requirements in the Marine Zone.
- f. Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.
- g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, “13&5” means R-13 cavity insulation plus R-5 continuous insulation.
- h. Mass walls shall be in accordance with Section N1102.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- i. A maximum *U*-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:
 1. Above 4,000 feet in elevation, or
 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

2024 International Residential Code

Revise as follows:

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

Portions of table not shown remain unchanged.

For SI: 1 foot = 304.8 mm. NR = Not Required, ci = Continuous Insulation.

- h. ~~“30 or 19+7.5ci or 20ci” means R-30 cavity insulation alone or R-19 cavity insulation with R-7.5 continuous insulation or R-20 continuous insulation alone.~~ “20 or 13+ 5ci or 15+2.9ci” means R-20 cavity insulation alone or R-13 cavity insulation with R-5 continuous insulation or R-15 cavity insulation with R-2.9 continuous insulation.

Reason Statement:

This proposal is meant to be a replace Virginia’s Amended “R-15 or 13+1” wall insulation requirement, which has been in-place since the 2012 Code Cycle.

When the Amendment was adapted, it generally aligned with the requirements in the Model I-Codes. Since then, prescriptive insulation values have incrementally increased in the Model I-Codes, while Virginia’s Wall insulation has remained the same.

This proposal will put Virginia’s insulation requirements, roughly in-line with the 2018 Model I-Codes.

Cost Impact: The code change proposal will increase the cost

If adopted, this code change will increase the cost to builders who generally use 2x4 framing, and R-15 batt insulation, since it will require the use of either 2x6 framing, or added continuous insulation on the exterior.

The cost of framing would also increase since window framing around exterior window and door openings would have to be extended, to facilitate the continuous insulation, or if 2x6 studs are used.

2.9 continuous insulation with R-15 batt insulation was determined to be roughly equivalent to R-13 + 5 continuous. Through preliminary research, R-2.9 rigid board insulation was regularly available at retail chains such as Lowes and Home Depot. For this reason, R-15 with 2.9 continuous was added as an option for builders who prefer to build with 2x4 studs, and use R-15 insulation.

Attached Files

- **VBCOA 2024 Code Change Proposal_N1102 Tables.pdf**
<https://va.cdpaccess.com/proposal/1408/2011/files/download/946/>

REC-R402.1.2(1)-24

IRC: TABLE N1102.1.2 (R402.1.2), TABLE N1102.1.3 (R402.1.3)

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2024 International Residential Code

Revise as follows:

TABLE N1102.1.2 (R402.1.2) MAXIMUM ASSEMBLY U-FACTORS^a AND FENESTRATION REQUIREMENTS
Portions of table not shown remain unchanged.

CLIMATE ZONE	3	4 EXCEPT MARINE	5 AND MARINE 4
CEILING U-FACTOR	0.090 0.026	0.026 0.024	0.026 0.024

For SI: 1 foot = 304.8 mm.

- a. Nonfenestration *U*-factors and *F*-factors shall be obtained from measurement, calculation, an approved source or Appendix NF where such appendix is adopted or approved.
- b. Mass walls shall be in accordance with Section N1102.2.6. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- c. In Warm Humid locations as defined by Figure N1101.7 and Table N1101.7, the *basement wall U*-factor shall not exceed 0.360.
- d. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - 1. Above 4,000 feet in elevation above sea level, or
 - 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.
- e. *F*-factors for slabs shall correspond to the *R*-values of Table N1102.1.3 and the installation conditions of Section N1102.2.10.1.

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a
Portions of table not shown remain unchanged.

CLIMATE ZONE	3	4 EXCEPT MARINE	5 AND MARINE 4
CEILING R-VALUE	38 49	49 60	49 60

For SI: 1 foot = 304.8 mm.NR = Not Required, ci = Continuous Insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. “5ci or 13” means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “10ci or 13” means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “15ci or 19 or 13&5ci” means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- c. Slab insulation shall be installed in accordance with Section N1102.2.10.1.
- d. Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.

- e. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, “13&5” means R-13 cavity insulation plus R-5 continuous insulation.
- f. Mass walls shall be in accordance with Section N1102.2.6. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- g. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - 1. Above 4,000 feet in elevation.
 - 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.
- h. “30 or 19+7.5ci or 20ci” means R-30 cavity insulation alone or R-19 cavity insulation with R-7.5 continuous insulation or R-20 continuous insulation alone.

Reason Statement:

This proposal reverses an efficiency rollback incorporated into the 2024 *IECC* by restoring the ceiling insulation R-values to R-60 for Virginia's climate zones (which is the current requirement in the Uniform Construction Code). This requirement was rolled back in the 2024 *IECC* as part of a large compromise among *IECC*-Residential Development Committee Members referred to as the “omnibus.” However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 *IECC* by the ICC Board of Directors as a result of several appeals, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 *IECC* but for the omnibus compromise, and we recommend that Virginia adopt prescriptive envelope requirements at least as efficient as the 2021 *IECC*. Ceiling insulation is one of the longest-lasting efficiency measures in a building and will provide comfort and energy savings for occupants in all seasons, as well as improved passive survivability in the event of natural disasters and long-term power outages.

Cost Impact: The code change proposal will not increase or decrease the cost

This proposal will maintain Virginia's current ceiling insulation prescriptive baseline, so there will be no increase in construction costs. However, if Virginia reduces ceiling insulation requirements (per the 2024 *IECC*), this would increase costs for homeowners over the 70-100 year useful life of the building.

REC-R402.1.2(2)-24

VRC: TABLE N1102.1.2 (R402.1.2), TABLE N1102.1.3 (R402.1.3); VCC: 1301.1.1.1

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2021 Virginia Residential Code

Revise as follows:

TABLE N1102.1.2 (R402.1.2) MAXIMUM ASSEMBLY *U*-FACTORS^a AND FENESTRATION REQUIREMENTS

Portions of table not shown remain unchanged.

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR ^f	SKYLIGHT <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{d, e}	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
3	0.30	0.55	0.25	0.026	0.060 0.079	0.098	0.047	0.091c	0.136
4 except Marine	0.30	0.55	0.40	0.024	0.045 0.079	0.098	0.047	0.059	0.065
5 and Marine 4	0.30	0.55	0.40	0.024	0.045 0.079	0.082	0.033	0.050	0.055

For SI: 1 foot = 304.8 mm.

- Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.
 - Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
 - In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U*-factor shall not exceed 0.360.
 - The SHGC column applies to all glazed fenestration.
- Exception:** In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
- There are no SHGC requirements in the Marine Zone.
 - A maximum *U*-factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - Above 4,000 feet in elevation above sea level, or
 - In windborne debris regions where protection of openings is required by Section R301.2.1.2.

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

Portions of table not shown remain unchanged.

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR ^{b, i}	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEILING <i>R</i> -VALUE	WOOD FRAME WALL <i>R</i> -VALUE ^g	MASS WALL <i>R</i> -VALUE ^h	FLOOR <i>R</i> -VALUE	BASEMENT ^{c, g} WALL <i>R</i> -VALUE	SLAB ^d <i>R</i> -VALUE & DEPTH	CRAWL SPACE ^{c, g} WALL <i>R</i> -VALUE
3	0.30	0.55	0.25	49	20 or 13&5ci or 0&15ci 45 or 13+ ^g	8/13	19	5ci or 13 ^f	10ci, 2 ft	5ci or 13 ^f
4 except Marine	0.30	0.55	0.40	60	30 or 20&5ci or 13&10ci or 0&20ci 45 or 13+ ^g	8/13	19	10ci or 13	10ci, 4 ft	10ci or 13

5 and Marine 4	0.30	0.55	0.40	60	30 or 20&5ci or 13&10ci or 0&20ci 15 or 13+19	13/17	30	15ci or 19 or 13&5ci	10ci, 4 ft	15ci or 19 or 13&5ci
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For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.

Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
- c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13&5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs, as indicated in the table. The slab-edge insulation for heated slabs shall not be required to extend below the slab.
- e. There are no SHGC requirements in the Marine Zone.
- f. Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.
- g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13&5" means R-13 cavity insulation plus R-5 continuous insulation.
- h. Mass walls shall be in accordance with Section N1102.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- i. A maximum *U*-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:
 1. Above 4,000 feet in elevation, or
 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the *International Energy Conservation Code* (IECC). The following changes shall be made to the IECC :

14. Change the wood frame wall *R* value categories for Climate Zones 3A, 4A and 5A in Table R402.1.3 to read:

		Wood Frame Wall <i>R</i> Value
		15 or 13+1 st

15. Change the frame wall *U* factor categories for Climate Zones 3A, 4A and 5A in Table R402.1.2 to read:

		Frame Wall <i>U</i> Factor
		0.070

Reason Statement:

This proposal will reduce energy costs for homeowners and improve comfort and passive survivability in new homes by adopting the wall insulation requirements as they appear in the 2021 and 2024 IECC. Virginia is now several cycles behind the model energy code in requirements that apply to wall insulation.

	IECC Wall Insulation R-Value (CZ4)	VA UCC Wall Insulation R-Value (CZ4)
2009	13	13
2012	20 or 13+5	15 or 13+1
2015	20 or 13+5	15 or 13+1
2018	20 or 13+5	15 or 13+1
2021	30 or 20+5 or 13+10 or 0+20	15 or 13+1
2024	30 or 20+5 or 13+10 or 0+20	

Virginia currently allows 75% higher wall U-factors (less stringent) than the 2021/24 IECC. That means Virginia homes allow 75% more heat transfer through the opaque walls than a home built to the 2021 or 2024 IECC. While we understand that initial construction costs are higher with increased insulation requirements, the long-term benefits in lower energy bills and increased comfort for the building owners/occupants are well-documented. Wall insulation is most cost-effectively installed at construction and is likely to remain unchanged over the useful life of the building. The homes constructed today will generate roughly 1200 utility bills (100 years x 12 months), and the amount of wall insulation will directly impact what the homeowner pays every month. It is critical to build new homes to reduce energy use wherever feasible, particularly in the systems and components that will last the longest. Because the IECC provides a wide range of compliance options -- prescriptive, Total UA, simulated performance, Energy Rating Index -- an increase in wall insulation requirements may not require a complete redesign of the proposed home, as long as the home achieves the same overall level of energy savings.

Cost Impact: The code change proposal will increase the cost

In its analysis for the efficiency improvements in the 2021 IECC, the U.S. Department of Energy estimated that the increased construction cost of an additional R-5 continuous insulation would be \$0.98/ft² wall area, or \$374.96 for the multifamily prototype/\$1,961.96 for the single-family prototype. This improvement was part of a 30-year life-cycle energy cost savings of \$2,243 in climate zone 4, with an estimated payback period of 12.4 years. See U.S. Department of Energy, *National Cost-Effectiveness of the Residential Provisions of the 2021 IECC* (June 2021).

REC-R402.1.2(4)-24

VCC: 1301.1.1.1 (New)

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the IECC. The following changes shall be made to the IECC:. (Portions of code section not shown remain unchanged.) ~~15. Change the frame wall U factor categories for Climate Zones 3A, 4A and 5A in Table R402.1.2 to read:~~

	Frame Wall U Factor
	0.079

~~16. Change the wood frame wall R Value categories for Climate Zones 3A, 4A, and 5A in Table R402.1.3 to read:~~

	Wood Frame Wall R Value Wood Frame Wall R Value
	15 or 13+1

Reason Statement:

The purpose of this proposal is to bring Virginia's standards for wall insulation into compliance with the 2024 IECC.

Virginia's residential building code has been behind the IECC's wall energy efficiency standards for over a decade -- since the 2012 IECC update. Virginia is even farther behind today since it failed to strengthen code standards for wall insulation to adopt the 2021 IECC standards, which strengthened wall insulation standards beyond the IECC's 2012 level, and which remain in the 2024 IECC standards.

Despite a decade of actual experience, IECC never weakened the wall insulation standards to levels below the 2012 IECC standards. Instead, as noted, the IECC strengthened the wall insulation standards in 2021.

Tightening wall insulation standards is important to residents —whether owners or tenants—, since it would help them save money, and experience greater comfort and a healthier home for decades after the dwelling is built.

Tightening prescriptive construction standards for wall insulation will help to

- (a) reduce occupancy costs, including for heating and conditioning of air in the dwelling,
- (b) reduce exposure to mold that can build up in walls,
- (c) increase residents' comfort,
- (d) increase physical and economic resiliency to power outages, climate change and rising energy prices,
- (e) reduce gaps for pests to enter the dwelling,
- (f) reduce pressure on utilities to raise rates in order to build and operate more energy delivery capabilities, and
- (g) reduce the air pollution that drives climate impacts and other harms to Virginia's health, property and economy.

Legal Standards. Remaining at 5.0 ACH level would leave Virginia's building code out of compliance with statutory standards. **Sections 36-99A and 36-99B of the Virginia Code** states that building codes are required to "protect the health, safety and welfare of the residents of the Commonwealth" and that adjustments to reduce construction costs must nevertheless be "**consistent with recognized standards of health, safety, energy efficiency and water efficiency.**" VIRGINIA ACTS OF ASSEMBLY – 2021 SPECIAL SESSION I, CHAPTER 425, Section 1 (referred to herein as "**H2227**"), which was enacted in 2021, calls for adoption of energy efficiency standards that are "at least as stringent" as the latest IECC considering factors such as consumer costs "over time" and air pollution.

Cost and energy savings. Beginning with its review of the 2012 IECC, in which the 3.0 ACH standard was first adopted, the U.S. Department of Energy and the Pacific Northwest National Laboratories (collectively DOE) has found that residents would save money from full implementation of each IECC update from 2012-2024 even after considering incremental purchase and mortgage costs. Focusing on the three most significant IECC updates containing the 3.0 ACH standard, DOE found that, over 30 years, lifecycle savings (i.e., net of additional purchase and mortgage costs): **full implementation of the 2012 IECC** (which introduced the 3.0 ACH requirement for Virginia's climate zone) would save average Virginia residents **\$5,836, if adopted**; **full implementation of the 2021 IECC** would save Virginia residents **\$8,376, if adopted**; and **full implementation of the 2024 IECC** would save residents of Virginia's Climate Zone 4 **\$3,790 and Zones 2 and 5 an average of \$2,502 compared to 2021 IECC**. Savings would have been achieved year in and year out, with rapid payback and lasting for decades. [2]

Collectively, Virginians would save billions of dollars in energy costs from full implementation of the IECC, greatly benefiting residents and Virginia's economy. In its July 2021 report on "Cost-Effectiveness of the 2021 IECC for Residential Buildings in Virginia" (PNNL-31627), PNNL found that aggregate energy cost savings for Virginia residents from adopting the full 2021 IECC would be \$7,192,000 in the first year and \$2,487,000,000 over 30 years. Virginia would achieve substantial pollution reductions and add jobs.

Significantly, even as it preserved the 2021 IECC's prescriptive wall insulation standards, the 2024 IECC offered's builders greater flexibility to achieve total efficiency targets through Simulated Building Performance and ERI compliance paths. These performance-based paths permit builders to trade some efficiency measures for other efficiency measures, provided they meet the code's overall efficiency goals. Importantly, however, the 2024 IECC's compliance flexibility are expressly tied to the 2024 Prescriptive Path's standards for envelope efficiency, including wall insulation. **The added flexibility was not intended to permit builders to reduce efficiency from a state-weakened baseline below the 2024 IECC's prescriptive standards for walls or otherwise.** Such double-dipping would be anything but "consistent with" or "at least as stringent as" the 2024 IECC.

Pollution Reductions. DOE has also repeatedly found that full compliance with the IECC's updates will reduce energy use and air pollution, including greenhouse gas pollution, which is critical to Virginians' future. Energy use in buildings is one of the largest drivers of CO2 emissions in Virginia. By cutting energy usage, **full implementation of the IECC's efficiency standards without weakening amendments would reduce air pollution, including greenhouse gas pollution that is driving climate change.** DOE found that full implementation of the 2024 IECC alone would reduce carbon emissions by 6.5% compared to the 2021 IECC, and the 2021 IECC would reduce carbon emissions by 8.7% compared to the prior IECC. (Full implementation of just the 2021 IECC "**will reduce statewide CO2 emissions over 30 years by 28,420,000 metric tons**, equivalent to the annual CO2 emissions of 6,181,000 cars on the road (1 MMT CO2 = 217,480 cars driven/year).") Applying the social cost of carbon to the CO2 reductions recognizes huge economic savings from to Virginia and the U.S. [3]

Given the 50-100 lifespans of new buildings, the accumulation of more efficient buildings over years will have significant impacts on reducing future climate and other pollution. Conversely, permitting less efficient new building to be constructed under weaker building code standards will have the opposite effect: driving up pollution and climate driven harms to all Virginians.

Climate change is already harming Virginia, and the harms will get much worse if we do not sharply reduce GHG emissions (particularly CO2 and methane). Growing climate dangers include harms to communities, infrastructure, people, property and the economy from rising seas, worsening storms and more severe rainfall events. Growing dangers also include rising atmospheric and water temperatures that threaten worsening heat-related illnesses, limits on economic activity, agriculture, fisheries, and our natural heritage. The likelihood of mitigating and recovering from those harms declines the longer we delay maximizing energy efficiency and minimizing GHG pollution.

--[1] See IECC; <https://basc.pnnl.gov/information/infiltration-meets-ach50-requirements> ; <http://passivehousebuildings.com/books/phc-2019/five-principles-of-passive-house-design-and-construction/> .

--[2] The U.S. Department of Energy and Pacific Northwest National Laboratories found that **full compliance with the 2012 IECC, including its stronger standards for wall insulation**, would save money even after considering purchase and mortgages costs and otherwise benefit residents compared to earlier standards. DOE/PNNL, **National Energy Cost Savings for New Single and Multifamily Homes, A Comparison of the 2006, 2009, and 2012 Editions of the IECC**, <https://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf> . Subsequently, DOE found that the 2021 IECC update, which strengthened wall insulation standards again, would reduce energy use and save money over the life of the dwelling, even after considering purchase and mortgage costs. DOE/PNNL, **Cost-Effectiveness of the 2021 IECC for Residential Buildings in Virginia** (July 2021). And, DOE/PNNL found that the 2024 IECC would save money for residents even after considering purchase and mortgage costs, **Energy Savings Analysis: 2024 IECC for Residential Buildings** (Dec. 2024); <https://www.energycodes.gov/national-and-state-analysis>. PNNL, **National Cost-Effectiveness of the Residential Provisions of the 2024 IECC** (January 2025). See also <https://www.energycodes.gov/determinations>

--[3] PNNL, **Impacts of Model Building Energy Codes** (Nov. 2023) (estimating climate and health benefits in excess of \$40,000,000,000 2010-2040 from residential energy building code). See also Notes [1][2] and PNNL report cited above.

