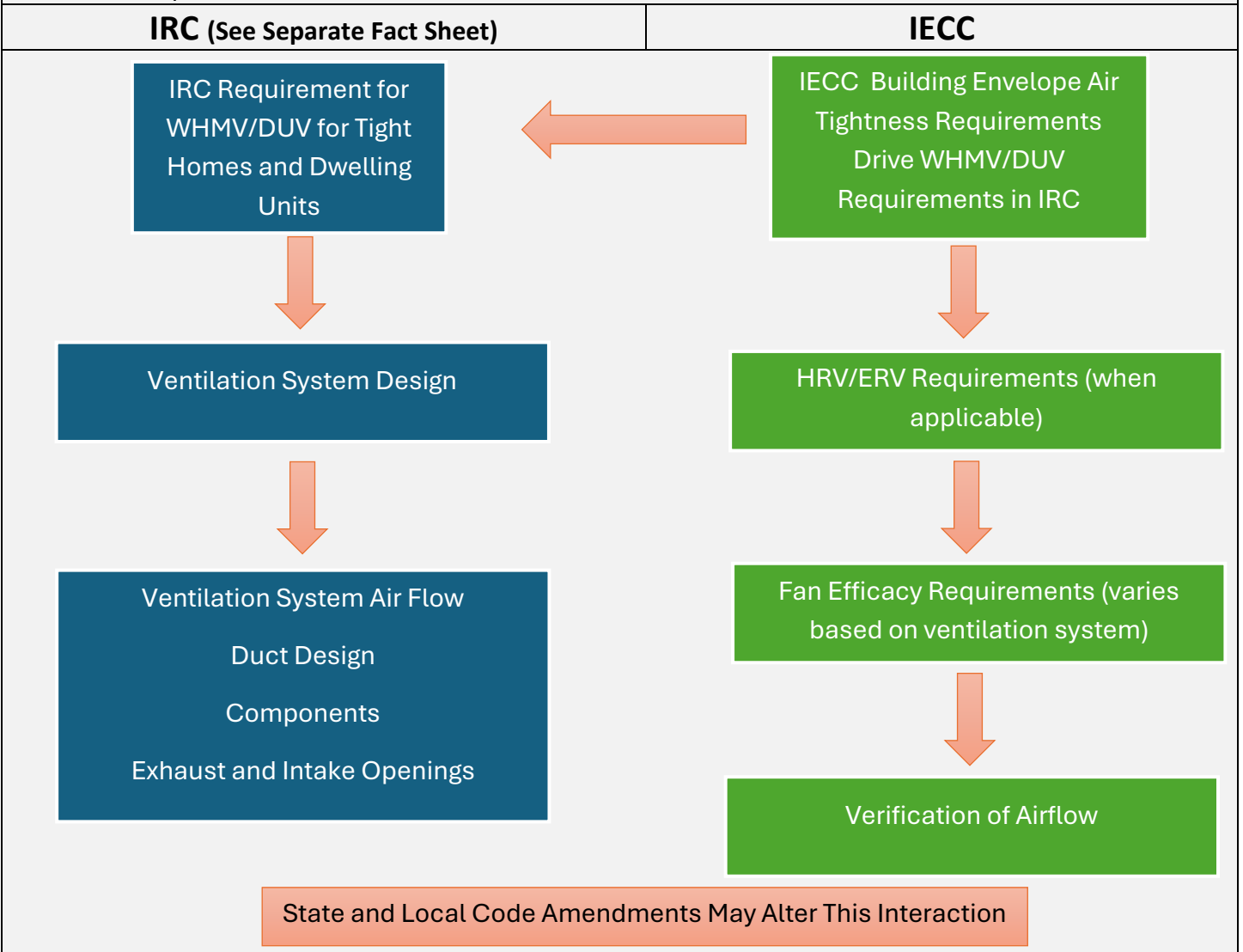




HRV/ERV Code Primer

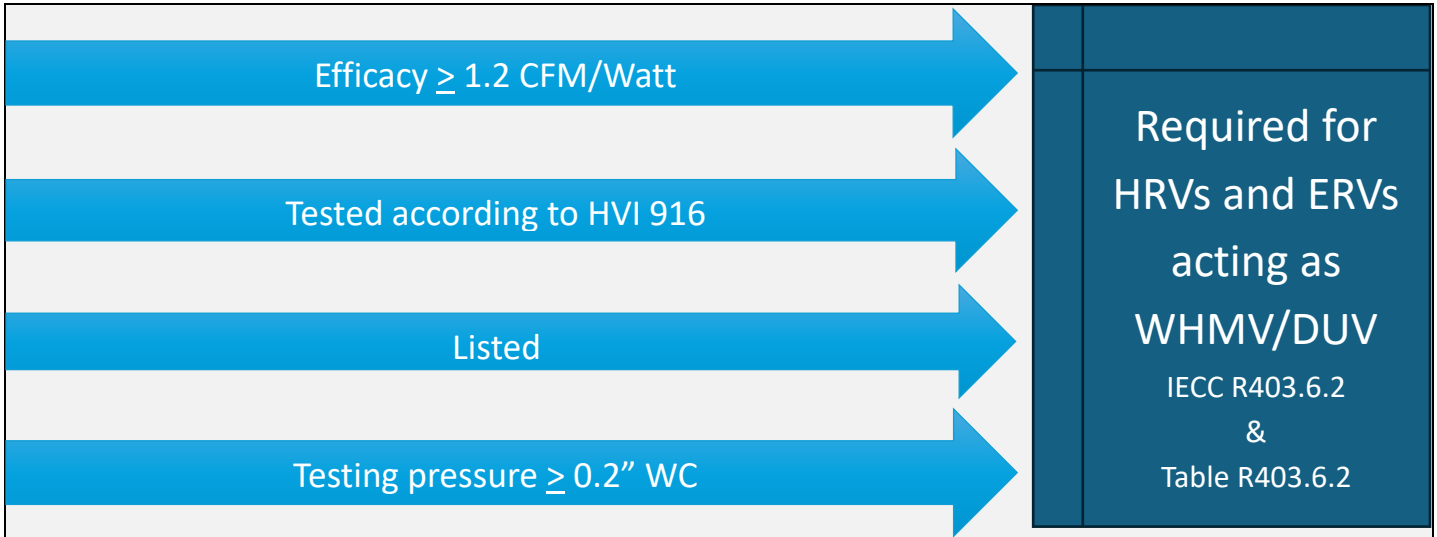
Background: Requirements for WHMV/DUV in one and two family homes in the Code that lead to HRV/ERV installations are primarily established by two ICC codes – the IRC and IECC. A combination of both codes (IECC setting building envelope air tightness requirements, and IRC setting WHMV/DUV requirements for tight homes and dwelling units) is often needed for the code to require all homes and dwelling units to install a WHMV/DUV system – a requirement that could be met by an HRV/ERV.

With this requirement established, the IRC provides specific requirements related to ventilation airflow, ducting, terminations, and components. The IECC provides specific requirements for energy recovery, fan efficacy, and air flow verification. This fact sheet provides guidance on how to find WHMV/DUV efficiency requirements that are relevant to HRVs/ERVs. Note that upon adoption, state and local jurisdictions may amend the code, or adopt different IRC and IECC code editions that will change the interaction between the codes on these issues. For dwelling units in multifamily buildings, the IMC instead of the IRC would establish ventilation requirements.





HRV/ERV Allowed?		HRV/ERV Satisfies WHMV/DUV Requirements?	
YES	No prohibition of HRV/ERV in IECC	YES	HRV/ERV satisfies requirements for WHMV/DUV. Specific requirements that apply to HRV/ERV are detailed in this fact sheet.
WHMV/DUV Required?		House / Dwelling Unit Building Envelope Air Tightness (Blower Door) Testing Required?	
YES	IECC R403.6 sets efficiency requirements for WHMV/DUV IRC R303.4 Establishes requirement to install WHMV/DUV	YES	Primary Test Option: IECC R402.4 Prescriptive Compliance: ≤ 5ACH50 CZ 1-2 ≤ 3ACH50 CZ 3-8 R405 or R406 Compliance: ≤ 5ACH50
