



Southwest Washington Chapter of ICC

# 2018 WSEC-R Updates & Discussions

**Michael Lubliner, Senior Building Science Specialist**

WSU Energy Program

January 15, 2021

1:00 – 4:00 pm (Pacific)



# WSEC-R Agenda - 3 hours

## Today's Theme: Challenges & Opportunities (CHOP)

- WSEC-R History - 40 years of Building Science “BS”
- View recorded webinar
- Q&A on recorded webinar big picture overview
- Surf new WSU Energy Program WSEC-R web page
- Demo - Prescriptive Path SF and MF worksheets
- Demo - WSEC-R Compliance Certificate
- WA IRC and IMC ventilation
- Interpretations and gray areas
- Q&A, wrap up and next steps

**Email us with any questions not covered today:**

**[energycode@energy.wsu.edu](mailto:energycode@energy.wsu.edu)**

# WSU Energy Program Code Support Services

Technical support we provide in Washington:

- Training (in-person, webinars, videos)
- Phone and email inquiry hotline support
- Energy code compliance tool development
- Website with educational resources

WSU Energy Code website:

<http://www.energy.wsu.edu/BuildingEfficiency/EnergyCode.aspx>

- Building department site visits

# Demo of New Prescriptive Path Worksheets

## 2015 Prescriptive Worksheet

**Prescriptive Energy Code Compliance for All Climate Zones in Washington**

*Project Information* *Contact Information*

This project will use the requirements of the Prescriptive Path below and incorporate the minimum values listed. In addition, based on the size of the structure, the appropriate number of additional credits are checked as chosen by the permit applicant.

Authorized Representative \_\_\_\_\_ Date \_\_\_\_\_

All Climate Zones		
	R-Value <sup>a</sup>	U-Factor <sup>a</sup>
Fenestration U-Factor <sup>b</sup>	n/a	0.30
Skylight U-Factor	n/a	0.50
Glazed Fenestration SHGC <sup>b,c</sup>	n/a	n/a
Ceiling <sup>d</sup>	4 <sup>g</sup>	0.026
Wood Frame Wall <sup>d,m</sup>	21 int	0.056
Mass Wall R-Value <sup>i</sup>	21/21 <sup>1</sup>	0.056
Floor	30 <sup>g</sup>	0.029
Below Grade Wall <sup>m</sup>	10/15/21 int + TB	0.042
Slab <sup>a</sup> R-Value & Depth	10, 2 ft	n/a

\*Table R402.1.1 and Table R402.1.3 Footnotes included on Page 2.

Each dwelling unit in a residential building shall comply with sufficient options from Table R406.2 so as to achieve the following minimum number of credits:

- Small Dwelling Unit: 1.5 credits**  
 Dwelling units less than 1500 square feet in conditioned floor area with less than 300 square feet of fenestration area. Additions to existing building that are greater than 500 square feet of heated floor area but less than 1500 square feet.
- Medium Dwelling Unit: 3.5 credits**  
 All dwelling units that are not included in #1 or #3. **Exception:** Dwelling units serving R-2 occupancies shall require 2.5 credits.
- Large Dwelling Unit: 4.5 credits**  
 Dwelling units exceeding 5000 square feet of conditioned floor area.
- Additions less than 500 square feet: .5 credits**

**Table R406.2 Summary**

Option	Description	Credit(s)	
1a	Efficient Building Envelope 1a	0.5	<input type="checkbox"/>
1b	Efficient Building Envelope 1b	1.0	<input type="checkbox"/>
1c	Efficient Building Envelope 1c	2.0	<input type="checkbox"/>
1d	Efficient Building Envelope 1d	0.5	<input type="checkbox"/>
2a	Air Leakage Control and Efficient Ventilation 2a	0.5	<input type="checkbox"/>
2b	Air Leakage Control and Efficient Ventilation 2b	1.0	<input type="checkbox"/>

## 2018 Prescriptive Worksheets (SF & MF)

**2018 Washington State Energy Code – Residential Prescriptive Energy Code Compliance for All Climate Zones in Washington**  
**Single Family – New & Additions (effective November 1, 2020)**

Each dwelling unit in a residential building shall comply with sufficient options from Table R406.2 (fuel normalization credits) and Table 406.3 (energy credits) to achieve the following minimum number of credits. To claim this credit, the building permit drawings shall specify the option selected and the maximum tested building air leakage, and show the qualifying ventilation system of operation.