Cost Impact: The code change proposal will increase the cost

Increasing the amount of wall insulation will somewhat increase construction costs. However, many choices affect the incremental costs, and the flexibility afforded by the Simulated Performance and ERI paths will enable builders to reduce costs.

Moreover, as discussed in the Reason Statement, **repeated findings by DOE and PNNL have shown that there is a net reduction of**

costs to residents when the IECC is fully implemented: (a) the cost increases are more than offset by the resulting energy cost savings; (b) the cost savings will last for decades and be accompanied by other important benefits, including more comfortable and healthier dwellings and greater resiliency to power outages and energy cost increases.

As found by DOE/PNNL (see notes in Reason Statement), residents will save money by keeping up with the IECC. Looking at the three IECC updates relevant to wall insulation, the savings are substantial.

Savings from Full Adoption of 2024, 2021 and 2012 IECC

National or Virginia Average	Life-cycle Cost Savings
Nat'l – Full 2024 IECC Savings CZ 4, 3 & 5	CZ4 - \$3,790 CZ3 - \$2,509 CZ5 - \$2,496
VA - Full 2021 IECC Savings	\$8,376
VA- Full 2012 IECC Savings	\$5,836

Energy cost savings over time are critical to defining “affordability” of housing.

- By reducing residents’ occupancy costs (including utilities) and making dwellings more resilient, the 2024 IECC’s energy efficiency requirements will make housing more affordable for owner-occupants and tenants for decades, not just at a buyer’s closing date.
- H2227 which requires a decision based on savings and other benefits over time compared to construction costs, not by just looking at construction costs.
- State and federal laws and policies define “affordability” in terms of occupancy costs, including mortgages, rents and utility costs.
- Insulation represents only a small component of total construction costs. Insulation represents 0.017 of the cost of construction, according to a published survey. *“How Much Does It Cost To Build A House In 2023?”* <https://www.forbes.com/home-improvement/contractor/cost-to-build-a-house/>. Yet, unlike other housing construction costs, energy efficiency saves money for residents during many years of occupancy, making housing more affordable.
- There are programs in Virginia to assist low-income residents with costs of downpayments, mortgages and rents and to subsidize builders’ construction of low-income housing. See JLARC, *Report to the Governor and the General Assembly, Affordable Housing in Virginia 2021*.

REC-R402.4.1.2-24

VRC: N1102.4.1.2, N1102.4.1.3; VCC: 1301.1.1.1

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2021 Virginia Residential Code

Delete without substitution:

N1102.4.1.2 (R402.4.1.2) Testing. ~~The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding 5 air changes per hour. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779, or ASTM E1827 and reported at a pressure of 0.2 inches w.g. (50 Pa). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be conducted by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia registered design professional, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater. The party conducting the test shall have been trained on the equipment used to perform the test. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.~~

~~**Note:** Should additional sealing be required as a result of the test, consideration may be given to the issuance of temporary certificate of occupancy in accordance with Section 116.1.1.~~

~~**During testing:**~~

- ~~1. Exterior windows and doors and fireplace and stove doors shall be closed, but not sealed beyond the intended weather stripping or other infiltration control measures;~~
- ~~2. Dampers, including exhaust, intake, makeup air, backdraft, and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;~~
- ~~3. Interior doors, if installed at the time of the test, shall be open;~~
- ~~4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;~~
- ~~5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and~~
- ~~6. Supply and return registers, if installed at the time of the test, shall be fully open.~~

~~**Exception:** When testing individual dwelling units, an air leakage rate not exceeding 0.30 cubic feet per minute per square foot [$0.008 \text{ m}^3/(\text{s} \times \text{m}^2)$] of the dwelling unit enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch water gauge (50 Pa), shall be permitted in all climate zones for:~~

- ~~1. Attached single and multiple family building dwelling units.~~
- ~~2. Buildings or dwelling units that are 1,500 square feet (139.4 m^2) or smaller.~~

~~Mechanical ventilation shall be provided in accordance with Section M1505 of this code or Section 403.3.2 of the International Mechanical Code, as applicable, or with other approved means of ventilation.~~

N1102.4.1.3 (R402.4.1.3) Leakage rate. ~~When complying with Section N1101.2.1 (R401.2.1), the building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 3 through 5, when tested in accordance with Section N1102.4.1.2 (R402.4.1.2).~~

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the International Energy Conservation Code (IECC). The following changes shall be made to the IECC :

19. Change Section R402.4.1.2 of the IECC to read:

R402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hour. Testing shall be conducted in accordance with RESNET/IGC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be conducted by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia *registered design professional*, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater. The party conducting the test shall have been trained on the equipment used to perform the test. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

Note: Should additional sealing be required as a result of the test, consideration may be given to the issuance of a temporary certificate of occupancy in accordance with Section 116.1.1.

During testing:

1. Exterior windows and doors and fireplace and stove doors shall be closed, but not sealed beyond the intended weatherstripping or other infiltration control measures.
2. Dampers, including exhaust, intake, makeup air, backdraft and flue dampers, shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.

20. Change Section R402.4.1.3 of the IECC to read:

R402.4.1.3 Leakage rate. When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 3 through 5, when tested in accordance with Section R402.4.1.2.

Reason Statement:

This proposal would improve the efficiency and durability of residential buildings and help maintain healthier indoor air quality by incorporating the air leakage testing requirements of the 2024 IECC into Virginia's code. Since the 2012 edition, the IECC has required all new residential dwellings in Virginia's climate zones to be tested and to verify a maximum total envelope leakage of 3.0 ACH50. However, Virginia did not adopt a testing requirement until the 2018 edition of the VCC, and set the maximum leakage allowance at 5.0 ACH50. That requirement remained unchanged in the 2021 VCC update, even though the 2021 IECC adopted additional flexibility that allows code users several alternatives for meeting the air tightness requirements. We believe Virginia is ready to catch up with the IECC envelope air leakage requirements. A well-sealed, verified thermal envelope will provide energy savings and promote better indoor air quality over the 70- to 100-year useful life of the home.

This proposal intends to delete the VA-specific amendments in order to incorporate the 2024 IECC air leakage testing requirements as published. This would result in the following changes:

1. All new dwelling units would be required to be air leakage tested, but the maximum allowable leakage for prescriptive compliance would improve from 5.0 ACH50 to 3.0 ACH50 in all Virginia climate zones.
2. The performance path baseline (R405) would be set at 3.0 ACH50, but dwellings could test as high as 5.0 ACH50 as long as efficiency losses are accounted for in other efficiency improvements. This allows considerable flexibility for code users who still find it challenging to achieve 3.0 ACH50, while maintaining the same overall efficiency required by the code.

3. Multifamily dwelling units (of any size) and buildings with 1500 square feet or less of conditioned floor area have the option to be tested to 0.27 cfm/min/ft² of testing unit enclosure area. This will help address the challenges of achieving low ACH in smaller dwellings.

Cost Impact: The code change proposal will increase the cost

It is possible that some additional time or materials will be required to achieve the lower air leakage number; however, we note that the largest cost is typically the cost of the blower door test itself, which is already required under the VA UCC.

REC-R402.4.1.2(1)-24

VCC: 1301.1.1.1

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the *International Energy Conservation Code (IECC)*. (Portions of code section not shown remain unchanged.) The following changes shall be made to the IECC :

19. Change Section R402.4.1.2 of the IECC to read:

~~R402.4.1.2 Testing.~~ ~~The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hour. Testing shall be conducted in accordance with RESNET/IGC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be conducted by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia registered design professional, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater. The party conducting the test shall have been trained on the equipment used to perform the test. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.~~

~~Note:~~ ~~Should additional sealing be required as a result of the test, consideration may be given to the issuance of a temporary certificate of occupancy in accordance with Section 116.1.1.~~

~~During testing:~~

- ~~1. Exterior windows and doors and fireplace and stove doors shall be closed, but not sealed beyond the intended weatherstripping or other infiltration control measures.~~
- ~~2. Dampers, including exhaust, intake, makeup air, backdraft and flue dampers, shall be closed, but not sealed beyond intended infiltration control measures.~~
- ~~3. Interior doors, if installed at the time of the test, shall be open.~~
- ~~4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.~~
- ~~5. Heating and cooling systems, if installed at the time of the test, shall be turned off.~~
- ~~6. Supply and return registers, if installed at the time of the test, shall be fully open.~~

20. Change Section R402.4.1.3 of the IECC to read:

~~R402.4.1.3 Leakage rate.~~ ~~When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 3 through 5, when tested in accordance with Section R402.4.1.2.~~

Reason Statement:

The purpose of this proposal is to bring Virginia's standards for air leakage rates into compliance with the 2024 IECC.

Virginia needs to adopt the IECC's 3.0 ACH (or 3 ACH50) air leakage standard, which has been in the national code since the 2012 IECC update. There is no valid reason for Virginia to continue a prescriptive air leakage standard that dates back to 2009.

The 2024 IECC is the fifth consecutive IECC to set the prescriptive standard for Virginia's climate zones at a maximum of 3.0 ACH. The IECC would not have repeatedly prescribed a 3.0 ACH maximum if actual experience had demonstrated that compliance was either impractical or raised costs or burdens that outweighed the benefits. The IECC has had four cycles, since 2012, to raise the

ACH from 3.0 to 5.0, but it has not done so.

Tightening building air sealing to 3.0 ACH is important to residents—both owners and tenants—, since it would help them save money, and experience greater comfort and a healthier home for decades after the dwelling is built. Virginia’s 5.0 ACH standard allows 67% more air changes per hour than the IECC’s 3.0 ACH standard.

Tightening prescriptive construction standards to 3.0 ACH will help to

- (a) reduce occupancy costs, including for heating and conditioning of air in the dwelling,
- (b) reduce exposure to mold that can build up in walls,
- (c) increase residents’ comfort,
- (d) increase physical and economic resiliency to power outages, climate change and rising energy prices,
- (e) reduce gaps for pests to enter the dwelling,
- (f) reduce pressure on utilities to raise rates in order to build and operate more energy delivery capabilities, and
- (g) reduce the air pollution that drives climate impacts and other harms to Virginia’s health, property and economy.

It is noteworthy that, while the 2024 IECC retains the 3.0 ACH prescriptive standard, It also **offers builders some flexibility to trade efficiency measures, including to allow up to 4.0 ACH of air leakage, when implementing Simulated Building Performance and ERI implementation methods. However, the 2024 IECC’s addition of trading flexibility is premised on full adoption of the IECC’s prescriptive baseline code, including 3.0 ACH.**

Legal Standards. Remaining at 5.0 ACH level would leave Virginia's building code out of compliance with statutory standards. **Sections 36-99A and 36-99B of the Virginia Code make clear that building codes are required to "protect the health, safety and welfare of the residents of the Commonwealth" and that adjustments to reduce construction costs must nevertheless be "consistent with recognized standards of health, safety, energy efficiency and water efficiency."** H2227, which was enacted in 2021, calls for adoption of energy efficiency standards that are **“at least as stringent” as the latest IECC considering factors such as consumer costs "over time" and air pollution.** VIRGINIA ACTS OF ASSEMBLY – 2021 SPECIAL SESSION I, CHAPTER 425, Section 1 (referred to herein as “H2227”). Thus, like energy costs over time, pollution is a named factor to be considered in connection with building code efficiency standards.

Broad Consensus. There is a broad consensus among recognized standards that tighter sealing of walls protects the health, safety and welfare of residents, and some recognized programs have stricter standards, which is part of why the IECC has incorporated the 3.0 ACH prescriptive standard in five consecutive IECC cycles from 2012-2024.

In its commentary on its 2024 ACH levels for new residential construction, the ICC explains the importance of its air leakage standards: **“Insulation alone is not enough to moderate indoor temperatures. Sealing the building envelope is critical to good thermal performance of the building.** Insulation is important because it traps pockets of air creating stagnant air resistant to temperature change, but the air barrier is needed to stop the movement of air from scrubbing away those pockets of air.

Regardless of the compliance option chosen in Section R401.2, air leakage limits apply, and all air leakage requirements of this section must be met.” Citing EPA, the IECC commentary states that air leakage “can account for 25 to 40 percent of the energy used for heating and cooling in a typical residence.” (ICC, 2024 IECC Code and Commentary.)

In EnergyStar: A complete Thermal Enclosure System (2017), EPA advised: “The energy savings from comprehensive air sealing can quickly add up when you consider all the places hot or cool air can enter or escape from your home. Having a well-sealed home also means better air quality because dirt, pollen, pests, and moisture can’t get in as easily. In addition, good sealing practices help protect your home against mold and moisture damage that can be caused by condensation.”

Even the NAHB has advised builders of the importance of air sealing and strategies to go below 3.0 ACH. See NAHB, et al., “TechNote – Building Tightness Code Compliance & Air Sealing Overview”, which (a) states “Air leakage in a building should be minimized;” (b) identifies benefits to residents including ““Heating & cooling energy savings; Reduced potential for moisture movement through the building thermal enclosure; Improved insulation effectiveness and reduced risk of ice dams; Reduced peak heating and cooling loads resulting in smaller HVAC equipment; Improved comfort (reduces drafts and noise); Improved indoor air quality (limits contaminants from garages, crawl spaces, attics, and adjacent units)” and (c) suggests a possible construction strategy with a goal of 2.5 ACH – stricter than the IECC.

The feasibility of meeting a 3.0 ACH standard is underscored by the IECC’s repeated adoption of 3.0 ACH for Virginia’s climate zones; by its adoption of a 2.5 ACH standard for Climate Zones north of Virginia’s; by use of 3.0 in the EnergyStar program; by DOE’s use of tighter standards in its net-zero ready program (2.5 ACH for CZ3-4 and 2.0 for CZ 5); and by the PassiveHouse standard of 0.6 ACH for its program.[1]

Cost and energy savings. Beginning with its review of the 2012 IECC, in which the 3.0 ACH standard was first adopted, the U.S. Department of Energy and the Pacific Northwest National Laboratories (collectively DOE) has found that residents would save money from **full implementation** of each IECC update from 2012-2024 even after considering incremental purchase and mortgage costs. Focusing on the three most significant IECC updates containing the 3.0 ACH standard, DOE found that, over 30 years, lifecycle savings (i.e., net of additional purchase and mortgage costs): **full implementation of the 2012 IECC** (which introduced the 3.0 ACH requirement for Virginia's climate zone) would have saved average Virginia residents **\$5,836**; **full implementation of the 2021 IECC** would have save Virginia residents **\$8,376**; and full implementation of the 2024 IECC would save Virginia residents of Virginia's Climate Zone 4 **\$3,790** and **Zones 2 and 5 an average of \$2,502 compared to 2021 IECC**. Savings would have been achieved year in and year out, with rapid payback and lasting for decades. [2]

Collectively, Virginians would save billions of dollars in energy costs from full implementation of the IECC, greatly benefiting residents and Virginia's economy. In its July 2021 report on "Cost-Effectiveness of the 2021 IECC for Residential Buildings in Virginia" (PNNL-31627), PNNL found that aggregate energy cost savings for Virginia residents from adopting the full 2021 IECC would be \$7,192,000 in the first year and \$2,487,000,000 over 30 years. Virginia would achieve substantial pollution reductions and add jobs.

Pollution Reductions. DOE has also repeatedly found that full compliance with the IECC's updates will reduce energy use and air pollution, including greenhouse gas pollution, which is critical to Virginians' future. Energy use in buildings is one of the largest drivers of CO2 emissions in Virginia. By cutting energy usage, **full implementation of the IECC's efficiency standards without weakening amendments would reduce air pollution, including greenhouse gas pollution that is driving climate change.** DOE found that full implementation of the 2024 IECC alone would reduce carbon emissions by 6.5% compared to the 2021 IECC, and the 2021 IECC would reduce carbon emissions by 8.7% compared to the prior IECC. (Full implementation of just the 2021 IECC "will reduce statewide CO2 emissions over 30 years by 28,420,000 metric tons, equivalent to the annual CO2 emissions of 6,181,000 cars on the road (1 MMT CO2 = 217,480 cars driven/year).") Applying the social cost of carbon to the CO2 reductions recognizes huge economic savings from to Virginia and the U.S. [3]

The accumulation of more efficient buildings over years will have significant impacts on reducing future climate and other pollution. Conversely, allowing less efficient new building to be constructed under weaker building code standards will have the opposite effect: driving up pollution and climate driven harms to all Virginians.

Climate change is already harming Virginia, and the harms will get much worse if we do not sharply reduce GHG emissions (particularly CO2 and methane). Growing climate dangers include harms to communities, infrastructure, people, property and the economy from rising seas, worsening storms and more severe rainfall events. Growing dangers also include rising atmospheric and water temperatures that threaten worsening heat-related illnesses, limits on economic activity, agriculture, fisheries, and our natural heritage. The likelihood of mitigating and recovering from those harms declines the longer we delay maximizing energy efficiency and minimizing GHG pollution.

--[1] See IECC; <https://basc.pnnl.gov/information/infiltration-meets-ach50-requirements> ; <http://passivehousebuildings.com/books/phc-2019/five-principles-of-passive-house-design-and-construction/> .

--[2] The U.S. Department of Energy found that full compliance with the 2012 IECC would save money and benefit residents compared to earlier standards. DOE/PNNL, National Energy Cost Savings for New Single and Multifamily Homes, A Comparison of the 2006, 2009, and 2012 Editions of the IECC, <https://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf> DOE found that the 2024 and 2021 IECC updates would reduce energy use and save money over the life of the dwelling, even after considering mortgage costs. U.S. Department of Energy, **Energy Savings Analysis: 2024 IECC for Residential Buildings** (Dec. 2024); DOE/PNNL, **Cost-Effectiveness of the 2021 IECC for Residential Buildings in Virginia** (July 2021), <https://www.energycodes.gov/national-and-state-analysis>. Following promulgation of the 2012 IECC, DOE found that the 2012 IECC changes improved efficiency and were cost effective for occupants because they saved money year after year for decades, more than recouping the cost of construction. DOE/PNNL, **National Energy Cost Savings for New Single and Multifamily Homes, A Comparison of the 2006, 2009, and 2012 Editions of the IECC**, <https://www.energycodes.gov/sites/default/files/documents/NationalResidentialCostEffectiveness.pdf> See also <https://www.energycodes.gov/determinations>

--[3] PNNL, Impacts of Model Building Energy Codes (Nov. 2023) (estimating climate and health benefits in excess of \$40,000,000,000 2010-2040 from residential energy building codes). See Notes [1][2] and PNNL report cited above.

