# ANSI/RESNET/ICC 301-2022 Addendum E-2024, CFIS

***Modify the definitions as follows:***

**3.2 Definitions.**

***Balanced Ventilation System (Balanced System)*** – A Ventilation system where the total supply airflow and total exhaust airflow are simultaneously within 10 percent of their average.

***Central Fan Integrated Supply System (CFIS System)*** – A Blower Fan of a Forced-Air HVAC System with a return-side outdoor air intake duct that supplies outdoor air to the Dwelling Unit[1].

***Dwelling Unit*** – A single unit providing complete independent living facilities for one or more persons, including permanent provisions for living, sleeping, eating, cooking, and sanitation.

***Dwelling Unit Mechanical Ventilation System*** – A Ventilation system, operating continuously or through a programmed intermittent schedule, consisting of powered Ventilation equipment,[2] related mechanical components,[3] and automated control devices[4] that provides Dwelling Unit Ventilation at a known or measured airflow rate.

***Exhaust Ventilation System (Exhaust System) –*** One or more fans that remove air from the Dwelling Unit, causing outdoor air to enter by Ventilation inlets or normal leakage paths through the Dwelling Unit envelope.

***Supply Ventilation System (Supply System) –*** One or more fans that supply outdoor air to the Dwelling Unit. Supply Ventilation Systems shall be designed and constructed to provide Ventilation air directly from the outdoors to the Dwelling Unit.

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[1] (Informative Note) A CFIS System does not automatically qualify as a Dwelling Unit Mechanical Ventilation System; see that definition for additional requirements. Additional criteria for characterizing and simulating a CFIS System can be found in Standard 380 in the Section on CFIS Systems, and in Standard 301 in the Section on Ventilation Systems, Table 4.5.2(1) Minimum Rated Features, and Normative Appendix B On-Site Inspection Protocols. Such systems exclude additional Ventilation fans unless the operation of those fans is coordinated with the Blower Fan through a common control.

[2] (Informative Note) Such as motor-driven fans and blowers.

[3] (Informative Note) Such as ducts, inlets, dampers, or filters.

[4] (Normative Note) A switch or thermostat setting, which enables the occupant to turn a system on and off, is not considered automated, continuous, nor programmed. The presence of a ventilation override control is permitted, if the override control is labeled with text or an icon that clearly indicate its function is to turn off the ventilation system.

***Modify section 4.2.2.7 as follows:***

**4.2.2.7.** Lighting, Appliances, Miscellaneous Energy Loads (MELs), Ventilation and Service Hot Water Systems.

**4.2.2.7.1. Energy Rating Reference Home**. Lighting, Appliance and Miscellaneous Energy Loads in the Energy Rating Reference Home shall be determined in accordance with the values provided in Table 4.2.2.5(1) and Table 4.2.2.5(2), as appropriate, and Equation 4.2-28:

**…**

**4.2.2.7.1.6. CFIS Systems.** Where a Rated Home has a CFIS System that does not qualify as a Dwelling Unit Mechanical Ventilation System, the Energy Rating Reference Home shall not include a corresponding CFIS System.

**…**

**4.2.2.7.2. Energy Rating Rated Homes.** The lighting, appliance, hot water heating, Ventilation systems and Miscellaneous Energy Loads in the Energy Rating Rated Home shall be determined in accordance with Sections 4.2.2.7.1 through 4.2.2.7.2.13~~4.2.2.7.2.12~~. For a Rated Home without a refrigerator, dishwasher, range/oven, clothes washer or clothes dryer, the values from Table 4.2.2.5(1) shall be assumed for both the Energy Rating Reference Home and Rated Home.

**…**

**4.2.2.7.2.13. Ventilation Systems.**

4.2.2.7.2.13.1. Where a Rated Home has a CFIS System that does qualify as a Dwelling Unit Mechanical Ventilation System, or a CFIS System that does not so qualify, the software inputs shall document and account for the presence or absence of the following CFIS System functions and components.

**4.2.2.7.2.13.1.1 Automatic flow control of outdoor air**. Software shall collect whether the CFIS System controls the flow of outdoor air through the outdoor air inlet duct using a mechanical damper or other flow control device.

**4.2.2.7.2.13.1.2 Primary Blower Fan control strategy**. Software shall collect whether the CFIS System's primary Blower Fan control strategy for providing Ventilation is to (a) run the Blower Fan at a fixed interval regardless of heating and cooling runtimes, or (b) include heating and cooling runtimes[5] in fan operation calculations.

**4.2.2.7.2.13.1.3 Strategy for meeting remainder of a Ventilation target[6].** Where the heating and cooling runtime is too brief to meet a design Ventilation target, software shall collect the CFIS System strategy for meeting the remainder of that Ventilation target:

[5] (Informative Note) For example, by verifying that this functionality exists in the CFIS System's operation manual and that the controls are set to this mode of operation.

[6] (Informative Note) This indicates the actual home's designed ventilation amount, not necessarily an amount required programmatically, e.g. Standard 301.