- Small Dwelling Unit: 3 credits**  
Dwelling units less than 1,500 sf in conditioned floor area with less than 300 square feet of fenestration area.
- Medium Dwelling Unit: 6 credits**  
All dwelling units that are not included in #1 or #3
- Large Dwelling Unit: 7 credits**  
Dwelling units exceeding 5,000 sf of conditioned floor area
- Additions less than 500 square feet: 1.5 credits**  
All other additions shall meet 1-3 above

Before selecting your credits on this Summary table, review the details in Table 406.3 (Multifamily), on page 3.

**2018 Washington State Energy Code – Residential Prescriptive Energy Code Compliance for All Climate Zones in Washington**  
**Multifamily (effective November 1, 2020)**

Each dwelling unit in a residential building shall comply with sufficient options from Table R406.2 (fuel normalization credits) and Table 406.3 (energy credits) so as to achieve the following minimum number of credits:

- Multifamily R2 Dwelling Unit: 4.5 credits**

Before selecting your credits on this Summary table, review the details in Table 406.3 (Multifamily), on page 3.

Summary (Table R406.2)			
Heating Options	Fuel Normalization Descriptions	Credits - select ONE heating option	User Notes
1	Combustion heating minimum NAECA <sup>a</sup>	0.0	<input type="checkbox"/>
2	Heat pump <sup>c</sup>	1.0	<input type="checkbox"/>
3	Electric resistance heat only - furnace or zonal	-1.0	<input type="checkbox"/>
4	DHP with zonal electric resistance per option 3.4	1.0	<input type="checkbox"/>
5	All other heating systems	-0.5	<input type="checkbox"/>
Energy Options	Energy Credit Option Descriptions	Credits - select ONE energy option from each category <sup>d</sup>	
1.1	Efficient Building Envelope	0.5	<input type="checkbox"/>
1.2	Efficient Building Envelope	1.0	<input type="checkbox"/>
1.4	Efficient Building Envelope	1.0	<input type="checkbox"/>
1.5	Efficient Building Envelope	1.5	<input type="checkbox"/>
1.6	Efficient Building Envelope	2.0	<input type="checkbox"/>
1.7	Efficient Building Envelope	0.5	<input type="checkbox"/>
2.1	Air Leakage Control and Efficient Ventilation	1.0	<input type="checkbox"/>
2.2	Air Leakage Control and Efficient Ventilation	1.5	<input type="checkbox"/>
2.3	Air Leakage Control and Efficient Ventilation	2.0	<input type="checkbox"/>
2.4	Air Leakage Control and Efficient Ventilation	2.5	<input type="checkbox"/>
3.1*	High Efficiency HVAC	1.0	<input type="checkbox"/>
3.3*	High Efficiency HVAC	1.0	<input type="checkbox"/>
3.4	High Efficiency HVAC	2.0	<input type="checkbox"/>
3.6*	High Efficiency HVAC	3.0	<input type="checkbox"/>
4.1	High Efficiency HVAC Distribution System	0.5	<input type="checkbox"/>
5.1*	Efficient Water Heating	0.5	<input type="checkbox"/>
5.2	Efficient Water Heating	0.5	<input type="checkbox"/>
5.3	Efficient Water Heating	1.0	<input type="checkbox"/>
5.4	Efficient Water Heating	2.0	<input type="checkbox"/>
5.5	Efficient Water Heating	2.5	<input type="checkbox"/>
5.6	Efficient Water Heating	3.0	<input type="checkbox"/>
6.1*	Renewable Electric Energy (3 credits max)	1.0	<input type="checkbox"/>
7.1	Appliance Package	1.5	<input type="checkbox"/>
<b>Total Credits</b>		<b>0.0</b>	<b>GREEN FORM</b>

a. An alternative heating source sized at a maximum of 0.5 W/sf (equivalent) of heated floor area or 500 W, whichever is bigger, may be installed in the dwelling unit.  
b. Equipment listed in Table C403.3.2(4) or C403.3.2(5)  
c. Equipment listed in Table C403.3.1(1) or C403.3.1(2)  
d. You cannot select more than one option from any category EXCEPT in category 5. Option 5.1 may be combined with options 5.2 through 5.6. See Table 406.3.  
e. 1.0 credit for each 1,200 kWh of electrical generation provided annually, up to 3 credits max. See Table R406.2 for full requirements and complete option descriptions.

