**REPI-86-21 (modification replaces the monograph)**

**IECC®: R403.3.6, TABLE R405.2**

**Proponents:**

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**2021 International Energy Conservation Code**

**CHAPTER 2 [RE] DEFINITIONS**

**No change (shown for context only):**

**DUCT**. A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.

**DUCT SYSTEM**. A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.

**Revise as follows:**

**R403.3 Duct~~s~~ Systems.**

**R403.3.5 Duct system testing.** Each ~~D~~*duct*~~s~~ *system* shall be ~~pressure~~ tested in accordance with ANSI/RESNET/ICC 380 or ASTM E1554 to determine air leakage. Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system. Registers shall be taped or otherwise sealed during the test. A written report of the results of the test 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. ~~by one of the following methods:~~

~~1. Rough-in test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the system, including the manufacturer’s air handler enclosure if installed at the time of the test. Registers shall be taped or otherwise sealed during the test.~~

~~2. Postconstruction test: Total leakage shall be measured with a pressure differential of 0.1 inch w.g. (25 Pa) across the entire system, including the manufacturer’s air handler enclosure. Registers shall be taped or otherwise sealed during the test.~~

**Exception**: ~~A duct air-leakage test shall not be required for ducts serving ventilation systems that are not integrated with ducts serving heating or cooling systems.~~

*Duct system* testing shall not be required for *ducts* or *duct systems* serving heat or energy recovery ventilators or ventilation systems that are not integrated with *ducts* or *duct systems* serving heating or cooling systems.

**R403.3.6 Duct system leakage.** ~~The total leakage of the ducts, where measured in accordance with Section R403.3.5, shall be as follows:~~

~~1. Rough-in test: The total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m2) of~~ *~~conditioned floor~~**~~area~~* ~~where the air handler is installed at the time of the test. Where the air handler is not installed at the time of the test, the total leakage shall be less than or equal to 3.0 cubic feet per minute (85 L/min) per 100 square feet (9.29 m2) of~~ *~~conditioned~~**~~floor area~~*~~.~~

~~2. Postconstruction test: Total leakage shall be less than or equal to 4.0 cubic feet per minute (113.3 L/min) per 100 square feet (9.29 m2) of~~ *~~conditioned~~**~~floor area~~*~~.~~

~~3. Test for ducts within thermal envelope: Where all ducts and air handlers are located entirely within the~~ *~~building thermal envelope~~*~~, total leakage shall be less than or equal to 8.0 cubic feet per minute (226.6 L/min) per 100 square feet (9.29 m2) of~~ *~~conditioned floor area~~*~~.~~

The total measured duct system leakage shall not exceed the values in Table R403.3.6. For buildings complying with Section R405 or R406, where duct system leakage to outside is tested in accordance with ANSI/ RESNET/ICC 380 or ASTM E1554, the ~~measured~~ duct leakage to outside value shall not be used for compliance with this Section but shall be permitted to be used in the calculation procedures of Section R405 and R406.

**TABLE R403.3.6**

**MAXIMUM TOTAL DUCT SYSTEM LEAKAGE**

|  |  |  |
| --- | --- | --- |
|  | **Rough In** | **Post Construction** |
| **Duct Systems Serving more than 1,000 ft2 of *Conditioned Floor Area*** | **cfm/100 ft2 (LPM/9.29 m2)** | **cfm/100 ft2**  **(LPM/9.29 m2)** |
| Air handler is not installed | 3 (85) | NA |
| Air handler is installed | 4 (113.3) | 4 (113.3) |
|  | | |
| **Duct Systems Serving less than or equal to 1,000 ft2 of *Conditioned Floor Area*** | **cfm (LPM)** | **cfm (LPM)** |
| Air handler is not installed | 30 (849.5) | NA |
| Air handler is installed | 40 (1132.7) | 40 (1132.7) |