Cost Impact: The code change proposal will increase the cost

Bringing Virginia in line with the IECC's 3.0 ACH air leakage standards may modestly increase the cost of construction, but those costs will be outweighed by reduced occupancy costs and improved health, comfort and resiliency for residents. The excess of benefits over costs is why the IECC has required 3.0 ACH for Virginia's Climate Zones for 5 consecutive updates: 2012-2024. (See Reason Statement, above.)

The costs of additional caulking, weather-stripping, gaskets, taping and other sealing measures are very limited, since workers will be on site, and the quantity of additional material is small. Planning, care and attention by builders during the framing, insulating and sealing processes is mainly what is needed to achieve the 3.0 ACH standard.

According to GreenBuildingAdvisor, "Once builders get their crews trained, 3 ACH50 should cost them the same as 5 or 7 ACH50."

<https://www.greenbuildingadvisor.com/article/how-much-air-leakage-in-your-home-is-too-much>

Having had more than a decade to train their crews to seal gaps and to meet blower door tests, Virginia builders should be fully capable of meeting the 3.0 ACH prescriptive standard. In addition to the time since the IECC's 2012 adoption of 3.0 ACH, Virginia builders will have a year from the effective date of Virginia's 2024 update to adjust their construction practices to meet the long-recognized model standard.

Under the 2024 IECC, cost impacts can also be mitigated by the 2024 IECC's permitting builders to go to 4.0 ACH with trading options for Simulated Performance and ERI compliance paths. However, that flexibility was premised upon full implementation of the IECC's prescriptive standards.

Achieving 3.0 ACH or better during initial construction is critical. Leaving buyers to retrofit after a house has been purchased would be very expensive since it would require the owner to reopen, close and refinish walls, replace windows and doors, etc. In addition to energy cost saving, comfort and health benefits from achieving 3.0 ACH, minimizing the need for future retrofits and repairs should be recognized as a cost benefit to residents.

REC-R403.14-24

IECC: R403.14 (N1103.14) (New)

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2024 International Energy Conservation Code [RE Project]

Add new text as follows:

R403.14 (N1103.14) Ceiling fans. R403.14 (N1103.14). A ceiling fan (with variable speeds and reversible direction) shall be installed in each bedroom and in the dwelling's planned principal living area (such as family room, living room, den).

Exception: such fans are not required in rooms with ceilings less than 8 feet high.

Reason Statement:

Ceiling fans save energy and improve comfort for residents. They are an inexpensive, well-established technology.

The U.S. Department of Energy (<https://www.energy.gov/energysaver/fans-cooling>) states:

"Ceiling fans are the most effective type of circulating fan. They help improve comfort year-round by effectively circulating air throughout a room.

- **Summer Use:** Run ceiling fans counterclockwise to create a cooling breeze.
- **Winter Use:** Reverse the direction to clockwise and set to low speed to circulate warm air from the ceiling down to living spaces.
- **Energy Savings:** Using a ceiling fan allows you to raise the thermostat setting by about 4 °F without reducing comfort. In moderate climates, ceiling fans can sometimes replace air conditioning altogether."

Distributing air with a ceiling fan will also improve comfort in rooms cooled by mini-splits or window air conditioners.

The potential energy and energy cost savings are very large when residents have the ability to live comfortably with temperatures set up to 4 degrees higher during the summer air-conditioning season. The benefits from ceiling fans will grow as climate change extends and exacerbates the annual air-conditioning season. As noted by DOE, winter demand can be reduced as well as summer demand.

Reduced demands for electricity will also reduce the driver of utilities' capital and operating costs. That will reduce rates for all customers and reduce utilities' need for intrusive and harmful construction projects to build or modify generation, transmission, distribution. Those reductions will benefit all Virginians.

Cost Impact: The code change proposal will increase the cost

Installing ceiling fans will modestly increase costs of construction but it will save money and improve comfort for residents for many years. The ability to reduce air conditioning demands by up to 4.0 F degrees will provide large savings for occupants and for utilities.

A 52-inch ceiling fan with a light, variable speeds and reversible directions can be purchased at retail for as little as \$60, and installation is no different from (and can even replace) installing a ceiling light. See, e.g., https://www.amazon.com/Ohniyou-Ceiling-Profile-Control-Dimmable/dp/B0DXFLNKCJ?crid=3J2IIQUXNZIAI&dib=eyJ2ljojMSJ9.035Rew5g2JQX-yOrWMaQ5X0_PCf-9ByTBjHjo0-RBTi2jXK9VQXVyNm-b0XSNpGg2bn8xdtXMa2VLwNz2nzmOwhwcgNY-njojkzwSNqvMRHFfb18LpOVgDkbCbvHcHgAl6j69IOfmzLvDiAeOCeSzv1UqZCINgXXnxBXDT9FOl-FGzOcv3qGrmoct76tOrzsitPHrxTYkV1qRnofglOhcPakbcl1GPRy4T796CzzMVGbZw-Fcm-G2VfTw3KWYvqtn3Jil1V7JZFuFw6SITZKj0q6N05ZNVVB0XnLvDVWviY.dfoKkyMLwF_aIO4ZXX5iNK2K7HXLdWpFArQeluh0taQ&dib_tag16&th=1.

REC-R404.5-24

IECC: 404.5 (N1104.5) (New), 404.5.1 (N1104.5.1) (New), 404.5.2 (N1104.5.2) (New), 404.5.2.1 (N1104.5.2.1) (New), 404.5.2.2 (N1104.5.2.2) (New), 404.5.2.3 (N1104.5.2.3) (New), 404.5.2.4 (N1104.5.2.4) (New), 404.5.2.5 (N1104.5.2.5) (New)

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2024 International Energy Conservation Code [RE Project]

Add new text as follows:

404.5 (N1104.5) ELECTRIC VEHICLE POWER TRANSFER.

404.5.1 (N1104.5.1) Definitions. _

AUTOMOBILE PARKING SPACE. A space within a building or private or public parking lot, exclusive of driveways, ramps, columns, office and work areas, for the parking of an automobile.

-
ELECTRIC VEHICLE (EV). An automotive-type vehicle for on-road use, such as passenger automobiles, buses, trucks, vans, neighborhood electric vehicles and electric motorcycles, primarily powered by an electric motor that draws current from a building electrical service, electric vehicle supply equipment (EVSE), a rechargeable storage battery, a fuel cell, a photovoltaic array or another source of electric current.

-
ELECTRIC VEHICLE CAPABLE SPACE (EV CAPABLE SPACE). A designated automobile parking space that is provided with electrical infrastructure such as, but not limited to, raceways, cables, electrical capacity, a panelboard or other electrical distribution equipment space necessary for the future installation of an EVSE.

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ELECTRIC VEHICLE READY SPACE (EV READY SPACE). An automobile parking space that is provided with a branch circuit and an outlet, junction box or receptacle that will support an installed EVSE.

-
ELECTRIC VEHICLE SUPPLY EQUIPMENT (EVSE). Equipment for plug-in power transfer, including ungrounded, grounded and equipment grounding conductors; electric vehicle connectors; attached plugs; any personal protection system; and all other fittings, devices, power outlets or apparatus installed specifically for the purpose of transferring energy between the premises wiring and the electric vehicle.

-
ELECTRIC VEHICLE SUPPLY EQUIPMENT INSTALLED SPACE (EVSE SPACE). An automobile parking space that is provided with a dedicated EVSE connection.

404.5.2 (N1104.5.2) Electric vehicle power transfer infrastructure. New residential automobile parking spaces for residential buildings shall be provided with electric vehicle power transfer infrastructure in accordance with Sections R404.5.2.1 through R404.5.2.5.

404.5.2.1 (N1104.5.2.1) Quantity. New one- and two-family dwellings and townhouses with a designated attached or detached garage or other on-site private parking provided adjacent to the dwelling unit shall be provided with one EV capable, EV ready or EVSE space per dwelling unit. R-2 occupancies or allocated parking for R-2 occupancies in mixed-use buildings shall be provided with an EV capable space, EV ready space or EVSE space for 40 percent of the dwelling units or automobile parking spaces, whichever is less.

Exceptions:

1. Where the local electric distribution entity certifies in writing that it is not able to provide 100 percent of the necessary distribution capacity within 2 years after the estimated certificate of occupancy date, the required EV charging infrastructure shall be reduced based on the available existing electric distribution capacity.

2. Where substantiation is approved that meeting the requirements of Section R404.5.2.5 will alter the local utility infrastructure design requirements on the utility side of the meter so as to increase the utility side cost to the builder or developer by more than \$450 per dwelling unit.

404.5.2.2 (N1104.5.2.2) EV Capable Spaces. R404.5.2.2 (N1104.5.2.2)EV capable spaces.

Each EV capable space used to meet the requirements of Section R404.5.2.1 shall comply withall of the following:

1. A continuous raceway or cable assembly shall be installed between a suitable panelboard or other on-site electrical distribution equipment and an enclosure or outlet located within 6 feet (1828 mm) of the EV capable space.

2. The installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with Section R404.5.2.5.

3. The electrical distribution equipment to which the raceway or cable assembly connects shall have sufficient dedicated space and spare electrical capacity for a two-pole circuit breaker or set of fuses.

4. The electrical enclosure or outlet and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."

404.5.2.3 (N1104.5.2.3) EV Ready Spaces. Each branch circuit serving EV ready spaces shall comply withall of the following:

1. Termination at an outlet or enclosure, located within 6 feet (1828 mm) of each EV ready space it serves and marked "For electric vehicle supply equipment (EVSE)."

2. Service by an electrical distribution system and circuit capacity in accordance with Section R404.5.2.5.

3. Designation on the panelboard or other electrical distribution equipment directory as "For electric vehicle supply equipment (EVSE)."

404.5.2.4 (N1104.5.2.4) EVSE Spaces. An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE spaces. Each EVSE serving either a single EVSE space or multiple EVSE spaces shall comply with the following:

1. Be served by an electrical distribution system in accordance with Section R404.5.2.5.

2. Have a nameplate charging capacity of not less than 6.2 kVA (or 30A at 208/240V) per EVSE space served. Where an EVSE serves three or more EVSE spaces and is controlled by an energy management system in accordance with Section R404.5.2.5, the nameplate charging capacity shall be not less than 2.1 kVA per EVSE space served.

3. Be located within 6 feet (1828 mm) of each EVSE space it serves.

4. Be installed in accordance with NFPA 70 and be listed and labeled in accordance with UL 2202 (Electric Vehicle (EV) Charging System Equipment—with revisions through February 2018) or UL 2594 (Standard for Electric Vehicle Supply Equipment Standard for Electric Vehicle Supply Equipment.)

404.5.2.5 (N1104.5.2.5) Electrical distribution system capacity. The branch circuits and electrical distribution system serving each EV capable space, EV ready space and EVSE space used to comply with Section R404.5.2.1 shall comply with one of the following:

1. Sized for a calculated EV charging load of not less than 6.2 kVA per EVSE, EV ready or EV capable space. Where a circuit is shared or managed, it shall be in accordance with NFPA 70.
2. The capacity of the electrical distribution system and each branch circuit serving multiple EVSE spaces, EV ready spaces or EV capable spaces designed to be controlled by an energy management system in accordance with NFPA 70 shall be sized for a calculated EV charging load of not less than 2.1 kVA per space. Where an energy management system is used to control EV charging loads for the purposes of this section, it shall not be configured to turn off electrical power to EVSE or EV used to comply with Section R404.5.2.1.

Reason Statement:

The purpose of this proposal is to incorporate into Virginia's residential building code the substance of 2024 IECC's Appendix RE which spells out requirements to install electric vehicle charging infrastructure in connection with new residential construction. Appendix RE comes with the 2024 IECC, but activation of Appendix RE requires inserting language into the Virginia Construction Code for residential construction, which this proposal would do by adding a new Section R404.5 and N1104.5.

Adoption of this proposal would benefit residents of new buildings by facilitating convenient electric vehicle charging, which can readily be expanded as the need grows. Implementation would benefit residents and the public with cost savings, pollution reduction (including greenhouse gases, ozone and carbon monoxide) and more equitable access to EVs and EV charging for residents. It would avoid the much higher costs of having to retrofit parking areas and building electrical systems.

Under Section 405, builders would be able to choose among three levels of EV charging readiness: EV Capable Space (raceway and basic infrastructure for future installation of a branch circuit and charger); or EV Ready Space (basic infrastructure plus a branch circuit, outlet, junction box or receptacle); or EVSE Space (includes actual charging).

The optionality allows builders to minimize construction costs while still making easier and much less costly for the owner to add an EV charger in the future. As explained in the IECC Commentary, "EV capable spaces are the first step towards the preparation of future electric vehicle charging infrastructure. The raceways, electrical capacity, and panelboard placed and sized accordingly will ease future installations and reduce future costs."

By agreement among members of the ICC's committee to develop the 2024 IECC, these EV charging requirements were to have been included in the main body of the 2024 IECC (as proposed here). It was shifted to an appendix on appeal but activating an appendix requires text in the code itself.

It would serve Virginians' near and long-term interest to require minimum levels of EV charging infrastructure in new construction. Given the savings to vehicle users and the pollution reduction benefits to the community, requiring installation of EV charging infrastructure is just as appropriate as it is for the building code to require lighting and other electric infrastructure for lighting and future equipment (HVAC, appliances, etc.), as well as safety measures like carbon monoxide alarms needed for houses with garages for traditional gas/diesel fired vehicles.

EVs have many economic and health benefits for vehicle users, and assuring installation of basic electric infrastructure to serve EVs as their usage grows will best serve Virginia and its residents. EVs are cheaper to use and maintain compared to vehicles with internal combustion engines (ICE).

At-home charging is important for EV owners. It accounts for approximately 80% EV charging today and is much more convenient than searching for public chargers. However, many EV owners and potential buyers do not have EV infrastructure at their dwellings or even the potential to install charging in the future. That is a barrier to EV adoption and the inherent benefits of EVs for residents.

Growing EV usage is very important to Virginia. As explained in the ICC commentary accompanying the 2024 IECC, "The U.S. transportation sector accounted for 29 percent of the nation's greenhouse gas (GHG) emissions in 2019." That is specifically due to the traditional predominance of vehicles with internal combustion engines (ICE). Greenhouse gases from charging and operating EVs are less than 30% of GHG emissions from fueling and operating ICE vehicles. <https://theicct.org/why-evs-are-already-much-greener-than-combustion-engine-vehicles-jul25/> Emissions will go down further as the electric system adopts more to zero-carbon energy sources. EVs are also far more energy efficient than burning fuels in vehicle engines.

Reducing GHG emissions is a stated policy goal in Virginia law because climate change is a current and growing danger for Virginians.

(See., e.g., § 45.2-1706.1. Commonwealth Clean Energy Policy. “A. The Commonwealth recognizes that effectively addressing climate change and enhancing resilience will advance the health, welfare, and safety of the residents of the Commonwealth. The Commonwealth further recognizes that addressing climate change requires reducing greenhouse gas emissions across the Commonwealth's economy sufficient to reach net-zero emission by 2045 in all sectors, including the electric power, transportation, industrial, agricultural, building, and infrastructure sectors....”) Virginia faces growing threats, including more heat-illnesses, disruption of outdoor work, worsening storms, flooding, sea level rise, supply-chain disruption, damage to crops, trees and natural resources, arrival of diseases and pests, etc.

Bringing on EVs will also reduce other air pollutants that also threaten Virginian's health and welfare. ICE vehicles are a major source of ozone and other pollutants, including carbon monoxide risks in homes with garages.

Providing EV electric infrastructure as part of new construction is no different from the building code's requiring electrical infrastructure for HVAC and other appliances likely to be used in the future or from its requiring more efficient equipment in homes (heat pumps, high-efficiency appliances and lighting). (The infrastructure for future EV charging could be used for other purposes if a resident were to choose to do so.)

Facilitating adoption of EVs requires that drivers have access to convenient, cost-effective EV charging. That can most easily be provided as part of new construction. It is very costly and complicated to renovate EV charging infrastructure into existing buildings. In the absence of a raceway from the electric panel to the garage, retrofitting would require reopening and repairing walls, which is very expensive and disruptive. Expanding EV charging at home is important and cannot be replicated by the slow process of trying to grow a highway-based charging system. That is why so much charging occurs at home.

The importance of incorporating into new construction is particularly great in the case of buildings whose parking is governed by condominium or common-interest-area boards. The high costs of retrofitting is a particularly large and a common barrier in apartment buildings where residents' choices are restricted by the need for third-party approvals and possible financial interests.

Cost Impact: The code change proposal will increase the cost

The cost of installing infrastructure would depend on the builder's choice among the three levels of EV charging readiness, which are provided by this proposal. The costs would be minimal for an EV Capable Space and not much more for the EV Ready Space option if the panel box is in or near a garage or outdoor parking space and low regardless of the location. Since electricity will be installed anyway (e.g. for garage or parking lighting at a minimum), it would not be difficult or costly to go the extra steps during building construction—far less than undertaking to install EV charging capabilities as a retrofit.

REC-R404.5(1)-24

VECC: R404.5 (New), R404.5.1 (New), R404.5.2 (New), R404.5.3 (New), R404.5.4 (New), R404.5.5 (New)

Proponents: Joseph Wages, representing National Electrical Manufacturers Association (NEMA) (joseph.wages@nema.org)

2021 Virginia Energy Code

Add new text as follows:

R404.5 Electric Vehicle Power Transfer Infrastructure. Residential automobile parking spaces for residential buildings shall be provided with electric vehicle power transfer infrastructure in accordance with Sections R404.5.1 through R404.5.5

R404.5.1 Quantity. One- and two-family dwellings and townhouses with a designated attached or detached garage or other onsite private parking provided adjacent to the dwelling unit shall be provided with one EV-capable, EV-ready, or EVSE space per dwelling unit. R-2 occupancies or allocated parking for R-2 occupancies in mixed-use buildings shall be provided with an EV capable space, EV ready space, or EVSE space for 40 percent of dwelling units or automobile parking spaces, whichever is less.