Please print only pages 1 and 2 of this worksheet for submission to your building official.

Prescriptive Path – Multifamily 2018 Washington State Energy Code-R 2

# Demo of New WSEC-R Compliance Certificate

## 2015 Compliance Certificate

## 2018 Compliance Certificate & Instructions

**2015 WSEC Residential Energy Compliance Certificate**

Property Address: \_\_\_\_\_

Conditioned Floor Area \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_

Builder or registered design professional: \_\_\_\_\_

Signature: \_\_\_\_\_

**R-Values**

Ceiling: Vaulted R-\_\_\_\_ Floors: Over unconditioned space R-\_\_\_\_  
 Attic R-\_\_\_\_ Slab on grade floor R-\_\_\_\_

Walls: Above grade R-\_\_\_\_ Doors: \_\_\_\_\_ R-\_\_\_\_  
 Below, int. R-\_\_\_\_ \_\_\_\_\_ R-\_\_\_\_  
 Below, ext. R-\_\_\_\_ \_\_\_\_\_ R-\_\_\_\_

**U-Factors and SHGC**

NRFC rating (or) Windows U-\_\_\_\_ SHGC- N/A  
 Default rating (Appendix A WSEC 2015) Skylights U-\_\_\_\_ SHGC- N/A

Table 406.2 Option(s) \_\_\_\_\_ Total 406.2 Credits \_\_\_\_\_

**Heating, Cooling & Domestic Hot Water**

System	Type	Efficiency
Heating		
Cooling		
DHW		

**Duct & Building Air Leakage**

All ducts & HVAC in conditioned space ( yes / no ) Insulation R-\_\_\_\_  
 Air handler present ( yes / no )  
 Test Target \_\_\_\_\_ CFM@25Pa Test Result \_\_\_\_\_ CFM@25Pa  
 Building air leakage target:  $ACH_{50} < 5.0$  - Tested leakage:  $ACH_{50} =$  \_\_\_\_\_

**Onsite Renewable Energy Electric Power System**

System type: \_\_\_\_\_ Rated annual generation \_\_\_\_\_ Kwh

**2018 WSEC Residential Energy Compliance Certificate (Effective November 1, 2020)**

Property address: \_\_\_\_\_

Builder/registered design professional name: \_\_\_\_\_

Builder/reg. design pro. signature: \_\_\_\_\_

Conditioned floor area: \_\_\_\_\_ sf (per building permit)

**R-Values (R303.1.1)**

Ceiling/ Vaulted R-\_\_\_\_ Floors: Over unconditioned space R-\_\_\_\_  
 attic Attic R-\_\_\_\_ Slab-on-grade floor R-\_\_\_\_

Walls: Above-grade R-\_\_\_\_ Fully insulated slab? Y/N (circle one)  
 Below, int. R-\_\_\_\_ Doors: R-\_\_\_\_, R-\_\_\_\_, R-\_\_\_\_  
 Below, ext. R-\_\_\_\_

**U-Value of Windows, Skylights and Doors (R303.1.1.3)**

Average weighted U-value from Glazing Worksheet Average U-\_\_\_\_

**Fuel Normalization and Energy Credits (Tables R406.2 and R406.3)**

Primary heating system # \_\_\_\_\_ Description \_\_\_\_\_

Options selected (1-7) \_\_\_\_\_ Total credits \_\_\_\_\_

System	Heating, Cooling and Domestic Hot Water Type	Efficiency
Heating		
Cooling		
DHW		

Drain water heat recovery? (circle one) Y or N Model: \_\_\_\_\_

**Onsite Renewable Energy Electric Power System**

System type: \_\_\_\_\_ Rated annual generation \_\_\_\_\_ Kwh

**Fuel Normalization and Energy Credits – Table R406.2 and R406.3**

Each dwelling unit must comply with sufficient options from Table R406.3 to achieve a certain number of energy credits, which varies depending on the size and type of the dwelling unit. Fuel normalization credits, selected from Table R406.2, account for the carbon emission differences between fuels.