**Revise as follows:**

**SECTION R405**

**TOTAL BUILDING PERFORMANCE**

**Table R405.2**

**REQUIREMENTS FOR TOTAL BUILDING PERFORMANCE**

**Portions of table not shown remain unchanged.**

|  |  |
| --- | --- |
| **Mechanical** | |
| R403.3~~, including R403.3.1, except Sections R403.3.2, R403.3.3 and R403.3.6~~ | Duct~~s~~ Systems |

**Revise as follows:**

**Portions of table not shown remain unchanged.**

**TABLE R405.4.2(1)**

**SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS**

|  |  |  |
| --- | --- | --- |
| **BUILDING COMPONENT** | **STANDARD REFERENCE DESIGN** | **PROPOSED DESIGN** |
| Thermal distribution  systems | Duct insulation:  in accordance with Section R403.3.1. | Duct insulation:  as proposed. |
| Duct location:  same as proposed design. | Duct location:  as proposed. |
| Duct System Leakage to Outside:  For ~~tested~~ duct systems serving ≤ 1,000ft2 of *conditioned floor area*, the duct leakage to outside rate shall be 40 cfm (1132.7 L/min).  For ~~tested~~ duct systems serving > 1,000ft2 of *conditioned floor area*, the duct leakage to outside rate shall be 4 cfm (113.3 L/min) per 100 ft2 (9.29 m2) of *conditioned floor area.* | 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.  **Exceptions:**   1. When 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. 2. When total duct system leakage is measured without the air handler installed, the simulation value shall be 4 cfm (113.3 L/min) per 100 ft2 (9.29 m2) of *conditioned floor area.* |
| Distribution System Efficiency (DSE):  ~~For all systems other than tested duct systems, a~~ 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. ~~for all systems other than tested duct systems~~.  ~~Duct location:~~  ~~same as proposed design.~~  **~~Exception:~~** ~~For nonducted heating and cooling systems that do not have a fan, the standard reference design thermal distribution system efficiency (DSE) shall be 1~~.  ~~For tested duct systems, the leakage rate shall be 4 cfm (113.3 L/min) per 100 ft~~~~2~~ ~~(9.29 m~~~~2~~~~) of~~ *~~conditioned floor area~~* ~~at a pressure of differential of 0.1 inch w.g. (25 Pa).~~ | Distribution System Efficiency (DSE):  ~~As tested or, where not tested,~~ For hydronic systems and ductless systems as specified in Table R405.4.2(2). |

**TABLE R405.4.2(2)**

**DEFAULT DISTRIBUTION SYSTEM EFFICIENCIES FOR**

**PROPOSED DESIGNSa**

**Revise as follows:**

|  |  |  |
| --- | --- | --- |
| **DISTRIBUTION SYSTEM CONFIGURATION AND CONDITION** | **FORCED AIR**  **SYSTEMS** | **HYDRONIC**  **SYSTEMSb** |
| Distribution system components located in unconditioned space | NA | 0.95 |
| ~~Untested d~~Distribution system components entirely located in conditioned space c | ~~0.88~~  NA | 1 |
| “Ductless” systemsd | 1 | NA |

a. Default values in this table are for untested distribution systems, which must still meet minimum requirements for duct system insulation.

b. Hydronic systems shall mean those systems that distribute heating and cooling energy directly to individual spaces using liquids pumped through closed-loop piping and that do not depend on ducted, forced airflow to maintain space temperatures.

c. Entire system in conditioned space shall mean that no component of the distribution system, ~~including the air-handler unit,~~ is located outside of the conditioned space.

d. Ductless systems shall be allowed to have forced airflow across a coil but shall not have any ducted airflow external to the manufacturer’s air-handler enclosure.

**Revise as follows:**

**SECTION R406**

**ENERGY RATING INDEX COMPLIANCE**

**ALTERNATIVE**

**Table R406.2**

**REQUIREMENTS FOR ENERGY RATING INDEX**

**Portions of table not shown remain unchanged.**

|  |  |
| --- | --- |
| **Mechanical** | |
| R403.3~~, except Sections R403.3.2, R403.3.3 and R403.3.6~~ | Duct~~s~~ Systems |