R404.5.2 EV Capable Spaces. Each EV capable space used to meet the requirements of Section R404.5.1 shall comply with all of the following:

- 1.A continuous raceway or cable assembly shall be installed between a suitable panelboard or other onsite electrical distribution equipment and an enclosure or outlet located within 6 feet (1828mm) of the EV capable space.
- 2.Installed raceway or cable assembly shall be sized and rated to supply a minimum circuit capacity in accordance with Section R404.5.5.
- 3.The electrical distribution equipment to which the raceway or cable assembly connects shall have sufficient dedicated space and spare electrical capacity for a 2-pole circuit breaker or set of fuses.
- 4.The electrical enclosure or outlet and the electrical distribution equipment directory shall be marked: "For future electric vehicle supply equipment (EVSE)."

R404.5.3 EV Ready Spaces. Each branch circuit serving EV ready spaces shall comply with all of the following:

- 1.Terminate at an outlet or enclosure, located within 6 feet (1828 mm) of each EV ready space it serves and marked "For electric vehicle supply equipment (EVSE)".
- 2.Be served by an electrical distribution system and circuit capacity in accordance with Section R404.5.5.
- 3.Be designated on the panelboard or other electrical distribution equipment directory as "For electric vehicle supply equipment (EVSE)."

R404.5.4 EVSE spaces. An installed EVSE with multiple output connections shall be permitted to serve multiple EVSE spaces. Each EVSE serving either a single EVSE space or multiple EVSE spaces shall comply with the following:

- 1.Be served by an electrical distribution system in accordance with Section R404.5.5
- 2.Have a nameplate charging capacity of not less than 6.2 kVA (or 30A at 208/240V) per EVSE space served. Where an EVSE serves three or more EVSE spaces and is controlled by an energy management system in accordance with Section R404.5.5, the nameplate charging capacity shall be not less than 2.1 kVA per EVSE space served.
- 3.Be located within 6 feet (1828 mm) of each EVSE space it serves.
- 4.Be installed in accordance with NFPA 70 and be listed and labeled in accordance with UL 2202 or UL 2594.

R404.5.5 Electrical distribution system capacity.. The branch circuits and electrical distribution system used to comply with Section R404.7.1 shall comply with one of the following:

- 1.Sized for a calculated EV charging load of not less than 7.2 kVA per EVSE, EV ready, or EV capable space. Where a circuit is

shared or managed it shall be in accordance with NFPA 70.

- 2.The capacity of the electrical distribution system and each branch circuit serving multiple EVSE spaces, EV ready spaces, or EV capable spaces designed to be controlled by an energy management system in accordance with NFPA 70, shall be sized for a calculated EV charging load of not less than 2.1 kVA per space. Where an energy management system is used to control EV charging loads for the purposes of this section, it shall not be configured to turn off electrical power to EVSE or EV ready spaces used to comply with Section R404.5.1.

Reason Statement: This proposal adds a new section covering Electric Vehicle Power Transfer Infrastructure as a mandatory requirement in Chapter 4 similar to Appendix RE in the 2024 IECC. These requirements were approved by the ICC appointed residential energy code consensus committee by a two-thirds majority vote during the 2024 IECC development cycle. Adding EV ready requirements to the 2024 VECC-R ensures new residential parking facilities have the electrical infrastructure necessary for the installation of EV charging equipment at time of construction or any time in the future. This will provide a significant cost and labor savings.

Cost Impact: The code change proposal will increase the cost

The code change proposal will increase the cost of premises-wiring systems and parking facilities for residential projects. However, the initial cost of EV ready infrastructure is considerably less expensive compared to retrofitting and altering the electrical system and parking facility in the future. The actual cost associated with this proposal is heavily dependent on the scale and scope of the residential project.

It should be noted NEMA proposals are developed by a member consensus process where both our bylaws and federal regulations prohibit us from discussing prices, costs, and other financial details of electrical products.

REC-R404.6-24

IECC: R404.6 (N1104.6) (New), R404.6.1 (N1104.6.1) (New), R404.6.2 (N1104.6.2) (New), R404.6.3 (N1104.6.3) (New), R404.6.4 (N1104.6.4) (New), R404.6.5 (N1104.6.5) (New), R404.6.6 (N1104.6.6) (New), R404.6.7 (N1104.6.7) (New), R404.6.8 (N1104.6.8) (New), R404.6.9 (N1104.6.9) (New)

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2024 International Energy Conservation Code [RE Project]

Add new text as follows:

R404.6 (N1104.6) Solar Ready Provisions - Detached One- and Two Story-Dwellings and Townhouses.

R404.6.1 (N1104.6.1) General. New detached one- and two-family dwellings, and townhouses with not less than 600 square feet (55.74 m²) of roof area oriented between 110 degrees and 270 degrees of true north shall comply with Sections R404.6.2 (N1104.6.2) through R404.6.9 (N1104.6.9).

Exceptions:

1. New residential buildings with a permanently installed on-site renewable energy system.
2. A building where all areas of the roof that would otherwise meet the requirements of this Section and Section R404.6.3 (N1104.6.3) are in full or partial shade for more than 70 percent of daylight hours annually.

R404.6.2 (N1104.6.2) General Definitions. -SOLAR-READY ZONE. A section or sections of the roof or building overhang designated and reserved for the future installation of a solar photovoltaic or solar thermal system.

R404.6.3 (N1104.6.3) Solar-ready zone area. The total solar-ready zone area shall be not less than 300 square feet (27.87 m²) exclusive of mandatory access or setback areas as required by the International Fire Code. New townhouses three stories or less in height above grade plane and with a total floor area less than or equal to 2,000 square feet (185.8 m²) per dwelling shall have a solar-ready zone area of not less than 150 square feet (13.94 m²). The solar-ready zone shall be composed of areas not less than 5 feet (1524 mm) in width and not less than 80 square feet (7.44 m²) exclusive of access or setback areas as required by the International Fire Code.

R404.6.4 (N1104.6.4) Obstructions. Solar-ready zones shall be free from obstructions, including but not limited to vents, chimneys, and roof mounted equipment.

R404.6.5 (N1104.6.5) Shading. The solar-ready zone shall be set back from any existing or new permanently affixed object on the building or site that is located south, east or west of the solar zone a distance not less than two times the object's height above the nearest point on the roof surface. Such objects include, but are not limited to, taller portions of the building itself, parapets, chimneys, antennas, signage, rooftop equipment, trees and roof plantings.

R404.6.6 (N1104.6.6) Capped roof penetration sleeve. A capped roof penetration sleeve shall be provided adjacent to a solar-ready zone located on a roof slope of not greater than 1 unit vertical in 12 units horizontal (8 percent slope). The capped roof penetration sleeve shall be sized to accommodate the installed or future photovoltaic system conduit, but shall have an inside diameter of not less than 1 1/4 inches (32 mm).

R404.6.7 (N1104.6.7) Construction document requirements. Construction documents shall clearly indicate

- 1.the solar-ready zone;
- 2.the structural design loads for roof dead load and roof live load;
- 3.pathways for routing of conduit or plumbing from the solar-ready zone to the electrical service panel or service hot water system.

R404.6.8 (N1104.6.8) 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 installation and shall be labeled "For Future Solar Electric." The reserved space shall be positioned at the opposite (load) end from the input feeder location or main circuit location.

R404.6.9 (N1104.6.9) 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.

Reason Statement:

This proposal adopts the provisions contained in IECC APPENDIX RB. The provisions of APPENDIX RB have been reorganized for greater clarity, but no substantive changes were made to the appendix. Adoption of this proposed section is needed since IECC appendices are not mandatory unless specifically referenced or otherwise incorporated in a state's building code. This proposed section is intended to support future potential improvements for detached one- and two-family dwellings and townhouses for solar electric and solar thermal systems. This provision requires a capped roof penetration sleeve in a solar-ready zone area, but does not require:

- The installation of conduit, prewiring or pre-plumbing.
- Any specific physical orientation of a residential building.
- Any increased load capacities for residential roofing systems.

Having important information and documentation available to the building department, solar contractor and homeowner will assist in supporting the accelerated working environment many municipalities have mandated.

This proposed section is intended to identify the areas of a residential building roof, called the solar-ready zone, for potential future installation of renewable energy systems. The ability to plan for possible future solar equipment starts with documenting necessary solar-ready zone information on the plans, some of which may already be required in permit construction documents. This proposal also requires the builder to post specific information about the home for use by the homeowner.

This definition clarifies the term "solar-ready zone" as an area of the roof or building where photovoltaic or thermal may be installed in the future.

The proposal does not apply to low-rise residential with more than two units or dwellings less than 600 square feet of roof area. For solar equipment to be effective, it must be adequately oriented to the sun. This section clarifies that the appendix only applies to roof area oriented between 110 degrees and 270 degrees of true north. Note that this is the orientation for the northern hemisphere; if the appendix were applied in the southern hemisphere, the equipment would need to be on a roof oriented between 110 degrees and 270 degrees of true south.

Exceptions are provided for buildings that already have permanently installed systems or are too shaded for the equipment to be viable.

To be solar-ready requires that the existing structure is capable of providing the required support for the future installation of a solar system. The benefit of the solar-ready provisions is to avoid the potential exponential costs of having to structurally retrofit a building for a future solar installation. Therefore, the design criteria provided within the construction documents for the proposed structure must indicate the structure is designed and will be built to the loading conditions necessary for a future solar installation.

This section establishes minimum dimensions and square footage for the solar-ready zones while balancing the need for a minimum area of solar access, fire safety and roof area.

For photovoltaics or thermal storage to be effective, unobstructed sun is important. This section simply clarifies that the solar access zone must not be located in an area where other rooftop obstructions will shade the equipment.

This section provides clarification for the term "shade" as used in [Section RB103.1](#), Exception 2. The section also specifies how far the designated solar-ready zone should be set back from permanently affixed objects.

As with other readiness requirements, the installation of roof penetration elements during initial construction is more cost effective than retrofitting existing construction. Due to other considerations, for roofs with a pitch over one unit vertical in 12 units horizontal this section is not applicable.

Planning ahead for electrical connections avoids retrofitting to accommodate the equipment. This section identifies the routing pathways

for electrical and plumbing connections.

This section specifies the requirements for labeling on the electrical service panel, ensuring adequate capacity for a dualpole circuit breaker.

The certificate requirements complement those of [Chapter 4](#) (see commentary, [Section R401.3](#)). The required certificate provides easy-to-reference information to building owners and contractors for future installation of solar equipment. The builder or other approved party must complete the certificate and place it in an approved location in the building, preferably near the electrical box. The permanent certificate shall not cover or obstruct the visibility of the circuit directory label, service disconnect label or other required labels.

The documentation of solar-ready zones and roof load calculations (already performed during the design phase) will assist building departments as well as any future solar contractors seeking to install renewable energy systems on a roof. The builder/designer is knowledgeable on the intricacies of each model and plan and can easily identify unobstructed roof areas as well as spaces where conduit, wiring and plumbing can be routed from the roof to the respective utility areas. This will save building departments and solar designers time and effort when installing future solar systems. If a homeowner wishes to install a solar energy system later, this documentation can save thousands of dollars in labor, installation, design and integration of the solar system into the house or townhouse.

Cost Impact: The code change proposal will not increase or decrease the cost

Like the IECC Appendix RB whose terms it incorporates, this proposed section does not require any specific construction cost changes, except the minimal cost of a roof-penetration sleeve which could be offset by simplification of the roof design. It mainly defines and requires documents describing areas of solar readiness and future pathways to connect to the electrical service panel.

REC-R404.7-24

IECC: R404.7 (N1104.7) (New), R404.7.1 (N1104.7.1) (New), R404.7.2 (N1104.7.2) (New), R404.7.3 (N1104.7.3) (New), R404.7.4 (N1104.7.4) (New)

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2024 International Energy Conservation Code [RE Project]

Add new text as follows:

R404.7 (N1104.7) Electric Readiness. Water heaters, household clothes dryers and cooking appliances that use fuel gas or liquid fuel shall comply with Sections R404.7.1 through R404.7.4.

R404.7.1 (N1104.7.1) Cooking appliances. A dedicated branch circuit outlet with a rating not less than 240 volts and not less than 40 amperes shall be installed and terminate within 3 feet (914 mm) of conventional cooking tops, conventional ovens or cooking appliances combining both.

Exception: Cooking appliances not installed in an individual dwelling unit.

R404.7.2 (N1104.7.2) Household clothes dryers. A dedicated branch circuit with a rating not less than 240 volts and not less than 30 amperes shall be installed and terminate within 3 feet (914 mm) of each household clothes dryer.

Exception: Clothes dryers not installed in an individual dwelling unit.

R404.7.3 (N1104.7.3) Water heaters. A dedicated branch circuit with a rating either not less than 240 volts and not less than 30 amperes, or not less than 120 volts and not less than 20 amperes, shall be installed and terminate within 3 feet (914 mm) of each water heater.

Exception: Water heaters serving multiple dwelling units in a R-2 occupancy.

R404.7.4 (N1104.7.4) Electrification-ready circuits. The unused conductors required by Sections R404.7.1 through R404.7.3 shall be labeled with the word "spare." Space shall be reserved in the electrical panel in which the branch circuit originates for the installation of an overcurrent device. Capacity for the circuits required by Sections R404.7.1 through R404.7.3 shall be included in the load calculations of the original installation.

Reason Statement:

This section incorporates into Virginia's code the text of Appendix RK in the 2024 IECC. It was originally agreed upon by participants as part of a package of measures for inclusion in the 2024 IECC but was shifted to an appendix on appeal.

Adoption of the proposed language would enhance customer choices by making it easy for homeowners to choose either electric or gas appliances and water heating equipment. It is a low-cost measure to improve residents' health and safety by reducing a much larger cost barrier of requiring retrofitting new branch circuits into a dwelling after walls have been enclosed and initial construction has been completed. In addition to the health and safety benefits from shifting to electricity discussed below, large amounts of energy can be saved, particularly by replacing combustion appliances with far more efficient electric-heat-pump water heaters and dryers and with induction cook tops. Availability of these options is growing, and consumer awareness will grow more in the future.

By helping insulate customers from potential high retrofit costs from gas to electric appliances, this "readiness" requirement also recognizes residents' and the public's long-term interest in shifting to electric appliances in order to reduce air pollution both indoors and outdoors and to reduce climate risks from CO₂ and methane emissions. Virginia's building code already recognizes the dangers of indoor carbon-monoxide air pollution from gas appliances and thus requires CO monitors be installed and interconnected in dwellings with fuel burning appliances. (See N311.2 and N311.3.)

Indoor air pollution from gas-fired appliances has been increasingly recognized as a health and safety hazard for residents, as well as for

the public. In addition to fire hazards, onsite fuel combustion also poses dangers from indoor air pollution from leakage of methane (CH₄), as well as combustion byproducts, such as CO and CO₂. See, e.g., <https://rmi.org/insight/gasstoves-pollution-health> Gas stoves are a particularly large source of indoor air pollution. <https://rmi.org/insight/gas-stoves-pollution-health> .

Electrification of appliances is one critical component of decarbonization strategies to reduce climate-pollution, especially CO₂ and methane that result from producing, transmitting and combusting fossil fuels. Reducing CO₂ and methane is essential to stabilizing and eventually reducing global warming. See, e.g., <https://www.vox.com/2016/9/19/12938086/electrify-everything>; <https://rmi.org/eight-benefits-of-building-electrification-for-households-communities-and-climate/> ; <https://www.rff.org/publications/explainers/electrification-101/> . While CO₂ has gotten greater attention, methane is a much more powerful greenhouse gas than carbon dioxide per unit emitted--approximately 86 times more potent than carbon dioxide as a heat-trapping gas, over 20 years. UCS, *The Natural Gas Gamble: A Risky Bet on America's Clean Energy Future* (March 2015). Substituting electric energy for on-site combustion is a necessary step to mitigating harms from climate change and meeting internationally recognized goals. Electricity is much cleaner and will become more so as Virginia utilities move toward zero-carbon renewable energy.

Increasingly, customers are concerned about health and climate impacts from fossil fuel combustion, in addition to energy efficiency and bills. Harmful indoor fumes that they may have ignored initially are getting greater attention. As a result, they may want to transition from fossil fuels to electric appliances to take advantage of the climate and efficiency benefits.

Cost Impact: The code change proposal will increase the cost

The proposal will modestly raise costs by requiring installation of branch circuits from the electrical panel to the vicinity of certain combustion driven appliances if such appliances are installed. The precise costs would depend on the appliances installed and their location. During construction, the additional line for future use could easily be installed along with the basic conductor going to the appliance resulting in little cost beyond the future conductors themselves. The cost impact would be much less than if the wiring were to be added in a retrofit after walls are closed and construction is completed.

Residents switching to newer, more efficient electric appliances will save money as well as energy. They can also save money by not having to replace CO alarms as the initial ones wear out. The cost, health, safety and environmental benefits from facilitating future appliance changes outweigh the modest initial costs.

REC-R405.2-24

IRC: N1105.2 (R405.2), TABLE N1105.4.2(1) [R405.4.2(1)]

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2024 International Residential Code

Revise as follows:

N1105.2 (R405.2) Simulated building performance compliance. Compliance based on *simulated building performance* requires that a *building* comply with the following:

- 1. The requirements of the sections indicated within Table N1105.2.
- 2. The proposed total *building thermal envelope* thermal conductance (TC) shall be less than or equal to the required total *building thermal envelope* TC using the prescriptive *U-factors* and *F-factors* from Table N1102.1.2 multiplied by 1.08 in *Climate Zones* 0, 1 and 2, and 1.15 in *Climate Zones* 3 through 8, in accordance with Equation 11-6 and Section N1102.1.5. The area-weighted maximum *fenestrationSHGC* permitted in *Climate Zones* 0 through 3 shall be 0.30.

For Climate Zones 0–2: $TC_{Proposed\ design} \leq 1.08 \times TC_{Prescriptive\ reference\ design}$

For Climate Zones 3–8: $TC_{Proposed\ design} \leq 1.15 \times TC_{Prescriptive\ reference\ design}$

Equation 11-6

- 3. For each *dwelling unit* with one or more fuel-burning appliances for space heating, water heating, or both, the annual energy cost of the *dwelling unit* shall be less than or equal to 80 percent of the annual energy cost of the *standard reference design*. For all other *dwelling units*, the annual energy cost of the *proposed design* shall be less than or equal to 89 85 percent of the annual energy cost of the *standard reference design*. For each *dwelling unit* with greater than 5,000 square feet (465 m²) of *living space* located above *grade plane*, the annual energy cost of the *dwelling unit* shall be reduced by an additional 5 percent of annual energy cost of the *standard reference design*. Energy prices shall be taken from an *approved source*, such as the US Energy Information Administration’s State Energy Data System prices and expenditures reports. Code officials shall be permitted to require time-of-use pricing in *energy cost* calculations.