- Using the Blower Fan
- Using a supplemental Exhaust System
- Using a supplemental Supply System
- Has no strategy to meet the remainder

Where a supplemental Ventilation system is part of the CFIS System, software shall collect whether that supplemental system runs simultaneously with the Blower Fan during heating and cooling runtime.

**4.2.2.7.2.13.1.4 Ventilation airflows**. For each operational control mode[7] used by the CFIS System, software shall collect the corresponding Ventilation airflows of each fan.

**4.2.2.7.2.13.1.5 Supplemental fan efficiency**. Where the CFIS System employs a supplemental Ventilation system, software shall collect the fan W/cfm of that supplemental fan.

**4.2.2.7.2.13.2.** Software shall simulate all CFIS Systems as follows:

**4.2.2.7.2.13.2.1** Where a Rated Home has a CFIS System, duct losses for all non-heating and non-cooling Blower Fan run-time shall be included in the simulation.

**4.2.2.7.2.13.2.2** Where the CFIS System automatically controls the flow of outdoor air, software shall simulate outdoor airflow through the inlet duct for all Ventilation runtime hours of the Blower Fan; where such control is absent, software shall simulate outdoor airflow through the inlet duct for all heating, cooling, and Ventilation runtime hours of the Blower Fan.

**4.2.2.7.2.13.2.3** Ventilation fan energy.

The Blower Fan efficiency used in the CFIS simulation shall employ the same W/cfm value used for simulation of heating and cooling by that Forced-Air HVAC System. The Blower Fan wattage shall be calculated by multiplying the fan efficiency by the larger of the heating and cooling flowrates.

Where the CFIS System uses the Blower Fan outside of heating and cooling runtimes, software shall simulate that added Blower Fan energy.

Where the CFIS System control strategy runs the Blower Fan at fixed intervals regardless of heating and cooling runtimes, software shall simulate the added Blower Fan energy each hour using the following runtime equation:

$$RT_{Add\ Blower} = RT_{VT} * (1 - RT_{HC} / 60)$$

Where:

$RT_{Add\ Blower}$ = Added Blower Fan run-time for the specific hour due to CFIS System, in minutes

[7] (Informative Note) For example, one operational mode may be only the Blower Fan operating while another mode may be only the supplemental ventilation fan operating. A third mode may run both simultaneously.

$RT_{HC}$ = Total run-time for the specific hour due to heating and cooling, in minutes
$RT_{VT}$ = Total run-time per hour to meet the Ventilation target, in minutes

Where the CFIS System employs a supplemental Exhaust or Supply System that runs concurrently or separately from the Blower Fan, software shall likewise simulate the supplemental fan energy use, using the data collected per Section 4.2.2.7.2.13.1.

***Modify Table 4.5.2(1) as follows:***

**Table 4.5.2(1) Minimum Rated Features**

| Building Element | Minimum Rated Feature |
|---|---|
| 24. Dwelling Unit Mechanical Ventilation System(s) and CFIS System(s) | Ventilation strategy (Supply, Exhaust, ~~or~~ Balanced, or a hybrid), equipment type (individual or shared), controls (continuous or programmed intermittent schedule), daily run time or average hourly airflow, measured exhaust airflow, measured supply airflow, system rated airflow and fan wattage.[8]<br><br>Where shared systems occur, include percentage of outdoor air in supply air, rated exhaust airflow and rated supply airflow of the shared systems. Fan motor efficiency and horsepower are acceptable substitutes for fan wattage.<br><br>Where the Rated Home employs a CFIS System, the following additional details shall be assessed:<br>a) Determine whether the automated CFIS System controller operates a mechanical damper or other flow control to block outdoor air when Ventilation is not required.<br>b) Determine whether the automated CFIS System controller operates the Blower Fan on a fixed timer interval regardless of heating and cooling runtimes, or preferentially uses the heating and cooling runtime to meet the hourly ventilation target.<br>c) Where the control strategy of the CFIS System relies on heating and cooling runtimes, determine whether the CFIS System has a strategy for meeting the remainder of the design Ventilation target when heating and cooling runtime is too brief to do so. Strategies include<br>i) operating the Forced-Air HVAC System's Blower Fan. |

[8] (Informative Note) A source for fan wattage is the Certified Home Ventilating Products Directory available from the Heating and Ventilation Institute (HVI).