HRV/ERV Required?		Additional Options for Blower Door Test (Encapsulation test instead of ACH commonly applied to attached dwellings):	
<p>YES CZ 7 & 8</p> <p>HRV/ERV must be:</p> <ul style="list-style-type: none"> ❖ Balanced ❖ Have an SRE ≥ 65% at 32°F at an airflow ≥ the design air flow 		<p>Only Applies to Climate Zone 7 & 8 Requirement IECC R403.6.1</p> <p>≤ 0.28 CFM50 / Ft² of enclosure area; or ≤ 0.30 CFM50 / Ft² of enclosure area for detached dwelling units ≤ 1500 Ft² or any attached dwelling units</p>	
Recommended Resource: See IRC for required air flows		Recommended Resource: See HVI CPD for SRE	
Ventilation Flow Rate Testing Required?		IECC 403.6.3	
YES	Note: AHJ may require approved third party to conduct testing including signed report	<p>Verification of required flow rates for WHMV/DUV:</p> <p>Using:</p> <ul style="list-style-type: none"> ❖ Flow hood/box or ❖ Flow grid or ❖ Other air flow measuring device <p>Measured at fan's</p> <ul style="list-style-type: none"> ❖ Inlet terminals or grilles or ❖ Outlet terminals or grilles or ❖ In the connected ventilation ducts 	
<p>Interpretation: The allowance of “other air flow measuring devices” appears to allow Integrated Diagnostic Tools, such as on-board air flow measuring devices included in an HRV/ERV to be used to comply with the requirements for measuring ventilation air flow. Likewise, commonly applied test standard (not referenced in code) ASNI/RESNET/ICC standard 380, used by above code programs, explicitly allows use of Integrated Diagnostic tools to verify flow rates. In the case that the AHJ requires an approved third party to perform the test, it is also possible that the AHJ will allow the approved third-party to use the reading from an on-board diagnostic tool. It is important to check with the AHJ to confirm their interpretation of this section.</p>			