Exceptions:

- 1. The energy use based on source energy expressed in *Btu* or *Btu* per square foot of *conditioned floor area* shall be permitted to be substituted for the *energy cost*. The source energy multiplier for electricity shall be 2.51 . The source energy multipliers shall be 1.09 for natural gas, 1.15 for propane, 1.19 for *fuel oil*, and 1.30 for imported liquified natural gas.
- 2. The energy use based on site energy expressed in *Btu* or *Btu* per square foot of *conditioned floor area* shall be permitted to be substituted for the *energy cost*.

TABLE N1105.4.2(1) [R405.4.2(1)] SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS
Portions of table not shown remain unchanged.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{d, e, j, k}	Fuel Type/Capacity: same as proposed design.	As proposed.
	Product class: same as proposed design.	As proposed.
	Efficiencies: For other than electric heating without a heat pump: same as proposed design.	As proposed.
	Where the proposed design utilizes electric heating without a heat pump, the standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the <i>IECC</i> – Commercial Provisions.	
	Heat pump: complying with 10 CFR §430.32	
	Fuel gas and liquid fuel furnaces: complying with 10 CFR §430.32	As proposed.
	Fuel gas and liquid fuel boilers: complying with 10 CFR §430.32	As proposed.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN				PROPOSED DESIGN			
Cooling systems ^{d, f, k}	Fuel Type: electric				As proposed.			
	Capacity: same as proposed design							
	Efficiencies: complying with 10 CFR §430.32 Same as proposed design.				As proposed.			
Service water heating ^{d, g, k}	Use, in units of gal/day = $25.5 + (8.5 \times N_{br})$ where: N_{br} = number of bedrooms.				Use, in units of gal/day = $25.5 + (8.5 \times N_{br}) \times (1 - HWDS)$ where: N_{br} = number of bedrooms. $HWDS$ = factor for the compactness of the hot water distribution system.			
					Compactness ratio ^l factor		HWDS	
					1 story		2 or more stories	
					> 60%		> 30%	
					> 30% to ≤ 60%		> 15% to ≤ 30%	
					> 15% to ≤ 30%		> 7.5% to ≤ 15%	
	< 15%		< 7.5%					
	Fuel type: same as proposed design				As proposed.			
	Rated storage volume: same as proposed design				As proposed.			
	Draw pattern: same as proposed design				As proposed.			
Efficiencies: Uniform Energy Factor complying with 10 CFR §430.32 Same as proposed design.				As proposed.				
Tank temperature: 120° F (48.9° C)				Same as standard reference design.				
Thermal distribution systems	Duct insulation: in accordance with Section N1103.3.3.				Duct insulation: as proposed. ^m			
	Duct location: <u>Same as proposed design.</u>				Duct location: as proposed. ^l			
	Foundation type	Slab-on-grade	Unconditioned crawl space	Basement or conditioned crawl space	—			
	Duct location (supply and return)	One-story building: 100% in unconditioned attic All other: 75% in unconditioned attic and 25% inside conditioned space	One-story building: 100% in unconditioned crawl space All other: 75% in unconditioned crawl space and 25% inside conditioned space	75% inside conditioned space 25% unconditioned attic	Duct system leakage to outside: The measured total duct system leakage rate shall be entered into the software as the duct system leakage to outside rate.			
	Duct system leakage to outside: for duct systems serving > 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 4 cfm per 100 ft ² of conditioned floor area. For duct systems serving ≤ 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 40 cfm.				Exceptions:			
					1 Where duct system leakage to outside is tested in accordance ANSI/RESNET/ICC 380 or ASTM E1554, the measured value shall be permitted to be entered.			
	Distribution System Efficiency (DSE): for hydronic systems and ductless systems a thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies.				2 Where total duct system leakage is measured without space conditioning equipment installed, the simulation value shall be 4 cfm per 100ft ² of conditioned floor area.			
					Distribution System Efficiency (DSE): for hydronic systems and ductless systems DSE shall be as specified in Table N1105.4.2(2).			

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (US) = 3.785 L, °C = (°F – 32)/1.8, 1 degree = 0.79 rad, 1 cubic foot per minute = 28.317 L/min.

- Hourly calculations as specified in the ASHRAE Handbook of Fundamentals , or the equivalent, shall be used to determine the energy loads resulting from infiltration.
- The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals , page 26.24 and the “Whole-house Ventilation” provisions of 2001 ASHRAE Handbook of Fundamentals , page 26.19 for intermittent mechanical ventilation.
- Thermal storage element shall mean a component that is not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element shall be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or shall be connected to such a room with pipes or ducts that allow the element to be actively charged.
- For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.
- For a proposed design without a proposed heating system, a heating system having the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

- f. For a proposed design without a proposed cooling system, an electric air conditioner having the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
- g. For a proposed design with a nonstorage-type water heater, For a proposed design without a proposed water heater, the following assumptions shall be made for both the proposed design and standard reference design. For a proposed design with a heat pump water heater, the following assumptions shall be made for the standard reference design, except the fuel type shall be electric:

Fuel Type: Same as the predominant heating fuel type

Rated Storage Volume: 40 gallons

Draw Pattern: Medium

Efficiency: Uniform Energy Factor complying with 10 CFR §430.32

- h. For residences with conditioned basements, R-2 and R-4 residences, and for townhouses, the following formula shall be used to determine glazing area:

$$AF = A_S \times FA \times F$$

where:

AF = Total glazing area.

A_S = Standard reference design total glazing area.

FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 × below-grade boundary wall area).

F = (above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

- Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.
- Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.
- Below-grade boundary wall is any thermal boundary wall in soil contact.
- Common wall area is the area of walls shared with an adjoining dwelling unit.

- i. The factor for the compactness of the hot water distribution system is the ratio of the area of the rectangle that bounds the source of hot water and the fixtures that it serves (the “hot water rectangle”) divided by the floor area of the dwelling.
 - 1. Sources of hot water include water heaters, or in multiple-family buildings with central water heating systems, circulation loops or electric heat traced pipes.
 - 2. The hot water rectangle shall include the source of hot water and the points of termination of all hot water fixture supply piping.
 - 3. The hot water rectangle shall be shown on the floor plans and the area shall be computed to the nearest square foot.
 - 4. Where there is more than one water heater and each water heater serves different plumbing fixtures and appliances, it is permissible to establish a separate hot water rectangle for each hot water distribution system and add the area of these rectangles together to determine the compactness ratio.
 - 5. The basement or attic shall be counted as a story when it contains the water heater.
 - 6. Compliance shall be demonstrated by providing a drawing on the plans that shows the hot water distribution system rectangle(s), comparing the area of the rectangle(s) to the area of the dwelling and identifying the appropriate compactness ratio and *HWDS* factor.
- j. For a proposed design with electric resistance heating, a split system heat pump complying with 10 CFR §430.32 (2021) shall be assumed modeled in the standard reference design.
- k. For heating systems, cooling systems, or water heating systems not included in this table, the standard reference design shall be the same as proposed design.
- l. Only sections of ductwork that are installed in accordance with Section N1103.3.4, Items 1 and 2 are assumed to be located completely inside conditioned space. All other sections of ductwork are not assumed to be located completely inside conditioned space.
- m. Sections of ductwork installed in accordance with Section N1103.3.5.1 are assumed to have an effective duct insulation *R*-value of R-25.

Reason Statement:

The proposed changes above will reverse the largest efficiency rollbacks incorporated into the 2024 *IECC* and maintain Virginia's current performance path approach to efficiency trade-offs for heating, cooling, and water heating equipment. It will also eliminate an unnecessary new credit for duct location. The proposal will also incorporate a single efficiency improvement to buildings with all equipment types based on the U.S. Department of Energy's Determination that the 2024 *IECC* reduced annual energy costs by roughly 6.6% as compared to the 2021 *IECC*. We believe the combination of these changes will allow Virginia code users to continue to use the performance path essentially as they do today, avoiding the controversies that have accompanied the 2024 *IECC* revisions to this section.

All of these new trade-off credits were included in the 2024 *IECC* as part of a large compromise among *IECC*-R Development Committee Members referred to as the “omnibus.” However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 *IECC* by the ICC Board of Directors as a result of several appeals, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 *IECC* but for the omnibus compromise, and we recommend that Virginia eliminate these trade-off credits to be consistent with the 2021 *IECC* and the current VA Construction Code approach to equipment efficiency in the performance path.

Equipment trade-offs were correctly eliminated in the 2009 version of the *IECC* (and in Virginia's adoption of the 2009 IRC/*IECC*) and were consistently rejected in every *IECC* and Virginia code update cycle until the ICC Residential Committee-developed 2024 *IECC*. Nearly every state that adopts the *IECC* has eliminated these trade-offs as well. Equipment trade-offs reduce building efficiency because commonly installed cooling, heating, and water heating equipment typically exceeds the federal minimum efficiencies, but states are unable to set more reasonable efficiency requirements (or more reasonable assumptions in the standard reference design baseline) because of federal preemption. **The result is an unwarranted trade-off credit that allows buildings to be constructed 11-22% less efficient overall than if the trade-offs were not allowed.** See ICF International, *Review and Analysis of Equipment Trade-offs in Residential Energy Codes*, at ii (Sep. 23, 2013).

Although proponents of equipment trade-offs argue that they are “energy neutral,” the reality is that they are a short-term trade-off that will

have long-term negative impacts on homeowners—who are often unaware that such trade-offs are taking place. For example, if a trade-off is permitted for water heater efficiency, an instantaneous natural gas water heater would allow the builder to reduce the efficiency of the rest of the home by an average of 9%. The remaining home will be 9% less efficient for its entire useful lifetime. As the water heater is replaced every 10-15 years, the envelope of that home will continue to underperform by 9%. By contrast, under the current Virginia Construction Code (and the 2021 *IECC*), no trade-off credit is awarded for the instantaneous water heater, which means the rest of the home will be built to meet the code. As the water heater is swapped out in future years, a home built to the current Virginia UCC-compliant home will outperform a home built using a water heater performance trade-off allowed by 9%.

Regarding duct location, the current Virginia Uniform Construction Code does not award performance path trade-off credit for ducts located inside conditioned space. In both the prescriptive path and the performance path, builders are neither penalized nor credited for the location of duct systems. Although it is generally good building practice to locate all ducts and air handlers inside conditioned space, many builders in Virginia already do this.

The 2024 *IECC* already provides another performance-based alternative that provides credit for equipment efficiency and duct location (the Energy Rating Index), as well as multiple credits for equipment and duct location in Table R408.2. Both of these compliance paths do not carry such a high risk of free ridership (and reduced overall efficiency) as the proposed performance path credits. The simulated performance path lacks several of the built-in protections of the ERI path, and thus cannot guarantee an equivalent level of performance. We strongly recommend eliminating these loopholes from the performance path and implementing provisions consistent with the Virginia Construction Code and the 2021 *IECC*.

Finally, this proposal replaces the two multipliers in Section N1105.2(3)/R405.2(3) with a single multiplier. Although we do not oppose setting a different multiplier based on whether a home uses fossil fuel-fired or electric appliances, for a starting place we recommend setting a multiplier that is consistent with the U.S. Department of Energy's Determination on energy cost savings associated with the prescriptive path of the 2024 *IECC*, and one that properly reflects the impact of equipment trade-offs (if any). In December of 2024, U.S. DOE found that homes built to the 2024 *IECC* prescriptive path will have 6.6% lower annual energy costs than homes built to the 2021 *IECC*, on average. See U.S. Department of Energy, *Notification of Determination*, 89 Fed. Reg. 106458 (Dec. 30, 2024). The current Virginia Construction Code already requires that the proposed home in Section R405 not exceed 95% of the annual energy costs of the standard reference design home. A 6.6% reduction in energy costs is roughly 89%, and that number is proposed above as a single multiplier. We note, however, that if efficiency trade-offs are allowed for heating, cooling, water heating equipment, or for duct location, there would need to be additional changes to the multiplier, and the result would likely be lower than the 80/85% in the published 2024 *IECC*. However, for purposes of this proposal, assuming the equipment trade-offs and duct location credit are deleted, we view 89% as a reasonable starting place that would maintain consistency across compliance paths.

Cost Impact: The code change proposal will increase the cost

This proposal improves the overall efficiency of the performance path by roughly 6.6%, which may increase costs depending on decisions made by code users. However, these changes, taken as a single package, would maintain consistency with improvements made in the prescriptive path.

REC-R405.2(1)-24

IECC: R405.2

Proponents: William Penniman, representing Sierra Club Virginia Chapter (wpenniman@aol.com)

2024 International Energy Conservation Code [RE Project]

Revise as follows:

R405.2 Simulated building performance compliance.. Compliance based on *simulated building performance* requires that a *building* comply with the following:

1. The requirements of the sections indicated within Table R405.2 (~~N1105.2~~).
2. The proposed total *building thermal envelope* thermal conductance (TC) shall be less than or equal to the required total building thermal envelope TC using the prescriptive *U*-factors and *F*-factors from Table R402.1.2 multiplied by 1.08 in Climate Zones 0, 1 and 2, and 1.15 in Climate Zones 3 through 8, in accordance with Equation 4-2 and Section R402.1.5. The area-weighted maximum fenestration SHGC permitted in Climate Zones 0 through 3 shall be 0.30.

For Climate Zones 0–2: $TC_{\text{Proposed design}} \leq 1.08 \times TC_{\text{Prescriptive reference design}}$

Equation 4-2

For Climate Zones 3–8: $TC_{\text{Proposed design}} \leq 1.15 \times TC_{\text{Prescriptive reference design}}$

3. For each *dwelling unit* with one or more fuel-burning appliances for space heating, water heating, or both, the annual ~~energy cost~~ site energy use expressed in Btu or Btu per square foot of conditioned floor area of the *dwelling unit* shall be less than or equal to 80 percent of the ~~annual energy cost~~ site energy use of the *standard reference design*. For all other *dwelling units*, the ~~annual energy cost of the proposed design~~ site energy use expressed in Btu or Btu per square foot of conditioned floor area shall be less than or equal to 85 percent of the annual ~~energy cost~~ site energy use of the *standard reference design*. For each dwelling unit with greater than 5,000 square feet (465 m²) of *living space* located above grade plane, the annual ~~energy cost of the dwelling unit~~ site energy use expressed in Btu or Btu per square foot of conditioned floor area shall be reduced by an additional 5 percent of ~~annual energy cost~~ site energy use of the *standard reference design*. ~~Energy prices shall be taken from an approved source, such as the US Energy Information Administration's State Energy Data System prices and expenditures reports. Code officials shall be permitted to require time of use pricing in energy cost calculations.~~

Exceptions:

1. The energy use based on source energy expressed in Btu or Btu per square foot of ~~conditioned floor area~~ shall be permitted to be substituted for the ~~energy cost~~. The source energy multiplier for electricity shall be 2.51. The source energy multipliers shall be 1.09 for natural gas, 1.15 for propane, 1.19 for fuel oil, and 1.30 for imported liquified natural gas.
2. The energy use based on site energy expressed in Btu or Btu per square foot of conditioned floor area shall be permitted to be substituted for the energy cost.

Reason Statement: This proposal provides that the TC calculations are to be based upon estimated the site energy usage of the specific building, not the imagined costs of miscellaneous fuels. This specifies use of one of the code options (Exception 2) presented by the IECC in Section 405.2, and prevents potentially inconsistent application of standards across the Commonwealth. The ICC's commentary recognizes that "some jurisdictions may require the comparison to be done on the basis of 'site energy' versus 'annual energy cost.'" It explains "Because of the fact that utility charges for various types of energy can change over time, some code officials may prefer that the comparison be made based on the amount of energy delivered to a residential building instead of the cost of that energy."

Making use of site-energy consistent across Virginia makes sense. Site energy usage is the only factor that can be consistently applied to assess new dwellings' energy efficiency, and it is also the only thing a builder or an occupant can control. Adopting a site-energy test will avoid basing Simulated Performance calculations upon past or current energy cost estimates that bear no

relation to actual energy costs that will be incurred while a dwelling is occupied. It will also eliminate risks of inconsistent implementation if designers or inspectors are left to choose among different tests.

Trying to compare the impact of energy efficiency choices based upon future upstream or delivered fuel and energy prices makes no sense.

Energy prices vary wildly over time. Just in the period 2020-2024, natural gas and coal prices varied as follows:

Natural gas Henry Hub	\$1.49-\$8.81/Mcf	https://www.eia.gov/dnav/ng/hist/rngwhhdm.htm
Natural gas delivered to citygate	\$3.05-\$12.10/Mcf	https://www.eia.gov/dnav/ng/hist/n3050us3m.htm
Natural gas residential prices	\$9.19-\$25.39/Mcf	https://www.eia.gov/dnav/ng/hist/n3010us3m.htm
Coal prices	\$50-\$435/Ton	https://tradingeconomics.com/commodity/coal
Crude oil prices	\$15.18-\$113.77/Barrel	https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=pet&s=f0000000_3&f=m

Over the likely 50-100+ years in which a dwelling will operate, energy prices will swing even more wildly than in the past five years.

Neither builders, nor inspectors nor the Board can reliably forecast future energy costs, which will change dramatically between code updates and change differently in the service areas of the multiple utilities operating in Virginia, including the IOUs, Coops, and municipal systems. Each has a different mix of supply costs, operating and fixed costs and rates.

The shift to zero-carbon sources for electricity over the next 20-25 years, as called for by Virginia law, will change the cost mix since wind and solar have zero fuel costs.

Utilities' future demand mixes and rate structures will likely change significantly, as will their supply mixes.

The multipliers assumed for upstream fuel supplies are not based on realistic data or assumptions specific to Virginia now or in the future. Again, each utility has a different mix of fuels – including growing zero-cost energy production – and a different mix of generators with different efficiencies. These will change annually depending on many factors including price fluctuations, future markets and weather changes driven by climate change.

Imagined fuel costs do not consider on-site renewable energy, which may be installed with initial construction or by the owner in the future.

