REC2D-10-23

IECC RE: R402.5.1.3, R408.2.1.4, R403.3.7, R503.1.2.3, R403.6.2

Proponents:

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2024 International Energy Code [RE] [RE Project] R3

Revise as follows:

R402.5.1.3 Maximum air leakage rate.

Where tested in accordance with Section R402.5.1.2, the air leakage rate for *buildings* or *dwelling units* shall be as follows:

1. Where complying with Section R401.2.1, the *building* or *dwelling units* in the *building* shall have an air leakage rate not greater than 4.0 air changes per hour in Climate Zones 0, 1 and 2, 3.0 air changes per hour in Climate Zones 3 through 5, and 2.5 air changes per hour in Climate Zones 6 through 8.
2. Where complying with Section R401.2.2 or R401.2.3, the *building* or dwelling units in the *building* shall have an air leakage rate not greater than 4.0 air changes per hour, or 0.22 cfm/ft^2~~(1.1 L/s x m^2)~~ [1.1 L/(s x m^2)]of the *building thermal envelope* area or *dwelling unit enclosure area*, as applicable.

Exceptions:

1. Where *dwelling units* are attached or located in an R-2 occupancy, and are tested without simultaneously testing adjacent *dwelling units*, the air leakage rate is permitted to be not greater than 0.27 cfm/ft^2~~(1.35 L/s x m^2)~~ [1.4 L/(s x m^2)]of the *dwelling unit enclosure area*. Where adjacent dwelling units are simultaneously tested in accordance with ASTM E779, the air leakage rate is permitted to be not greater than 0.27 cfm/ft^2~~(1.35 L/s x m^2)~~[1.4 L/(s x m^2)] of the *dwelling unit enclosure area* that separates *conditioned space* from the exterior.
2. Where *buildings* have 1,500 square feet (139.4 m^2) or less of *conditioned floor area*, the air leakage rate is permitted to be not greater than 0.27 cfm/ft^2~~(1.35 L/s x m^2)~~[1.4 L/(s x m^2)].

R408.2.1.4 Reduced air leakage.

For the reduced air leakage credit, the *building*shall have a measured air leakage rate no less than 2.0 ACH50 and no greater than 2.5 ACH50 or the *dwelling units* in the *building*shall have an average measured *air leakage* rate no greater than 0.24 cfm~~50~~/ft^2[1.2 L/(s x m^2)].

R403.3.7 Duct system testing.

Each *duct system* shall be tested for air leakage in accordance with ANSI/RESNET/ICC 380 or ASTM E1554. Total leakage shall be measured with a pressure differential of 0.1 inch water gauge (25 Pa) across the *duct system* and shall include the measured leakage from the supply and return *ductwork*. A written report of the test results shall be signed by the party conducting the test and provided to the *code official*. *Duct system* leakage testing at either rough-in or post-construction shall be permitted with or without the installation of registers or grilles. Where installed, registers and grilles shall be sealed during the test. Where registers and grilles are not installed, the face of the register boots shall be sealed during the test.

Exceptions:

1. Testing shall not be required for *duct systems* serving *ventilation* systems that are not integrated with *duct systems* serving heating or cooling systems.

2. Testing shall not be required where there is not more than 10 feet (3.03 m) of total *ductwork* external to the *space conditioning equipment* and both the following are met:

    2.1. The *duct system* is located entirely within *conditioned space*.

    2.2 The *ductwork* does not include *plenums* constructed of building cavities or gypsum board.

3. Where the *space conditioning equipment* is not installed, testing shall be permitted. The total measured leakage of the supply and return *ductwork* shall be less than or equal to 3.0 ~~cubic feet per minute~~cfm (85 L/min) per 100 ft^2 ~~square feet~~ (9.29 m) of *conditioned floor area*.

4. Where tested in accordance with Section R403.3.9, testing of each *duct system* is not required.

R503.1.2.3 Duct system leakage.

Where an *alteration* includes any of the following, *duct systems* shall be tested in accordance with Section R403.3.5 and shall have a total leakage less than or equal to 12.0 ~~cubic feet per minute~~cfm (339.9 L/min) per 100 ft^2~~square feet~~ (9.29 m^2) of *conditioned floor area*:

1. Where 25 percent or more of the registers that are part of the *duct system* are relocated.
2. Where 25 percent or more of the total length of all *ductwork* in the *duct* system are relocated.
3. Where the total length of all *ductwork* in the *duct system* is increased by 25 percent or more.

Exception: *Duct systems* located entirely inside a *conditioned space* in accordance with Section R403.3.2.

R403.6.2 Whole-dwelling mechanical ventilation system fan efficacy.

Fans used to provide whole-dwelling mechanical *ventilation* shall meet the efficacy requirements of Table R403.6.2 at one or more rating points. Fans shall be tested in accordance with the test procedure referenced by Table R403.6.2 and *listed*. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing or on the label. Fan efficacy for fully ducted HRV, ERV, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2 inch water gauge ~~w.c.~~ (~~49.85~~50 Pa). Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure of not less than 0.1 inch water gauge~~w.c.~~ (~~24.91~~25 Pa).

Reason:

Clean-up Units for Air-Leakage and Duct Leakage metrics

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Reason Statement: Since we don't have a style guide to strictly follow, we now have some incorrect and also inconsistent use of units that cannot be corrected by staff without a proposal. This proposal corrects some but not all.

