

## EC103–09/10

### 403.2.1, 403.2.2, 403.2.3; IRC N1103.2.1, N1103.2.2, N1103.2.3

**Proponent:** Bill Prindle, ICF International, representing the Energy Efficient Codes Coalition; Jeff Harris, Alliance to Save Energy; Harry Misuriello, American Council for an Energy-Efficient Economy (ACEEE); Garrett Stone, Brickfield, Burchette, Ritts & Stone; Steve Rosenstock, Edison Electric Institute; Brian Dean, ICF International

**THIS IS A 2 PART CODE CHANGE. PART I WILL BE HEARD BY THE IECC COMMITTEE. PART II WILL BE HEARD BY THE IRC BUILDING/ENERGY CODE COMMITTEE. SEE THE TENTATIVE HEARING ORDERS FOR THESE COMMITTEES.**

#### PART I – IECC

##### Revise as follows:

**403.2.1 Insulation (Prescriptive).** Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

**Exception:** Where all ducts or portions thereof are located completely within conditioned space inside the building thermal envelope, supply ducts shall be insulated to a minimum of R-4.

**403.2.2 Sealing (Mandatory).** All ducts, air handlers, and filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4.1 of the *International Residential Code* or Section 603.9 of the *International Mechanical Code*, as applicable.

Duct tightness shall be verified by a test performed by a party approved by the code official after construction is completed. Where required by the code official, testing shall be conducted by an approved party independent from the builder and the installer of the ducts, either of the following: A written report specifying the results of the test and attesting to the accuracy of the results shall be signed by the party conducting the testing and provided to the builder and the code official.

1. ~~Post-construction test: L As tested, total duct leakage to outdoors shall be less than or equal to 8 cfm (226.5 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area or a total leakage less than or equal to 6 12 cfm (226.5 12 L/min) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the entire system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test.~~
2. ~~Rough-in test: Total leakage shall be less than or equal to 6 cfm (169.9 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed-in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (113.3 L/min) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area.~~

**Exceptions:** Duct tightness test is not required if Where the air handler and all ducts are located within conditioned space, total duct leakage shall not exceed 12 cfm per 100 square feet of conditioned floor area when tested as specified above.

**403.2.3 Building cavities (Mandatory).** Building framing cavities shall not be used as supply ducts.

**PART II – IRC BUILDING/ENERGY**

**Revise as follows:**

**N1103.2.1 Insulation.** Supply ducts in attics shall be insulated to a minimum of R-8. All other ducts shall be insulated to a minimum of R-6.

**Exception:** Where all ducts or portions thereof are located completely within conditioned space inside the building thermal envelope, supply ducts shall be insulated to a minimum of R-4.

**N1103.2.2 Sealing.** All ducts, air handlers, and filter boxes, and building cavities used as ducts shall be sealed. Joints and seams shall comply with Section M1601.4 of the *International Residential Code*.

Duct tightness shall be verified by a test performed by a party approved by the building official after construction is completed. Where required by the building official, testing shall be conducted by an approved party independent from the builder and the installer of the ducts, either of the following: A written report specifying the results of the test and attesting to the accuracy of the results shall be signed by the party conducting the testing and provided to the builder and the building official.

1. ~~Post construction test: As tested, total duct leakage to outdoors shall be less than or equal to 8 cfm (3.78 L/S) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area or a total leakage less than or equal to 6 1/2 cfm (226.5 L/min 5.66 L/S) per 100 square feet (9.29 m<sup>2</sup>) of conditioned floor area when tested at a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer's air handler end closure enclosure. All register boots shall be taped or otherwise sealed during the test.~~
2. ~~Rough-in test: Total leakage shall be less than or equal to 6 cfm (2.83 L/S) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area when tested at a pressure differential of 0.1 inches w.g. (25 Pa) across the roughed in system, including the manufacturer's air handler enclosure. All register boots shall be taped or otherwise sealed during the test. If the air handler is not installed at the time of the test, total leakage shall be less than or equal to 4 cfm (1.89 L/S) per 100 ft<sup>2</sup> (9.29 m<sup>2</sup>) of conditioned floor area.~~

**Exceptions:** Duct tightness test is not required if Where the air handler and all ducts are located within conditioned space, total duct leakage shall not exceed 12 cfm per 100 square feet of conditioned floor area when tested as specified above.

**N1103.2.3 Building cavities.** Building framing cavities shall not be used as supply ducts.

**Reason:** This proposal is intended to substantially improve the code's current duct insulation, sealing and testing requirements. It is well-recognized that properly designed, constructed, insulated and sealed ducts are crucial for an energy efficient home and occupant comfort. Among other items, this proposal:

- Reduces allowed total duct leakage by 50% in homes where ducts are not located in conditioned space;
- Requires a less stringent duct tightness test for ducts in conditioned space to ensure that conditioned air is delivered to its intended destination;
- Requires R-4 duct insulation when ducts are located in the conditioned space to address condensation and house durability issues;
- Eliminates the use of building framing cavities as ducts;
- Establishes requirements for a written test report, to increase and simplify enforceability and accountability;
- Creates the ability for the code official to require an independent party to conduct the test;
- Simplifies and makes consistent testing requirements by reducing the four possible tests to a single post-construction test of total duct leakage;
- Requires final testing of the ducts when construction is complete to ensure that the home owner is receiving a home that meets the intent of the code.

Field experience with duct sealing shows that these reduced leakage rates are attainable with today's technology and practice. It also shows that duct leakage, even when ducts are in conditioned spaces, can induce energy losses. For example, a leaky duct that does not supply sufficient airflow to a given space can create negative pressure in that space, inducing air filtration that would not otherwise occur. Such a condition would also reduce comfort, and could cause occupants to adjust thermostat settings, increasing energy use for the whole zone or house.

These changes are relatively simple and yet add significant energy savings potential and improved enforcement. The estimated savings as shown in the table below are savings from this proposal in addition to the requirements in the 2009 IECC, which first established a requirement for testing or locating the ducts in conditioned space in the code. The additional cost for achieving the tested values in this proposal are minimal compared to energy savings.

	Climate Zone 1	Climate Zone 2	Climate Zone 3	Climate Zone 4	Climate Zone 4M	Climate Zone 5	Climate Zone 6	Climate Zone 7	Climate Zone 8
Heating, Cooling, Hot Water Purchased Energy Cost Percent Savings	2.8%	2.7%	2.5%	2.6%	2.6%	2.7%	2.9%	2.7%	2.5%
Total Purchased Energy Cost Percent Savings (also including major appliances and lighting)	2.0%	1.9%	1.8%	1.9%	2.0%	2.0%	2.3%	2.1%	2.0%

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

**PART I – IECC**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

**PART II – IRC BUILDING/ENERGY**

Public Hearing:	Committee:	AS	AM	D
	Assembly:	ASF	AMF	DF

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ICCFILENAME: PRINDLE-EC-23-403.2.1-N1103.2.1