Assumed fuel costs and multipliers do not take into account either pollution or climate costs from different fuels or the likely prices for carbon emissions, which will be restored when Virginia law requiring RGGI participation is enforced as it is written. Moreover, despite political vicissitudes it is generally recognized that there will be a price on carbon within the lives of buildings constructed under the 2024 code updates, and, if not, the damage costs to persons, properties and the economy will be far worse. None of these costs are reflected in the use of imagined fuel costs or multipliers.

Basing comparisons upon on-site energy usage will enhance resiliency. Residents of better-insulated buildings will be able to withstand periods of energy supply disruptions for longer periods.

In sum, the only reasonable measure is on-site energy consumption, which can be estimated based upon the construction choices.

Cost Impact: The code change proposal will not increase or decrease the cost

There are no foreseeable construction cost impacts. Attempting to estimate future fuel costs may or may not alter construction decisions but one cannot predict how. Incorporating estimated upstream and delivered fuel/energy costs will cause more confusion than benefits. This proposal should simplify implementation of the performance option.

REC-R408.2.9-24

IRC: N1108.2.9 (R408.2.9)

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2024 International Residential Code

Delete without substitution:

~~**N1108.2.9 (R408.2.9) Opaque walls.** For buildings in Climate Zones 4 and 5, the maximum *U*-factor of 0.060 shall be permitted to be used for wood-framed walls for compliance with Table N1102.1.2 where complying with one or more of the following:~~

- ~~1. Primary space heating is provided by a *heat pump* that meets one of the efficiencies in Section N1108.2.2.~~
- ~~2. All installed *water heaters* are *heat pumps* that meet one of the efficiencies in Section N1108.2.3.~~
- ~~3. In addition to the number of credits required by Section N1108.2, three additional credits are achieved.~~
- ~~4. *Renewable energy resources* are installed to meet the requirements of Section N1108.2.7.~~

Reason Statement:

New Section R408.2.9 is an efficiency loophole incorporated into the 2024 *IECC* with potential long-term negative impacts. It allows a reduction in wall insulation where one of four conditions is met. There are several problems with this section:

1. None of the specific measures will provide efficiency for as long as the wall insulation being traded off. Measures 1 and 2 have significantly shorter useful lifetimes than wall insulation; measure 4 creates an efficiency trade-off for renewable energy, which is not allowed in either the prescriptive or performance paths of the *IECC*; and measure 3 allows a code user to select 3 more credits from Table R408.2, effectively creating a prescriptive envelope trade-off for 40+ measures that may or may not match the longevity or efficiency of wall insulation. No analysis was provided to justify this trade-off or to quantify whether these measures could save a comparable amount of energy as well-insulated walls.

2. Some advocates have been urging states to allow double-counting of these measures, effectively reducing envelope efficiency without any improvements elsewhere in the building. The charging language does not clarify whether measures 1, 2, and 4 are *in addition to* measures already used to comply with Section R408.2, or whether a code user may simply double-count these measures and reduce envelope efficiency. Neither the proponent's reason statement for this measure (REPI-33-21) nor any of the debate in the 2024 *IECC* development cycle addressed the possibility of double-counting, and it would seem to contradict language in measure 3 (which requires 3 credits "in addition to the number of credits required by Section R408.2"). Yet advocates at the state and national level have argued that code users should receive credit for these measures both to comply with Section R408.2 and to receive the benefits of an insulation reduction under R408.2.9.

This entire section is problematic, and will only lead to reduced efficiency. The only reason it is included in the 2024 *IECC* is because it was part of a deal among *IECC* Residential Consensus Committee members where sustainability measures and efficiency rollbacks that failed to achieve the required number of votes were grouped into a large "omnibus" package. In response to several appeals, the ICC Board of Directors later reversed the portions of the omnibus related to sustainability, but left in place the efficiency rollbacks, making the 2024 *IECC* less stringent than the 2021 *IECC* in several places. Other states considering the 2024 *IECC* have either deleted this controversial section or are in the process of debating it. We strongly recommend deleting the entire section and maintaining the stringency of the *IECC*.

Cost Impact: The code change proposal will not increase or decrease the cost

This section is a problematic and confusing exception that was introduced in the 2024 *IECC*. Eliminating it does not change the base efficiency requirements of the code, so it will neither increase nor decrease costs for code users.

M1103.1-24

IMC®: TABLE 1103.1, 1104.4.1, 1104.4.2, 1109.2.5

Proponents: Dennis Hart, Fairfax County, representing VPMIA/VBCOA (dennis.hart@fairfaxcounty.gov)

2024 International Mechanical Code

Revise as follows:

TABLE 1103.1 REFRIGERANT CLASSIFICATION, AMOUNT AND OEL

Portions of table not shown remain unchanged.

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE							(F) DEGREES OF HAZARD ^a
				RCL			LFL			OEL	
				lb/MCF	ppm	g/m ³	lb/MCF	ppm	g/m ³	ppm	
R-11 ^c	CCl ₃ F	trichlorofluoromethane	A1	0.39	1,100	6.1	—	—	—	1,000	2-0-0 ^b
R-12 ^c	CCl ₂ F ₂	dichlorodifluoromethane	A1	5.6	18,000	90	—	—	—	1,000	2-0-0 ^b
R-13 ^c	CClF ₃	chlorotrifluoromethane	A1	—	—	—	—	—	—	1,000	2-0-0 ^b
R-13B1 ^c	CBrF ₃	bromotrifluoromethane	A1	—	—	—	—	—	—	1,000	2-0-0 ^b
R-13I1	CF ₃ I	trifluoroiodomethane	A1	1.0	2,000	16	—	—	—	500	—
R-14	CF ₄	tetrafluoromethane (carbon tetrafluoride)	A1	25	110,000	400	—	—	—	1,000	2-0-0 ^b
R-22	CHClF ₂	chlorodifluoromethane	A1	13	59,000	210	—	—	—	1,000	2-0-0 ^b
R-23	CHF ₃	trifluoromethane (fluoroform)	A1	7.3	41,000	120	—	—	—	1,000	2-0-0 ^b
R-30	CH ₂ Cl ₂	dichloromethane (methylene chloride)	B1	—	—	—	—	—	—	—	—
R-31	CH ₂ ClF	chlorofluoromethane	—	—	—	—	—	—	—	—	—
R-32	CH ₂ F ₂	difluoromethane (methylene fluoride)	A2L	4.8	36,000	77	19.1	144,000	306	1,000	1-4-0
R-40	CH ₃ Cl	chloromethane (methyl chloride)	B2	—	—	—	—	—	—	—	—
R-41	CH ₃ F	fluoromethane (methyl fluoride)	—	—	—	—	—	—	—	—	—
R-50	CH ₄	methane	A3	—	—	—	—	50,000	—	1,000	—
R-113 ^c	CCl ₂ FCClF ₂	1,1,2-trichloro-1,2,2-trifluoroethane	A1	1.2	2,600	20	—	—	—	1,000	2-0-0 ^b
R-114 ^c	CClF ₂ CClF ₂	1,2-dichloro-1,1,2,2-tetrafluoroethane	A1	8.7	20,000	140	—	—	—	1,000	2-0-0 ^b
R-115	CClF ₂ CF ₃	chloropentafluoroethane	A1	47	120,000	760	—	—	—	1,000	—
R-116	CF ₃ CF ₃	hexafluoroethane	A1	34	97,000	550	—	—	—	1,000	1-0-0
R-123	CHCl ₂ CF ₃	2,2-dichloro-1,1,1-trifluoroethane	B1	3.5	9,100	57	—	—	—	50	2-0-0 ^b
R-124	CHClFCF ₃	2-chloro-1,1,1,2-tetrafluoroethane	A1	3.5	10,000	56	—	—	—	1,000	2-0-0 ^b
R-125	CHF ₂ CF ₃	pentafluoroethane	A1	23	75,000	370	—	—	—	1,000	2-0-0 ^b
R-134a	CH ₂ FCF ₃	1,1,1,2-tetrafluoroethane	A1	13	50,000	210	—	—	—	1,000	2-0-0 ^b
R-141b	CH ₃ CCl ₂ F	1,1-dichloro-1-fluoroethane	—	0.78	2,600	12	17.8	60,000	287	500	2-1-0
R-142b	CH ₃ CClF ₂	1-chloro-1, 1-difluoroethane	A2	5.1	20,000	82	20.4	80,000	329	1,000	2-4-0
R-143a	CH ₃ CF ₃	1,1,1-trifluoroethane	A2L	4.4	21,000	70	17.5	82,000	282	1,000	2-0-0 ^b
R-152a	CH ₃ CHF ₂	1,1-difluoroethane	A2	2.0	12,000	32	8.1	48,000	130	1,000	1-4-0
R-170	CH ₃ CH ₃	ethane	A3	0.54	7,000	8.6	2.4	31,000	38	1,000	2-4-0
R-E170	CH ₃ OCH ₃	Methoxymethane (dimethyl ether)	A3	1.0	8,500	16	4.0	34,000	64	1,000	—
R-218	CF ₃ CF ₂ CF ₃	octafluoropropane	A1	43	90,000	690	—	—	—	1,000	2-0-0 ^b
R-227ea	CF ₃ CHFCF ₃	1,1,1,2,3,3,3-heptafluoropropane	A1	36	84,000	580	—	—	—	1,000	—
R-236fa	CF ₃ CH ₂ CF ₃	1,1,1,3,3,3-hexafluoropropane	A1	21	55,000	340	—	—	—	1,000	2-0-0 ^b
R-245fa	CHF ₂ CH ₂ CF ₃	1,1,1,3,3-pentafluoropropane	B1	12	34,000	190	—	—	—	300	2-0-0 ^b
R-290	CH ₃ CH ₂ CH ₃	propane	A3	0.59	5,300	9.5	2.4	21,000	38	1,000	2-4-0
R-C318	-(CF ₂) ₄ -	octafluorocyclobutane	A1	41	80,000	650	—	—	—	1,000	—
R-400 ^c	zeotrope	R-12/114 (50.0/50.0)	A1	10	28,000	160	—	—	—	1,000	2-0-0 ^b
R-400 ^c	zeotrope	R-12/114 (60.0/40.0)	A1	11	30,000	170	—	—	—	1,000	—
R-401A	zeotrope	R-22/152a/124 (53.0/13.0/34.0)	A1	6.6	27,000	110	—	—	—	1,000	2-0-0 ^b
R-401B	zeotrope	R-22/152a/124 (61.0/11.0/28.0)	A1	7.2	30,000	120	—	—	—	1,000	2-0-0 ^b
R-401C	zeotrope	R-22/152a/124 (33.0/15.0/52.0)	A1	5.2	20,000	84	—	—	—	1,000	2-0-0 ^b
R-402A	zeotrope	R-125/290/22 (60.0/2.0/38.0)	A1	17	66,000	270	—	—	—	1,000	2-0-0 ^b
R-402B	zeotrope	R-125/290/22 (38.0/2.0/60.0)	A1	15	63,000	240	—	—	—	1,000	2-0-0 ^b
R-403A	zeotrope	R-290/22/218 (5.0/75.0/20.0)	A2	7.6	33,000	120	—	—	—	1,000	2-0-0 ^b
R-403B	zeotrope	R-290/22/218 (5.0/56.0/39.0)	A1	18	68,000	290	—	—	—	1,000	2-0-0 ^b
R-404A	zeotrope	R-125/143a/134a (44.0/52.0/4.0)	A1	31	130,000	500	—	—	—	1,000	2-0-0 ^b
R-405A	zeotrope	R-22/152a/142b/C318 (45.0/7.0/5.5/42.5)	—	16	57,000	260	—	—	—	1,000	—
R-406A	zeotrope	R-22/600a/142b (55.0/4.0/41.0)	A2	4.7	21,000	75	18.8	82,000	301.9	1,000	—
R-407A	zeotrope	R-32/125/134a (20.0/40.0/40.0)	A1	19	83,000	300	—	—	—	1,000	2-0-0 ^b
R-407B	zeotrope	R-32/125/134a (10.0/70.0/20.0)	A1	21	79,000	330	—	—	—	1,000	2-0-0 ^b
R-407C	zeotrope	R-32/125/134a (23.0/25.0/52.0)	A1	18	81,000	290	—	—	—	1,000	2-0-0 ^b
R-407D	zeotrope	R-32/125/134a (15.0/15.0/70.0)	A1	16	68,000	250	—	—	—	1,000	2-0-0 ^b
R-407E	zeotrope	R-32/125/134a (25.0/15.0/60.0)	A1	17	80,000	280	—	—	—	1,000	2-0-0 ^b
R-407F	zeotrope	R-32/125/134a (30.0/30.0/40.0)	A1	20	95,000	320	—	—	—	1,000	—

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				RCL			LFL			OEL	
R-407G	zeotrope	R-32/125/134a (2.5/2.5/95.0)	A1	13	52,000	210	—	—	—	1,000	—
R-407H	zeotrope	R-32/125/134a (32.5/15.0/52.5)	A1	19	92,000	300	—	—	—	1,000	—
R-407I	zeotrope	R-32/125/124a (19.5/8.5/72.0)	A1	16	71,100	250	—	—	—	1,000	—
R-408A	zeotrope	R-125/143a/22 (7.0/46.0/47.0)	A1	21	94,000	330	—	—	—	1,000	2-0-0 ^b
R-409A	zeotrope	R-22/124/142b (60.0/25.0/15.0)	A1	7.1	29,000	110	—	—	—	1,000	2-0-0 ^b
R-409B	zeotrope	R-22/124/142b (65.0/25.0/10.0)	A1	7.3	30,000	120	—	—	—	1,000	2-0-0 ^b
R-410A	zeotrope	R-32/125 (50.0/50.0)	A1	26	140,000	420	—	—	—	1,000	2-0-0 ^b
R-410B	zeotrope	R-32/125 (45.0/55.0)	A1	27	140,000	430	—	—	—	1,000	2-0-0 ^b
R-411A	zeotrope	R-127/22/152a (1.5/87.5/11.0)	A2	2.9	14,000	46	11.6	55,000	185.6	970	—
R-411B	zeotrope	R-127/22/152a (3.0/94.0/3.0)	A2	2.8	13,000	45	14.8	70,000	238.3	940	—
R-412A	zeotrope	R-22/218/142b (70.0/5.0/25.0)	A2	5.1	22,000	82	20.5	87,000	328.6	1,000	—
R-413A	zeotrope	R-218/134a/600a (9.0/88.0/3.0)	A2	5.8	22,000	93	23.4	88,000	374.9	1,000	—
R-414A	zeotrope	R-22/124/600a/142b (51.0/28.5/4.0/16.5)	A1	6.4	26,000	100	—	—	—	1,000	—
R-414B	zeotrope	R-22/124/600a/142b (50.0/39.0/1.5/9.5)	A1	6.0	23,000	96	—	—	—	1,000	—
R-415A	zeotrope	R-22/152a (82.0/18.0)	A2	2.9	14,000	47	—	—	—	1,000	—
R-415B	zeotrope	R-22/152a (25.0/75.0)	A2	2.1	12,000	34	—	—	—	1,000	—
R-416A	zeotrope	R-134a/124/600 (59.0/39.5/1.5)	A1	3.9	14,000	62	—	—	—	1,000	2-0-0 ^b
R-417A	zeotrope	R-125/134a/600 (46.6/50.0/3.4)	A1	3.5	13,000	55	—	—	—	1,000	2-0-0 ^b
R-417B	zeotrope	R-125/134a/600 (79.0/18.3/2.7)	A1	4.3	15,000	69	—	—	—	1,000	—
R-417C	zeotrope	R-125/134a/600 (19.5/78.8/1.7)	A1	5.4	21,000	87	—	—	—	1,000	—
R-418A	zeotrope	R-290/22/152a (1.5/96.0/2.5)	A2	4.8	22,000	77	19.2	89,000	308.4	1,000	—
R-419A	zeotrope	R-125/134a/E170 (77.0/19.0/4.0)	A2	4.2	15,000	67	16.7	60,000	268.6	1,000	—
R-419B	zeotrope	R-125/134a/E170 (48.5/48.0/3.5)	A2	4.6	17,000	74	18.5	69,000	297.3	1,000	—
R-420A	zeotrope	R-134a/142b (88.0/12.0)	A1	12	44,000	180	—	—	—	1,000	2-0-0 ^b
R-421A	zeotrope	R-125/134a (58.0/42.0)	A1	17	61,000	280	—	—	—	1,000	2-0-0 ^b
R-421B	zeotrope	R-125/134a (85.0/15.0)	A1	21	69,000	330	—	—	—	1,000	2-0-0 ^b
R-422A	zeotrope	R-125/134a/600a (85.1/11.5/3.4)	A1	18	63,000	290	—	—	—	1,000	2-0-0 ^b
R-422B	zeotrope	R-125/134a/600a (55.0/42.0/3.0)	A1	16	56,000	250	—	—	—	1,000	2-0-0 ^b
R-422C	zeotrope	R-125/134a/600a (82.0/15.0/3.0)	A1	18	62,000	290	—	—	—	1,000	2-0-0 ^b
R-422D	zeotrope	R-125/134a/600a (65.1/31.5/3.4)	A1	16	58,000	260	—	—	—	1,000	2-0-0 ^b
R-422E	zeotrope	R-125/134a/600a (58.0/39.3/2.7)	A1	16	57,000	260	—	—	—	1,000	—
R-423A	zeotrope	R-134a/227ea (52.5/47.5)	A1	19	59,000	300	—	—	—	1,000	2-0-0 ^b
R-424A	zeotrope	R-125/134a/600a/601a (50.5/47.0/0.9/1.0/0.6)	A1	6.2	23,000	100	—	—	—	990	2-0-0 ^b
R-425A	zeotrope	R-32/134a/227ea (18.5/69.5/12.0)	A1	16	72,000	260	—	—	—	1,000	2-0-0 ^b
R-426A	zeotrope	R-125/134a/600a/601a (5.1/93.0/1.3/0.6)	A1	5.2	20,000	83	—	—	—	990	—
R-427A	zeotrope	R-32/125/143a/134a (15.0/25.0/10.0/50.0)	A1	18	79,000	290	—	—	—	1,000	2-1-0
R-428A	zeotrope	R-125/143a/290/600a (77.5/20.0/0.6/1.9)	A1	23	84,000	370	—	—	—	1,000	—
R-429A	zeotrope	R-E170/152a/600a (60.0/10.0/30.0)	A3	0.81	6,300	13	3.2	25,000	83.8	1,000	—
R-430A	zeotrope	R-152a/600a (76.0/24.0)	A3	1.3	8,000	21	5.2	32,000	44.0	1,000	—
R-431A	zeotrope	R-290/152a (71.0/29.0)	A3	0.68	5,500	11	2.7	22,000	38.6	1,000	—
R-432A	zeotrope	R-127/0/E170 (80.0/20.0)	A3	0.13	1,200	2.1	2.4	22,000	39.2	550	—
R-433A	zeotrope	R-127/0/290 (30.0/70.0)	A3	0.34	3,100	5.5	2.4	20,000	32.4	750	—
R-433B	zeotrope	R-127/0/290 (5.0-95.0)	A3	0.39	3,500	6.3	2.0	18,000	32.1	950	—
R-433C	zeotrope	R-127/0/290 (25.0-75.0)	A3	0.41	3,700	6.5	2.0	18,000	83.8	790	—
R-434A	zeotrope	R-125/143a/600a (63.2/18.0/16.0/2.8)	A1	20	73,000	320	—	—	—	1,000	—
R-435A	zeotrope	R-E170/152a (80.0/20.0)	A3	1.1	8,500	17	4.3	34,000	68.2	1,000	—
R-436A	zeotrope	R-290/600a (56.0/44.0)	A3	0.50	4,000	8.1	2.0	16,000	32.3	1,000	—
R-436B	zeotrope	R-290/600a (52.0/48.0)	A3	0.51	4,000	8.2	2.0	16,000	32.7	1,000	—
R-436C	zeotrope	R-290/600a (95.0/5.0)	A3	0.57	5,000	9.1	2.3	20,000	36.5	1,000	—
R-437A	zeotrope	R-125/134a/600/601 (19.5/78.5/1.4/0.6)	A1	5.1	19,000	82	—	—	—	990	—
R-438A	zeotrope	R-32/125/134a/600/601a (8.5/45.0/44.2/1.7/0.6)	A1	4.9	20,000	79	—	—	—	990	—
R-439A	zeotrope	R-32/125/600a (50.0/47.0/3.0)	A2	4.7	26,000	76	18.9	104,000	303.3	1,000	—
R-440A	zeotrope	R-290/134a/152a (0.6/1.6/97.8)	A2	1.9	12,000	31	7.8	46,000	124.7	1,000	—
R-441A	zeotrope	R-170/290/600a/600 (3.1/54.8/6.0/36.1)	A3	0.39	3,200	6.3	2.0	16,000	31.7	1,000	—
R-442A	zeotrope	R-32/125/134a/152a/227ea (31.0/31.0/30.0/3.0/5.0)	A1	21	100,000	330	—	—	—	1,000	—
R-443A	zeotrope	R-127/0/290/600a (55.0/40.0/5.0)	A3	0.19	1,700	3.1	2.2	20,000	35.6	640	—
R-444A	zeotrope	R-32/152a/1234ze(E) (12.0/5.0/83.0)	A2L	5.1	21,000	81	19.9	82,000	324.8	850	—
R-444B	zeotrope	R-32/152a/1234ze(E) (41.5/10.0/48.5)	A2L	4.3	23,000	69	17.3	93,000	277.3	930	—
R-445A	zeotrope	R-744/134a/1234ze(E) (6.0/9.0/85.0)	A2L	4.2	16,000	67	2.7	63,000	347.4	930	—
R-446A	zeotrope	R-32/1234ze(E)/600 (68.0/29.0/3.0)	A2L	2.5	16,000	39	13.5	62,000	217.4	960	—
R-447A	zeotrope	R-32/125/1234ze(E) (68.0/3.5/28.5)	A2L	2.6	16,000	42	18.9	65,000	303.5	960	—
R-447B	zeotrope	R-32/125/1234ze(E) (68.0/8.0/24.0)	A2L	2.6	16,000	42	20.6	121,000	312.7	970	—
R-448A	zeotrope	R-32/125/1234yf/134a/1234ze(E) (26.0/26.0/20.0/21.0/7.0)	A1	24	110,000	390	—	—	—	860	—
R-449A	zeotrope	R-32/125/1234yf/134a (24.3/24.7/25.3/25.7)	A1	23	100,000	370	—	—	—	840	—
R-449B	zeotrope	R-32/125/1234yf/134a (25.2/24.3/23.2/27.3)	A1	23	100,000	370	—	—	—	850	—
R-449C	zeotrope	R-32/125/1234yf/134a (20.0/20.0/31.0/29.0)	A1	23	98,000	360	—	—	—	800	—
R-450A	zeotrope	R-134a/1234ze(E) (42.0/58.0)	A1	20	72,000	320	—	—	—	880	—