Recommended Resource: See HVI CPD for listing and for CFM/Watt ratings

IECC R303.3: Systems Requiring Maintenance

- ❖ Supply maintenance Instructions
 - ❖ Required regular maintenance on readily visible label
 - ❖ Label points to title or publication number for manual
- Note: Broad requirement for any equipment – not limited to ventilation or HRV/ERV systems

IECC R403.6: Outdoor air intakes and exhausts have:

- ❖ Automatic eamper, or
- ❖ Gravity damper

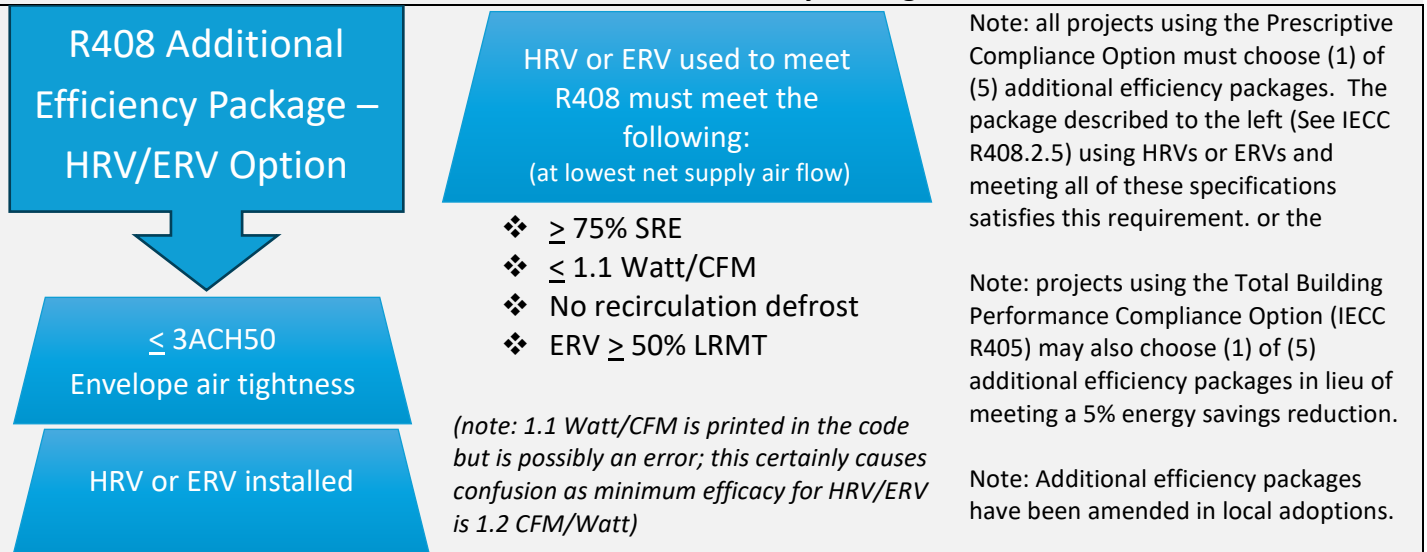
Damper closes when ventilation not operating

Inspections and Compliance Documentation

IECC R105.2.4 requires mechanical rough-in inspection which includes mechanical ventilation systems.

IECC 103.2 item 6 requires mechanical equipment size, type, and efficiency to be listed on construction/permit documents.