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

Inconsistent Units:

1 . The 2024 IECC-R uses both "cfm/ft^2" and "cubic feet per minute per square foot". It also uses "L/s x m^2" and "L/(s × m^2)" which are not technically the same conversion.

Recommendation 1:

Consistently use “cfm/ft^2” and “[L/(s × m^2)]” and check conversions (seem to be different in R303 than R402)

R303.1.5 Air-impermeable insulation

. Insulation having an air permeability not greater than

0.004 ~~cubic feet per minute per square foot~~ cfm/ft^2 [0.0~~0~~2 L/(s × m^2)] under pressure differential of 0.3 inch water gauge (75 Pa) when tested in accordance with ASTM E2178 shall be determined air-impermeable insulation.

R402.5.1.3 Maximum air leakage rate.

1…

2. Where complying with Section R401.2.2 or R401.2.3, the building or dwelling units in the building shall have an air leakage rate not greater than 4.0 air changes per hour, or 0.22 cfm/ft^2~~(1.1 L/s x m^2)~~ [1.1 L/(s × m^2)] of the building thermal envelope area or dwelling unit enclosure area, as applicable.

Exceptions:

1. Where dwelling units are attached or located in an R-2 occupancy, and are tested without simultaneously testing adjacent dwelling units, the air leakage rate is permitted to be not greater than 0.27 cfm/ft^2~~(1.35 L/s x m^2)~~ [1.4 L/(s × m^2)] of the dwelling unit enclosure area. Where adjacent dwelling units are simultaneously tested in accordance with ASTM E779, the air leakage rate is permitted to be not greater than 0.27 cfm/ft^2~~(1.35 L/s x m^2)~~ [1.4 L/(s × m^2)] of the dwelling unit enclosure area that separates conditioned space from the exterior.

2. Where buildings have 1,500 square feet (139.4 m^2) or less of conditioned floor area, the air leakage rate is permitted to be not greater than 0.27 cfm/ft^2~~(1.35 L/s x m^2)~~ [1.4 L/(s × m^2)][GV(1] [GV2]].

R408.2.1.4 Reduced air leakage

. For the reduced air leakage credit, the building shall have a measured air leakage rate no less than 2.0 ACH50 and no greater than 2.5ACH50 or the dwelling units in the building shall have an average measured air leakage rate no greater than 0.24 cfm~~50~~/ft^2 [1.2 L/(s × m^2)].

2. The 2024 IECC-R is inconsistent in duct leakage metrics.

Recommendation 2: Consistently use “cfm (## L/min) per 100 ft^2”

R403.3.7 Duct system testing.

Exceptions:

1.

2.

3. Where the space conditioning equipment is not installed, testing shall be permitted. The total measured leakage of the supply and return ductwork shall be less than or equal to 3.0 cfm ~~cubic feet per minute~~ (85 L/min) per 100 ft^2 ~~square feet~~ (9.29 m^2) of conditioned floor area.

TABLE R403.3.8

MAXIMUM TOTAL DUCT SYSTEM LEAKAGE

cfm/100 ft^2 (LPM/9.29 m^2)

R503.1.2.3 Duct system leakage.

Where an alteration includes any of the following, duct systems shall be tested in accordance with Section R403.3.5 and shall have a total leakage less than or equal to 12.0 cfm ~~cubic feet per minute~~ (339.9 L/min) per 100 ft^2 ~~square feet~~ (9.29 m^2) of conditioned floor area:

TABLE R405.4.2 (1)

SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS

4 cfm (113.3 L/min) per 100 ft^2 (9.29 m^2)

3.

In air leakage and duct leakage tests, we say "0.2 inch water gauge (50 Pa)" and "0.1 inch water gauge (25 Pa)" respectively. R403.6.2 shows 49.85 and 24.91 Pa respectively.

Recommendation 3: Round to 25 and 50 Pa. Consider whether "w.c." could be "water gauge"[GV3]

R403.6.2 Whole-dwelling mechanical ventilation system fan efficacy. Fans used to provide whole-dwelling mechanical ventilation shall meet the efficacy requirements of Table R403.6.2 at one or more rating points. Fans shall be tested in accordance with the test procedure referenced by Table R403.6.2and listed. The airflow shall be reported in the product listing or on the label. Fan efficacy shall be reported in the product listing or shall be derived from the input power and airflow values reported in the product listing or on the label. Fan efficacy for fully ducted HRV, ERV, balanced, and in-line fans shall be determined at a static pressure of not less than 0.2 inch water gauge~~w.c.~~ (50~~49.85~~ Pa). Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure of not less than 0.1 water gauge~~w.c.~~ (25~~24.91~~ Pa).

4 . Where using "percent" sometimes it is preceded by a dash (sometimes not). It is spelled out most everywhere except R408.2.2.

Recommendation 4: Don't use the dash between the number and the "percent"

5.

Climate Zone is a defined term. Sometimes is it is capitalized when referencing a specific climate zone, sometimes it is in italics when not referencing a specific zone.

Recommendation 5: Replace “*Climate Zone*” in R408.2 & RG101.3 with “*climate zone*”. Remove italics from “Climate Zone 8” in R408.2.5 and Appendix RI where they reference specific zones.

Also, when a range of climate zones are referenced, it should always be stated “Climate Zones 4 through 8”, not “Climate Zones 4 to 8” nor “Climate Zones 4 – 8.”

[GV(1]2024 IECC-C is using (1.4 L/s x m2)

[GV2]90.-2022 uses "cfm/ft2"

[GV3]Confirmed with Mike Moore.

Cost Impact:

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

editorial changes