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				RCL			LFL			OEL	
R-451A	zeotrope	R-1234yf/134a (89.8/10.2)	A2L	5.0	18,000	81	20.3	70,000	326.6	530	—
R-451B	zeotrope	R-1234yf/134a (88.8/11.2)	A2L	5.0	18,000	81	20.3	70,000	326.6	530	—
R-452A	zeotrope	R-32/125/1234yf (11.0/59.0/30.0)	A1	27	100,000	440	—	—	—	790	—
R-452B	zeotrope	R-32/125/1234yf (67.0/7.0/26.0)	A2L	4.8	30,000	77	19.3	119,000	310.5	870	—
R-452C	zeotrope	R-32/125/1234yf (12.5/61.0/26.5)	A1	27	100,000	430	—	—	—	810	—
R-453A	zeotrope	R-32/125/134a/227ea/600/601a (20.0/20.0/53.8/5.0/0.6/0.6)	A1	7.8	34,000	120	—	—	—	1,000	—
R-454A	zeotrope	R-32/1234yf (35.0/65.0)	A2L	3.2	16,000	52	18.3	63,000	293.9	690	—
R-454B	zeotrope	R-32/1234yf (68.9/31.1)	A2L	3.1	19,000	49	22.0	77,000	352.6	850	—
R-454C	zeotrope	R-32/1234yf (21.5/78.5)	A2L	4.4	19,000	71	18.0	62,000	289.5	620	—
R-455A	zeotrope	R-744/32/1234yf (3.0/21.5/75.5)	A2L	4.9	22,000	79	26.9	118,000	432.1	650	—
R-456A	zeotrope	R-32/134a/1234ze(E) (6.0/45.0/49.0)	A1	20	77,000	320	—	—	—	900	—
R-457A	zeotrope	R-32/1234yf/152a (18.0/70.0/12.0)	A2L	3.4	15,000	54	13.5	60,000	216.3	650	—
R-457B	zeotrope	R-32/1234yf/152a (35.0/55.0/10.0)	A2L	3.7	19,000	59	14.9	76,000	239	730	—
R-458A	zeotrope	R-32/125/134a/227ea/236fa (20.5/4.0/61.4/13.5/0.6)	A1	18	76,000	280	—	—	—	1,000	—
R-459A	zeotrope	R-32/1234yf/1234ze(E) (68.0/26.0/6.0)	A2L	4.3	27,000	69	17.4	107,000	278.7	870	—
R-459B	zeotrope	R-32/1234yf/1234ze(E) (21.0/69.0/10.0)	A2L	30	25,000	92	23.3	99,000	373.5	640	—
R-460A	zeotrope	R-32/125/134a/1234ze(E) (12.0/52.0/14.0/22.0)	A1	24	92,000	380	—	—	—	950	—
R-460B	zeotrope	R-32/125/134a/1234ze(E) (28.0/25.0/20.0/27.0)	A1	25	120,000	400	—	—	—	950	—
R-460C	zeotrope	R-32/125/134a/1234ze(E) (2.5/2.5/46.0/49.0)	A1	20	73,000	310	—	—	—	900	—
R-461A	zeotrope	R-125/143a/134a/227ea/600a (55.0/5.0/32.0/5.0/3.0)	A1	17	61,000	270	—	—	—	1,000	—
R-462A	zeotrope	R-32/125/143a/134a/600 (9.0/42.0/2.0/44.0/3.0)	A2	3.9	16,000	62	16.6	105,000	265.8	1,000	—
R-463A	zeotrope	R-744/32/125/1234yf/134a (6.0/36.0/30.0/14.0/14.0)	A1	19	98,000	300	—	—	—	990	—
R-464A	zeotrope	R-32/125/1234ze(E)/227ea (27.0/27.0/40.0/6.0)	A1	27	120,000	430	—	—	—	930	—
R-465A	zeotrope	R-32/290/1234yf (21.0/7.9/71.1)	A2	2.5	12,000	40	10.0	98,000	160.9	660	—
R-466A	zeotrope	R-32/125/131i (49.0/11.5/39.5)	A1	6.2	30,000	99	—	—	—	860	—
R-467A	zeotrope	R-32/125/134a/600a (22.0/5.0/72.4/0.6)	A2L	6.7	31,000	110	—	—	—	1,000	—
R-468A	zeotrope	R-1132a/32/1234yf (3.5/21.5/75.0)	A2L	4.1	18,000	66	—	—	—	610	—
R-469A	zeotrope	R-744/R-32/R-125 (35.0/32.5/32.5)	A1	8	53,000	—	—	—	—	1,600	—
R-470A	zeotrope	R-744/32/125/134a/1234ze(E)/227ea (10.0/17.0/19.0/7.0/44.0/3.0)	A1	17	77,000	270	—	—	—	1,100	—
R-470B	zeotrope	R-744/32/125/134a/1234ze(E)/227ea (10.0/17.0/19.0/7.0/44.0/3.0)	A1	16	72,000	270	—	—	—	1,100	—
R-471A	zeotrope	R-1234ze(E)/227ea/1336mzz(E) (78.7/4.3/17.0)	A1	9.7	31,000	160	—	—	—	710	—
R-472A	zeotrope	R-744/32/134a (69.0/12.0/19.0)	A1	4.5	35,000	72	—	—	—	2,700	—
R-500 ^d	azeotrope	R-12/152a (73.8/26.2)	A1	7.4	29,000	120	—	—	—	1,000	2-0-0 ^b
R-501 ^c	azeotrope	R-22/12 (75.0/25.0)	A1	13	54,000	210	—	—	—	1,000	—
R-502 ^d	azeotrope	R-22/115 (48.8/51.2)	A1	21	73,000	330	—	—	—	1,000	2-0-0 ^b
R-503 ^d	azeotrope	R-23/13 (40.1/59.9)	—	—	—	—	—	—	—	1,000	2-0-0 ^b
R-504 ^c	azeotrope	R-32/115 (48.2/51.8)	—	28	140,000	450	—	—	—	1,000	—
R-507A	azeotrope	R-125/143a (50.0/50.0)	A1	32	130,000	510	—	—	—	1,000	2-0-0 ^b
R-508A	azeotrope	R-23/116 (39.0/61.0)	A1	14	55,000	220	—	—	—	1,000	2-0-0 ^b
R-508B	azeotrope	R-23/116 (46.0/54.0)	A1	13	52,000	200	—	—	—	1,000	2-0-0 ^b
R-509A	azeotrope	R-22/218 (44.0/56.0)	A1	24	75,000	380	—	—	—	1,000	2-0-0 ^b
R-510A	azeotrope	R-E170/600a (88.0/12.0)	A3	0.87	7,300	14	3.5	29,000	56.1	1,000	—
R-511A	azeotrope	R-290/E170 (95.0/5.0)	A3	0.59	5,300	9.5	2.4	21,000	38.0	1,000	—
R-512A	azeotrope	R-134a/152a (5.0/95.0)	A2	1.9	11,000	31	7.7	45,000	123.9	1,000	—
R-513A	azeotrope	R-1234yf/134a (56.0/44.0)	A1	20	72,000	320	—	—	—	650	—
R-513B	azeotrope	R-1234yf/134a (58.5/41.5)	A1	21	74,000	330	—	—	—	640	—
R-514A	azeotrope	R-1336mzz(S)/1130(E) (74.7/25.3)	B1	0.86	2,400	14	—	—	—	320	—
R-515A	azeotrope	R-1234ze(E)/227ea (88.0/12.0)	A1	19	63,000	300	—	—	—	810	—
R-515B	azeotrope	R-1234ze(E)/227ea (91.1/8.9)	A1	18	61,000	290	—	—	—	810	—
R-516A	azeotrope	R-1234yf/134a/152a (77.5/8.5/14.0)	A2	3.2	13,000	5.2	13.1	50,000	210.1	590	—
R-600	CH ₃ CH ₂ CH ₂ CH ₃	butane	A3	0.15	1,000	2.4	3.0	20,000	48	1,000	1-4-0
R-600a	CH(CH ₃) ₂ CH ₃	2-methylpropane (isobutane)	A3	0.59	4,000	9.5	2.4	16,000	38	1,000	2-4-0
R-601	CH ₃ CH ₂ CH ₂ CH ₂ CH ₃	pentane	A3	0.18	1,000	2.9	2.2	12,000	35	600	—
R-601a	(CH ₃) ₂ CHCH ₂ CH ₃	2-methylbutane (isopentane)	A3	0.18	1,000	2.9	2.4	13,000	38	600	—
R-610	CH ₃ CH ₂ OCH ₂ CH ₃	ethoxyethane (ethyl ether)	—	—	—	—	—	—	—	400	—
R-611	HCOOCH ₃	methyl formate	B2	—	—	—	—	—	—	100	—
R-717	NH ₃	ammonia	B2L	0.014	320	0.22	7.2	167,000	116	25	3-3-0 ^c
R-718	H ₂ O	water	A1	—	—	—	—	—	—	—	0-0-0
R-744	CO ₂	carbon dioxide	A1	4.5	40,000	72	—	—	—	5,000	2-0-0 ^b
R-1130(E)	CHCl=CHCl	trans-1,2-dichloroethene	B2	0.25	1,000	4	16	65,000	258	200	—
R-1132a	CF ₂ =CH ₂	1,1-difluoroethylene	A2	2.0	13,000	33	8.1	50,000	131	500	—
R-1150	CH ₂ =CH ₂	ethene (ethylene)	A3	—	—	—	2.2	31,000	36	200	1-4-2
R-1224yd(Z)	CF ₃ CF=CHCl	(Z)-1-chloro-2,3,3,3-tetrafluoroethylene	A1	23	60,000	370	—	—	—	1,000	—
R-1233zd(E)	CF ₃ CH=CHCl	trans-1-chloro-3,3,3-trifluoro-1-propene	A1	5.3	16,000	85	—	—	—	800	—
R-1234yf	CF ₃ CF=CH ₂	2,3,3,3-tetrafluoro-1-propene	A2L	4.5	16,000	75	18.0	62,000	289	500	—

CHEMICAL REFRIGERANT	FORMULA	CHEMICAL NAME OF BLEND	REFRIGERANT SAFETY GROUP CLASSIFICATION	AMOUNT OF REFRIGERANT PER OCCUPIED SPACE						(F) DEGREES OF HAZARD	
				RCL			LFL				OEL
R-1234ze(E)	CF ₃ CH=CFH	trans-1,3,3,3-tetrafluoro-1-propene	A2L	4.7	16,000	76	18.8	65,000	303	800	—
R-1270	CH ₃ CH=CH ₂	Propene (propylene)	A3	0.1	1,000	1.7	—	—	—	500	1-4-1
R-1336mzz(E)	CF ₃ CHCHCF ₃	trans 1,1,1,4,4,4-hexafluoro-2-butene	A1	3.0	7,200	48	—	—	—	400	—
R-1336mzz(Z)	CF ₃ CHCHCF ₃	cis-1,1,1,4,4,4-hexafluoro-2-butene	A1	5.2	13,000	84	—	—	—	500	—

For SI: 1 pound = 0.454 kg, 1 cubic foot = 0.0283 m³.

- Degrees of hazard are for health, fire, and reactivity, respectively, in accordance with NFPA 704.
- Reduction to 1-0-0 is allowed if analysis satisfactory to the code official shows that the maximum concentration for a rupture or full loss of refrigerant charge would not exceed the IDLH, considering both the refrigerant quantity and room volume.
- Class I ozone depleting substance; prohibited for new installations.
- Occupational Exposure Limit based on the OSHA PEL, ACGIH TLV-TWA, the TERA WEEL or consistent value on a time-weighted average (TWA) basis (unless noted C for ceiling) for an 8 hr/d and 40 hr/wk.

1104.4.1 Noncommunicating spaces. ~~Where For Group A1 and B1 refrigerants, where~~ the refrigerant-containing parts of a system are located in one or more spaces that do not communicate through permanent openings or HVAC ducts, the volume of the smallest, enclosed occupied space shall be used to determine the permissible quantity of refrigerant in the system. For all other refrigerant classifications, where the refrigerant-containing parts of a system are located in one or more spaces that do not communicate through permanent openings or HVAC ducts, the volume of the smallest, enclosed occupied or unoccupied space shall be used to determine the permissible quantity of refrigerant in the system

1104.4.2 Communicating spaces. ~~Where For Group A1 and B1 refrigerants, where~~ an evaporator or condenser is located in an air duct system, the volume of the smallest, enclosed occupied space served by the duct system shall be used to determine the maximum allowable quantity of refrigerant in the system. For all other refrigerant classifications, where an evaporator or condenser is located in an air duct system, the volume of the smallest, enclosed occupied or unoccupied space served by the duct system shall be used to determine the maximum allowable quantity of refrigerant in the system

Exception: If airflow to any enclosed space cannot be reduced below one-quarter of its maximum, the entire space served by the air duct system shall be used to determine the maximum allowable quantity of refrigerant in the system.

1109.2.5 Refrigerant pipe shafts. Refrigerant piping that penetrates two or more floor/ceiling assemblies shall be enclosed in a fire-resistance-rated shaft enclosure. The fire-resistance-rated shaft enclosure shall comply with Section 713 of the *International Building Code*.

Exceptions:

- Refrigeration systems using R-718 refrigerant (water).
- Piping in a direct refrigeration system ~~using Group A1 refrigerant~~ where the refrigerant quantity does not exceed the limits of Table 1103.1 for the smallest ~~occupied~~ space through which the piping passes.
- Piping located on the exterior of the *building* where vented to the outdoors.

Reason Statement: For decades typical human comfort cooling was based on A1 refrigerants which were nonflammable. The only concern for volume calculations was asphyxiation. With the introduction of A2L refrigerant there is a flammability component introduced that wasn't a concern with A1 refrigerant. Exceeding the RCL in an unoccupied space such as an elevator machine room, could create an ignition issue.