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| | ii) operating a supplemental Exhaust Ventilation System.<br>iii) operating a supplemental Supply Ventilation System.<br>iv) Has no strategy to meet the remainder.<br>d) Where the CFIS System uses a supplemental Ventilation system, determine whether it also operates the supplemental Ventilation system simultaneously with the Blower Fan during heating and cooling runtime.<br>e) Where the CFIS System employs a supplemental Ventilation system, measured airflow and fan wattage shall be obtained for that system in addition to the CFIS System airflow. |

***Modify Appendix B as follows:***

| **Building Element: Dwelling Unit Mechanical Ventilation System(s) <u>& CFIS Systems</u>** | | |
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| **Rated Feature** | **Task** | **On-Site Inspection Protocol** |
| Centralized system equipment type | Data collection for centralized Dwelling Unit Mechanical Ventilation systems that serve more than one Dwelling Unit | *Centralized exhaust fans* – Record the model number from the nameplate data of each fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine and record the fan cfm and wattage or horsepower from the manufacturer's data sheet.<br><br>*Centralized supply or balanced system fans* – Record the model number from the nameplate data of each fan being utilized to provide ventilation air, directly or indirectly, to the Dwelling Unit. Record the percent of outdoor air in the supply air and whether the supply air is heated or cooled. If conditioned, record capacity and efficiency ratings of heating and cooling systems. Use the fan model number to determine and record the fan cfm and wattage or horsepower from the manufacturer's data sheet. For balanced systems, also record the sensible recovery efficiency and total recovery efficiency. |
| Individual system equipment type | Data collection for individual Dwelling Unit Mechanical Ventilation systems that serve a single Dwelling Unit | *Individual exhaust fans* – Determine and record the fan wattage and model number from the nameplate data of the exhaust fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine and record the fan wattage from the manufacturer's data sheet or HVI Directory. Where the fan is operated using a programmed schedule, document the daily run time for the fan, using the ventilation controller run time setting as observed on-site. If the fan is set to run continuously, then document the daily run time as 24 hours. In Attached Dwelling Units, determined and recorded whether there is supply air provided to the Dwelling Unit, directly or indirectly from adjacent corridor. See Corridor Ventilation section for guidance.<br><br>*Individual supply fans* - Record the fan wattage and model number from the nameplate data of the supply fan being utilized to provide Dwelling Unit Mechanical Ventilation. Use the fan model number to determine and record the fan wattage from the manufacturer's data sheet or HVI Directory. Where the fan is operated using a programmed schedule, document the daily run time for the |

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| | | fan, using the ventilation controller run time setting as observed on-site. If the fan is set to run continuously then document the daily run time as 24 hours. Record whether the supply fan is separate or integrated with the space conditioning system.<br><br>*Individual Balanced Ventilation Fans* – These are commonly known as energy recovery ventilators (ERV) or heat recovery ventilators (HRV). Record model number from the nameplate data of the ERV/HRV. Use the model number to determine and record the fan wattage, sensible recovery efficiency and total recovery efficiency from the manufacturer's data sheet or HVI Directory. Where the fan is operated using a programmed schedule, document the daily run time for the fan, using the ventilation controller run time setting as observed on-site. If the fan is set to run continuously, then document the daily run time as 24 hours.<br><br>*Central Fan Integrated Supply (CFIS) Ventilation System* – *See CFIS System Inspection Protocol.*~~A central fan integrated Supply Ventilation System is a specific type of supply-only ventilation that includes a duct running from the outside into the return plenum of the heating/cooling system, a mechanical damper, and controls that ensure the system provides ventilation air even when there is no demand for heating or cooling. For these systems, record the central fan model number from the nameplate data of the air handler fan and whether it is equipped with an ECM motor. Use the fan model number to determine and record the fan cfm and either horsepower or wattage from the manufacturer's data sheet. Where fan wattage is not provided, use (HP x 746)/0.90 to calculate fan wattage. Where the fan has multiple speeds, use values associated with the high-speed setting to select or calculate the fan wattage.~~<br><br>*Unit ventilator* – Similar to the CFIS system, a fan coil unit can be designed to provide both space conditioning and mechanical ventilation to the space that it is serving. Classify as a ventilation system only if the unit operates continuously with the outdoor air ~~outside air~~ damper open or if the damper is controlled to allow the supply of ventilation air when there is no call for heating or cooling. |

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| Dwelling Unit Mechanical Ventilation rate | Measure exhaust and supply airflow | Ventilation airflows in the Dwelling Unit shall be measured following the procedures in ANSI/RESNET/ICC 380. |
| CFIS Systems | Data collection for CFIS Systems | A CFIS System is a Blower Fan of a Forced-Air HVAC System combined with a return-side outdoor air intake duct that supplies outdoor air to the Dwelling Unit. However, such systems come in a variety of configurations (e.g., with or without a mechanical damper, the ability to optimize runtimes, or the ability to control a supplemental Ventilation system) and only some of these configurations meet the definition of a Dwelling Unit Mechanical Ventilation System.<br><br>All CFIS Systems must be properly characterized to accurately simulate their energy impact. For each system, record the following:<br>1) Characterize whether the system has automatic flow control of outdoor air, its primary Blower Fan control strategy, and its strategy for meeting the remainder of the Ventilation target, per ANSI / RESNET / ICC 380.<br>2) For each operational control mode used by the CFIS System, test and record the corresponding ventilation airflows of each fan, per ANSI / RESNET / ICC 380.<br>3) Record the Blower Fan model number from the nameplate data of the Forced-Air HVAC System. This links the CFIS System to the correct Forced-Air HVAC System. |