**Fuel Normalization and Energy Credits (Tables R406.2 and R406.3)**

Primary heating system # \_\_\_\_\_ Description \_\_\_\_\_

Options selected (1-7) \_\_\_\_\_ Total credits \_\_\_\_\_

**HVAC System Duct Leakage Testing (R403.3)** Circle one

All ductwork and air handler in conditioned space? Y or N  
 All ductwork in unconditioned spaces buried and tested, and air handler in conditioned space? Y or N  
 All ductwork and air handler outside conditioned space insulated to minimum R-8? Y or N  
 Air handler present at duct leakage test? Y or N  
 Do HVAC duct leakage tests include GPS and time stamp verification? Y or N

HVAC system leakage test calculated design target: \_\_\_\_\_ CFM @ 25 Pa  
 HVAC system leakage test measured results: \_\_\_\_\_ CFM @ 25 Pa

**Building Leakage Testing (R402.4.1.2)**

Building leakage test calculated design target: \_\_\_\_\_ CFM @ 50 Pa  
 Building leakage test measured results: \_\_\_\_\_ CFM @ 50 Pa  
 Do building leakage tests include GPS and time stamp verification? Y or N

**Whole House Ventilation System Measured Flow Rates (M105.4 IRC-WA)** Circle one

Are the system controls correctly labeled? Y or N  
 The Whole House Ventilation (WHV) system operation and maintenance (O&M) instructions were provided to the building owner? Y or N  
 Provided to: \_\_\_\_\_ on \_\_\_\_\_ (date)

Whole House Ventilation System Type: (circle one)

- Whole house exhaust fan, operating continuously, location \_\_\_\_\_
- Whole house exhaust fan, operating intermittently, location \_\_\_\_\_  
 Specify run-time: \_\_\_\_\_ hours per day
- Balanced HRV/ ERV, operating continuously, location \_\_\_\_\_
- Balanced HRV/ ERV, operating intermittently, location \_\_\_\_\_  
 Specify run-time: \_\_\_\_\_ hours per day
- Supply or HRV WHV integral to the air handler. Describe system control sequence of operations or reference to design submittal: \_\_\_\_\_

Enter the primary heating system type number (1-5) from Table R406.2. Also, enter a description of the heating system type. Example descriptions include: "Natural gas furnace" and "Electric resistance with DHP in largest zone."

List the Energy Credit Options implemented by number (1-7) per Table R406.3. Enter the total energy credits achieved from the listed options.

# Overview – WA IRC and IMC Ventilation Changes

## Single Family:

- IRC-WA have higher rates for exhaust only
- IRC-WA allows use of 62.2 rates (more flexible)

## R2 - Low Rise Multi-family:

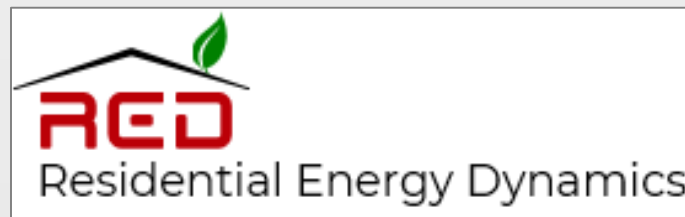
- IMC-WA have higher rates for exhaust only
- IMC-WA does not allow 62.2 rates
- IMC-WA requires balanced systems
- IMC-WA not allowed to use exhaust only anymore
- Most will have balanced HRV/ERV!
- Yes, you can put the HRV in the attic (???)