R408 Additional Efficiency Packages





The Role of HRV/ERV in Alternative Performance Compliance Paths

(Energy simulation performed to measure whole house or dwelling unit efficiency with additional flexibility)

<p>IECC R405 Total Building Performance Compliance Option (Energy cost simulation or alternatively source Btu or Btu per square foot; compares proposed design to a standard reference design)</p>	<p>IECC R406 ERI Compliance Option (energy rating index calculated based on ANSI/RESNET/ICC Standard 301; typically requires specialized training and certification to access software; compares proposed design to a 2006 IECC minimum design)</p>
<p>WHMV/DUV Required for This Option?</p> <p>YES IECC Table R405.2 <i>All WHMV/DUV requirements apply to this compliance path</i></p>	<p>WHMV/DUV Required for This Option?</p> <p>YES IECC Table R406.2 <i>All WHMV/DUV requirements apply to this compliance path</i></p>
<p>Does HRV or ERV Provide R405 Compliance Flexibility?</p> <p>YES HRV/ERV Compared to Balanced Ventilation Without Recovery Achieving Savings Relative to the Standard Reference Design</p>	<p>Does HRV or ERV Provide R406 Compliance Flexibility?</p> <p>YES HRV/ERV Achieve Lower ERI Score (Lower is Better), Allowing User to Achieve Target Score More Easily</p>
<p>Note: system compared against baseline system assuming minimum fan efficacy listed in IECC Table R403.6.2 and ventilation air flow rated defined in the IRC). HRV/ERV with better fan efficacy and recovery will show savings compared to the standard reference design, adding compliance flexibility</p>	<p>Note: in many cases, homes or dwelling units modeled with an HRV/ERV will achieve a better ERI compared to the baseline home which does not include balanced ventilation or recovery. HRV/ERV may show higher appliance energy use due to balanced nature of the appliance but lower heating and/or cooling energy for an overall energy reduction. HRV/ERV in most climate zones for most homes will achieve several ERI points.</p>

Frequently Asked Questions	Fact Sheet Acronyms
<ul style="list-style-type: none"> ❖ Does code require insulation of ventilation ducts outside of conditioned space? Answer: Duct insulation requirements have not been historically applied to ventilation ducts. However, without an explicit exception, it is always a good idea to check with the AHJ. (IECC R403.3.1) ❖ Does code require duct leakage testing of ventilation ducts? Answer: Ventilation ducts NOT integrated with heating and cooling system ducts are specifically exempted (IECC R403.3.5) ❖ Do duct penetrations through the air barrier have to be air sealed? Answer: IECC Table R402.4.1.1 requires that duct shafts and flues, as well as utility penetrations, be air sealed using materials that allow for expansion, contraction, and mechanical vibration. Likewise, heating, cooling, and ventilation register boots that penetrate the air barrier must be sealed to the finished surface of the space (e.g. drywall, etc) 	<p>ACH50 = Air Changes per Hour at 50 Pascals Pressure AHJ = Authority Having Jurisdiction ANSI = American National Standards Institute Btu = British thermal unit CFM = Cubic Feet per Minute CPD = Certified Products Directory CZ = Climate Zone DUV = Dwelling Unit Ventilation ERI = Energy Rating Index ERV = Energy Recovery Ventilator HRV = Heat Recovery Ventilator HVI = Home Ventilating Institute ICC = International Code Council IECC = International Energy Conservation Code IMC = International Mechanical Code IRC = International Residential Code LRMT = Latent Recovery Moisture Transfer SRE = Sensible Recovery Efficiency RESNET = Residential Energy Services Network WC = Water Column WHMV = Whole House Mechanical Ventilation</p>



Important Errata: In the first printing of 2021 IECC, Table R405.2 exempts section R403.6 (Mechanical Ventilation) from R403.3 (Ducts). This might lead the user to mistakenly believe that the R405 Total Building Performance Compliance Option does not include Mechanical Ventilation Requirements. However, R403.6 cannot be exempted from R403.3 because it does not reside within that section. Furthermore, R403.6 is later listed in Table R404.2 as a required section.

❖ Solution: The second printing of 2021 IECC corrects this error by exempting R403.3.6 (Duct testing target) from 403.3. If the Authority Having Jurisdiction is using the 1st printing, point to the later requirement for 403.6 in the table and point out that section R406 (ERI) which uses the same structure, correctly prints the requirement. While heating and cooling duct testing is required, the meeting the prescriptive duct testing target is not mandated using the R405 compliance path.

Notes: For any interpretation question, please discuss with the AHJ for their official ruling.

Important Resources

- ❖ HVI CPD <https://www.hvi.org/hvi-certified-products-directory/>
- ❖ ASHRAE Read-Only Standards <https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards>
- ❖ ICC Codes <https://codes.iccsafe.org/> for actual code text and other codes referenced throughout IECC
- ❖ State and/or Local Code Adoption Information – check with your state and/or local building department for adopted code edition and any amendments. Depending on the AHJ, requirements may be significantly amended from ICC published code