Cost Impact: The code change proposal will not increase or decrease the cost

This calculation is performed during the design phase and should not affect the overall cost of the project.

M-FG310.2-24

IFGC: 310.2, 310.2.1, 310.2.2, 310.2.3, 310.2.4, 310.2.5, 310.3, 403.4.5

Proponents: Dennis Hart, Fairfax County, representing VPMIA/VBCOA (dennis.hart@fairfaxcounty.gov)

2024 International Fuel Gas Code

Delete without substitution:

~~**310.2 CSST.** This section applies to corrugated stainless steel tubing (CSST) that is not listed with an arc-resistant jacket or coating system in accordance with ANSI LC 1/CSA 6.26. CSST gas *piping* systems and *piping* systems containing one or more segments of CSST shall be electrically continuous and bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system.~~

~~**310.2.1 Point of connection.** The bonding jumper shall connect to a metallic pipe, pipe fitting or CSST fitting.~~

~~**310.2.2 Size and material of jumper.** The bonding jumper shall be not smaller than 6 AWG copper wire or equivalent.~~

~~**310.2.3 Bonding jumper length.** The length of the bonding jumper between the connection to a gas *piping* system and the connection to a grounding electrode system shall not exceed 75 feet (22 860 mm). Any additional grounding electrodes installed to meet this requirement shall be bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system.~~

~~**310.2.4 Bonding connections.** Bonding connections shall be in accordance with NFPA 70.~~

~~**310.2.5 Connection devices.** Devices used for making the bonding connections shall be *listed* for the application in accordance with UL 467.~~

Revise as follows:

310.3 Arc-resistant CSST. Corrugated stainless steel tubing (CSST) that is listed with an arc-resistant jacket or coating system ~~shall be listed as arc-resistant~~ in accordance with ANSI LC 1/CSA 6.26. ~~Are-resistant jacketed CSST 6.26. Are-resistant jacketed CSST~~ Arc-resistant jacketed CSST shall be electrically continuous and bonded to an effective ground fault current path. ~~Where any CSST used in a piping system does not have an arc-resistant jacket or coating system, the bonding requirements of Section 310.2 shall apply.~~ Arc-resistant jacketed CSST shall be considered to be bonded where it is connected to one or more *appliances* that are connected to the equipment grounding conductor of the circuit that supplies that ~~appliance(s)~~ appliance(s). Where arc-resistant CSST is installed in a piping system without an appliance with an equipment grounding conductor, or where the system contains any non-arc-resistant CSST, the piping system shall be bonded in accordance with the manufacturer's installation instructions and ANSI LC1/CSA 6.26 Annex C.

403.4.5 Corrugated stainless steel tubing. Corrugated stainless steel tubing shall be *listed* in accordance with ANSI LC 1/CSA 6.26 and shall be arc-resistant in accordance with 5.16 of LC 1/CSA 6.26. **Exception:** Corrugated stainless steel tubing installed below grade outside of the building in compliance with 404.11 or beneath the building in compliance with 404.14 shall not be required to be arc-resistant.

Reason Statement:

This proposal eliminates the use of non-arc-resistant jacketed corrugated stainless steel tubing (CSST) and permits only arc-resistant jacketed CSST to be installed. Arc-resistant CSST has been shown to significantly reduce the risk of fire caused by arcing from nearby electrical faults or lightning strikes, a known hazard associated with non-arc resistant jacketed CSST.

Non–arc-resistant CSST has a long history of performance concerns related to lightning-related damage and has been the subject of numerous manufacturer warnings, insurance claims, and litigation. In response, manufacturers developed arc-resistant CSST with enhanced protection. Allowing non–arc-resistant CSST to remain in the code increases risk and perpetuates the need for additional safety measures, such as prescriptive bonding.

By limiting installations to arc-resistant CSST only, this proposal also removes the need for prescriptive bonding requirements from the code. Instead, bonding requirements are to be determined and specified by the manufacturer as part of their listed installation instructions. This approach aligns with how other listed and tested gas piping products are regulated, simplifying enforcement and ensuring that bonding practices are consistent with product-specific requirements.

This change reflects industry best practices, reduces complexity in the field, improves safety, and enhances code clarity by removing outdated and risk-prone options from the code.

Cost Impact: The code change proposal will not increase or decrease the cost

While the cost per foot of arc-resistant CSST is higher than that of non-arc-resistant CSST, the overall expense may be offset by the elimination of additional bonding requirements.

RE3601.8-24

IRC: E3601.8, E3601.6.2

Proponents: Corian Carney, York County, representing Virginia Chapter IAEI, Eastern Virginia Division IAEI (corian.carney@yorkcounty.gov); Charles Stiles, Spotsylvania County, representing VA Chapter IAEI (cstiles@spotsylvania.va.us); Ryan Celestino, City of Newport News, representing VA Chapter IAEI (celestino@nnva.gov); Joseph Willis, Prince William County, representing Virginia Chapter IAEI (jwillis@pwcgov.org)

2024 International Residential Code

Delete without substitution:

~~**E3601.8 Emergency disconnects.** For one and two family dwelling units, all service conductors shall terminate in disconnecting means having a short circuit current rating equal to or greater than the available fault current, installed in a readily accessible outdoor location. If more than one disconnect is provided, they shall be grouped. Each disconnect shall be one of the following:~~

- ~~1. Service disconnects marked as follows: EMERGENCY DISCONNECT, SERVICE DISCONNECT.~~
- ~~2. Meter disconnect switches that have a short circuit current rating equal to or greater than the available fault current and all metal housings and service enclosures are grounded in accordance with Section E3908.7 and bonded in accordance with Section E3609. A meter disconnect switch shall be capable of interrupting the load served and shall be marked as follows: EMERGENCY DISCONNECT, METER DISCONNECT, NOT SERVICE EQUIPMENT.~~
- ~~3. Other listed disconnect switches or circuit breakers that are marked suitable for use as service equipment, but not marked as suitable only for use as service equipment and marked as follows: EMERGENCY DISCONNECT, NOT SERVICE EQUIPMENT.~~

~~Markings shall comply with Section E3404.12 and both of the following:~~

- ~~1. The marking or labels shall be located on the outside front of the disconnect enclosure with red background and white text.~~
- ~~2. The letters shall be at least $\frac{1}{2}$ -inch (13mm) high. [230.82 (3), 230.85]~~

Revise as follows:

E3601.6.2 Service disconnect location. The service disconnecting means shall be installed ~~at in~~ a readily accessible location ~~either outside of a building or inside nearest the point of entrance of the service conductors, outdoor location in accordance with one the following:~~

1. On the dwelling unit.
2. Within sight of the dwelling unit in accordance with E3405.8

Service disconnecting means shall not be installed in bathrooms. Each occupant shall have access to the disconnect serving the dwelling unit in which they reside. [230.70(A)(1)(2), 230.72(C)]

Reason Statement: The proposed regulations for the 2026 National Electrical Code remove the options for Emergency Disconnects from Article 230 (Services), and relocate them to Article 225 (Feeders). The language in the 2020 and 2023 National Electrical Code unintentionally contradicts intent in other code sections related to service conductors and grounding electrode system connection. Removal of this language from the 2024 Virginia Residential Code will allow Virginia to keep up with more current safety standards provided by the National Electrical Code, and eliminate confusion between contractors and building department staff.

Cost Impact: The code change proposal will decrease the cost

by eliminating potential for multiple disconnecting means being installed or from reworking of installations due to confusion or

misinterpretation of the code language.

Attached Files

- **70_A2025_NEC_P10_FD_BallotFinal.pdf**
<https://va.cdpassess.com/proposal/1259/1893/files/download/925/>

RE3705.6-24

IRC: TABLE E3705.6 (Table 240.6)

Proponents: Joseph Willis, Prince William County, representing Virginia Chapter IAEL (jwillis@pwcgov.org)

2024 International Residential Code

Revise as follows:

TABLE E3705.6 (Table 240.6) STANDARD AMPERE RATING FOR FUSES AND INVERSE TIME CIRCUIT BREAKERS

STANDARD AMPERE RATINGS				
<u>10</u>	15	20	25	30
35	40	45	50	60
70	80	90	100	110
125	150	175	200	225
250	300	350	400	----

Reason Statement: The purpose of this proposal is to align the table for standard fuse and inverse time circuit breaker sizes with 2023 NFPA 70 section 240.6 and to accommodate the allowance for 10 amp circuits as outlined the E3702.3 of the 2024 International Residential Code

Cost Impact: The code change proposal will decrease the cost

While the instances of a 10 amp circuit being used for a typical one or 2 family dwelling, by adding a 10 amp circuit breaker to list of standard fuses and inverse time circuit breakers the option is given to the installer to install that circuit breaker of that rating. Without this being expressly allowed in the list, the installer would be required to install a circuit of a standard size, or install a circuit of a standard size then install a fused disconnect in the circuit to appropriately protect the devices and wiring at 10 amps.

Estimate cost savings per instance: Approximately \$100-\$125 per instance

RE3901.4.2-24

IRC: E3901.4.2

Proponents: Joseph Willis, representing Prince William County (jwillis@pwcgov.org); Eric Mays, representing Prince William County (emays@pwcgov.org)

2024 International Residential Code

Revise as follows:

E3901.4.2 Island and peninsular countertops and work surfaces. ~~Receptacle outlets, if installed to serve an island or peninsular countertop or work surface, shall be installed in accordance with Section E3901.4.3. If a receptacle outlet is not provided to serve an island or peninsular countertop or work surface, provisions shall be provided at the island or peninsula for future addition of a receptacle outlet to serve the island or peninsular countertop or work surface.~~

Reason Statement:

The language in the 2024 International Residential Code provides the installer the option to either install a receptacle outlet or provide future provisions for a receptacle outlet at peninsular and island work surfaces. By eliminating the language to allow for future provisions, the temptation to perform unpermitted and potentially non-compliant work will be drastically decreased as the convenience of having future provisions will no longer be available. In addition, the temptation to utilize extension cords from a nearby receptacle to place a small appliance on these work surfaces is also eliminated. This particular code section is the only code section in the electrical provisions of the 2024 IRC that allows the installation of wiring for future use and one of only six times that “future” is used as it pertains to installations for use at an undetermined time. The other instances apply to plumbing as it relates to drainage and venting and mechanical and gas sections pertaining to dryer exhaust duct. The specific requirements to have receptacle outlet serve island and peninsular countertop work surfaces has been a requirement since the 1990 edition of NFPA 70, The National Electrical Code. This code change proposal to the 2024 Virginia Residential Code fully addresses the safety deficiencies identified by the NFPA in the commentary for the 2023 Edition of the National Electrical Code.

Cost Impact: The code change proposal will not increase or decrease the cost

This code change proposal will have no cost impact to the owner/designer/contractor chooses to install receptacles on the island and/or peninsular countertop work surfaces. In addition to the zero-cost impact, the removal of the future provisions will save money in the long run as the cost of material and labor continue to increase.

RM-FG2411.2-24

IRC: G2411.2 (310.2), G2411.2.1 (310.2.1), G2411.2.2 (310.2.2), G2411.2.3 (310.2.3), G2411.2.4 (310.2.4), G2411.2.5 (310.2.5), G2411.3 (310.3), G2414.4.4 (403.4.5)

Proponents: Dennis Hart, Fairfax County, representing VPMIA/VBCOA (dennis.hart@fairfaxcounty.gov)

2024 International Residential Code

Delete without substitution:

G2411.2 (310.2) CSST. This section applies to corrugated stainless steel tubing (CSST) that is not *listed* with an arc-resistant jacket or coating system in accordance with ANSI LC1/CSA 6.26. CSST *gas piping systems* and piping systems containing one or more segments of CSST shall be electrically continuous and bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system.

G2411.2.1 (310.2.1) Point of connection. The *bonding jumper* shall connect to a metallic pipe, pipe fitting or CSST fitting.

G2411.2.2 (310.2.2) Size and material of jumper. The *bonding jumper* shall be not smaller than 6 AWG copper wire or equivalent.

G2411.2.3 (310.2.3) Bonding jumper length. The length of the *bonding jumper* between the connection to a *gas piping system* and the connection to a grounding electrode system shall not exceed 75 feet (22 860 mm). Any additional grounding electrodes installed to meet this requirement shall be bonded to the electrical service grounding electrode system or, where provided, the lightning protection grounding electrode system.

G2411.2.4 (310.2.4) Bonding connections. Bonding connections shall be in accordance with NFPA 70.

G2411.2.5 (310.2.5) Connection devices. Devices used for making the bonding connections shall be *listed* for the application in accordance with UL 467.

Revise as follows:

G2411.3 (310.3) Arc-resistant CSST. Corrugated stainless steel tubing (CSST) that is listed with an arc-resistant jacket or coating system ~~shall be listed as arc-resistant in~~ in accordance with ANSI LC1/CSA 6.26. ~~6.26. Arc-resistant jacketed CSST shall be electrically continuous and bonded to an effective ground fault current path. Where any CSST used in a piping system does not have an arc-resistant jacket or coating system, the bonding requirements of Section G2411.2 shall apply.~~ apply. Arc-resistant-jacketed CSST shall be considered to be bonded where it is connected to one or more *appliances* that are connected to the *equipment* grounding conductor of the circuit that supplies that *appliance(s)* Where arc-resistant CSST is installed in a piping system without an appliance with an equipment grounding conductor, or where the system contains any non-arc-resistant CSST, the piping system shall be bonded in accordance with the manufacturer's installation instructions and ANSI LC1/CSA 6.26 Annex C.

G2414.4.4 (403.4.5) Corrugated stainless steel tubing. Corrugated stainless steel *tubing* shall be *listed* in accordance with ANSI LC1/CSA 6.26 and shall be arc-resistant in accordance with 5.16 of LC 1/CSA 6.26. **Exception:** Corrugated stainless steel tubing installed below grade outside of the building in compliance with 404.11 or beneath the building in compliance with 404.14 shall not be required to be arc-resistant.

Reason Statement:

This proposal eliminates the use of non-arc-resistant jacketed corrugated stainless steel tubing (CSST) and permits only arc-resistant jacketed CSST to be installed. Arc-resistant CSST has been shown to significantly reduce the risk of fire caused by arcing from nearby electrical faults or lightning strikes, a known hazard associated with non-arc resistant jacketed CSST.

Non-arc-resistant CSST has a long history of performance concerns related to lightning-related damage and has been the subject of numerous manufacturer warnings, insurance claims, and litigation. In response, manufacturers developed arc-resistant CSST with enhanced protection. Allowing non-arc-resistant CSST to remain in the code increases risk and perpetuates the need for additional safety measures, such as prescriptive bonding.

By limiting installations to arc-resistant CSST only, this proposal also removes the need for prescriptive bonding requirements from the code. Instead, bonding requirements are to be determined and specified by the manufacturer as part of their listed installation instructions. This approach aligns with how other listed and tested gas piping products are regulated, simplifying enforcement and ensuring that bonding practices are consistent with product-specific requirements.

This change reflects industry best practices, reduces complexity in the field, improves safety, and enhances code clarity by removing outdated and risk-prone options from the code.

Cost Impact: The code change proposal will not increase or decrease the cost

While the cost per foot of arc-resistant CSST is higher than that of non-arc-resistant CSST, the overall expense may be offset by the elimination of additional bonding requirements.

IB260-24

VRC: 13VAC5-91-260.

Proponents: DHCD Staff, representing DHCD (sbco@dhcd.virginia.gov)

2021 Virginia Building and Fire Code Related Regulations

Revise as follows:

13VAC5-91-260. Registration seal for industrialized buildings

~~13VAC5-91-260. Registration seal for industrialized buildings.~~

- A. Registered industrialized buildings shall be marked with approved registration seals issued by the SBCO. The seals shall be applied to a registered industrialized building intended for sale or use in Virginia prior to the shipment of the building from the place of manufacture. The seals shall be applied by the compliance assurance agency or by the manufacturer when authorized to do so by the compliance assurance agency.
- B. Registered industrialized buildings shall bear one registration seal on each manufactured section or module, or, as an alternative, the registration seal for each manufactured section or module may be placed in one location in the completed building.
- C. Closed panel construction shall require one registration seal for every 600 square feet, or part thereof, of floor area.
- D. Approved registration seals shall be purchased by the compliance assurance agency from the SBCO in advance of use. The fee for each registration seal shall be \$75. Fees shall be submitted by checks made payable to "Treasurer of Virginia" or shall be submitted by electronic means. Payment for the seals must be received by the SBCO before the seals can be sent to the user. The compliance assurance agency shall maintain permanent records of seals purchased, including a record of any manufacturers receiving such seals.
- E. To the extent practicable, the registration seal shall be installed so that it cannot be removed without destroying it. The seal shall be applied in the vicinity of the electrical distribution panel or in another location that is readily accessible for inspection and shall be installed near the certification label.
- F. In accordance with § 36-85.1 of the Code of Virginia, any person or corporation having paid the fee for an approved registration seal that it will not use may, unless and except as otherwise specifically provided, within one year from the date of the payment of any such fee, apply to the administrator for a refund, in whole or in part, of the fee paid; provided that no payment shall be recovered unless the approved registration seal is returned unused and in good condition to the administrator. Additionally, as a requirement of this chapter, an administrative and processing fee of 25% of the amount of the refund due shall be deducted from the refund; however, such deduction shall not exceed \$250.
- G. When requested by a compliance assurance agency, replacement seals may be issued by the SBCO for registered industrialized buildings provided that the previous seal was defaced or destroyed and that sufficient documentation exists to show that the structure was registered, including but not limited to, a data plate, full plans, owner's manual or other data deemed pertinent by the SBCO.

Reason Statement:

Registration seals in existing registered industrialized buildings are sometimes damaged or destroyed during accidents or ordinary repairs. Allowing issuance of a replacement seal in situations where existing records or documentation are available will ensure that a building can be relabeled with a registration seal and easily identified as a registered building without requiring unnecessary hurdles and expenses that could result if the building were required to be treated as an unregistered industrialized building and registered again in order to receive a seal. The proposed change allows a path to obtain replacement seals for registered industrialized buildings, when needed, and reduces the burden of verifying and ensuring compliance, thus expediting the approval process.

Cost Impact: The code change proposal will not increase or decrease the cost

The proposed change is an option and applies to existing structures only. Providing a path for the issuance of replacement registration seals might actually reduce the cost burden associated with the approval process of registered industrialized buildings that are missing the registration seals.