# WSU HVAC Air Leakage Training & Certification

- Required per RS-33
- See list of certified testers
- AHJs taking the test also!
- New 0.5 option for buried ducts
- Check out HVAC training webinar
- Links to TEC and RETROTEC for specific equipment training

# TEC, RETROTEC & RED

- Now that you understand the testing approaches and requirements for WSEC-R, it is important to **learn how to use the equipment and become proficient using it**
- **Spend 1-3 hours on these websites learning how to use the equipment:**
  - <https://retrotec.com/>
  - <https://www.redcalc.com/>
  - <https://energyconservatory.com/>





# Duct Testing Equipment

- Duct tester
- Manometer
- Register blocks or “mask”



fan & rings

# Duct Leakage to the Exterior



and



**Yields duct leakage CFM to the exterior**

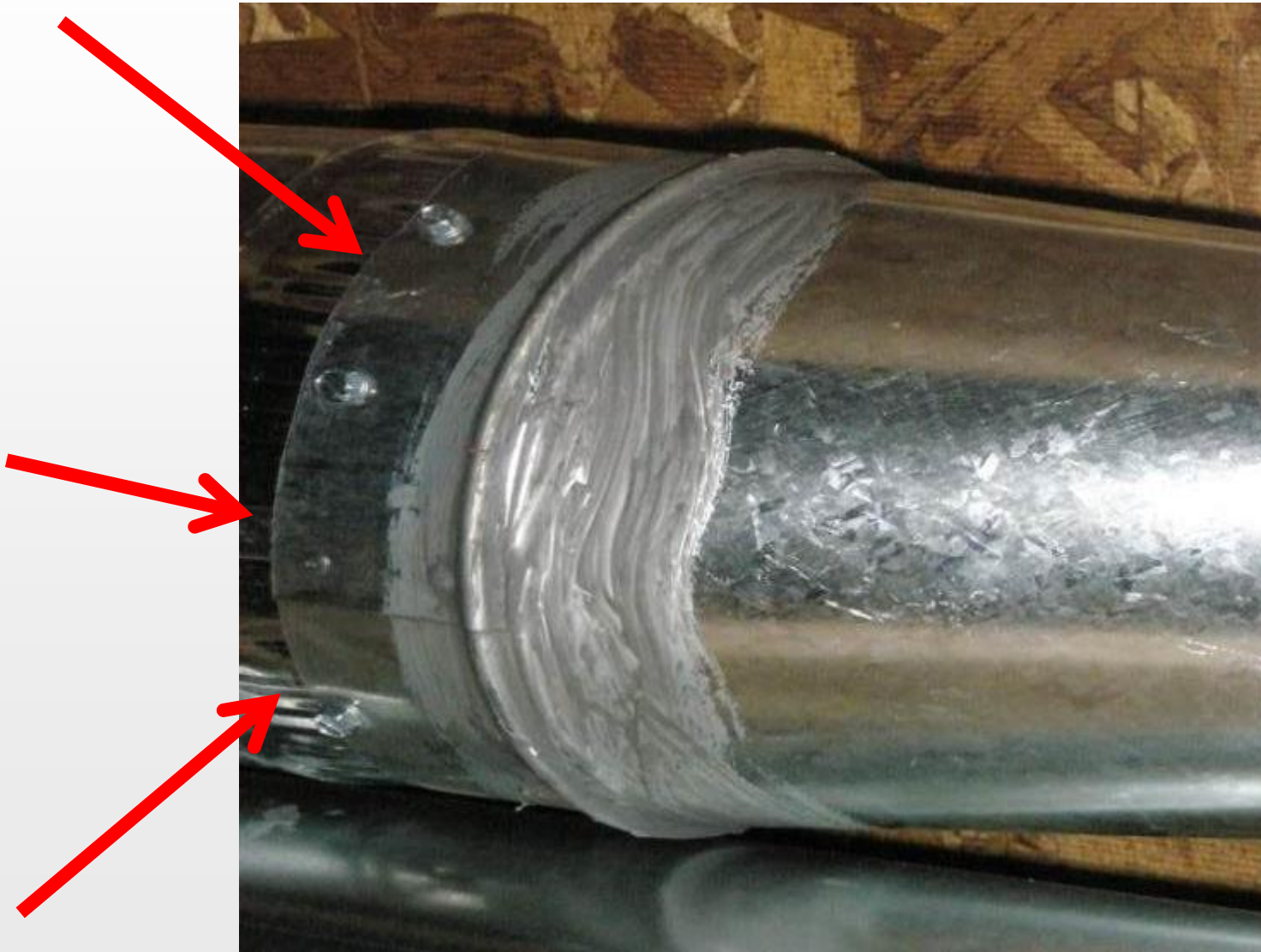
# Duct Tape







# All Joints Must Be Sealed



# “I’ve Got Some Duct Tape”

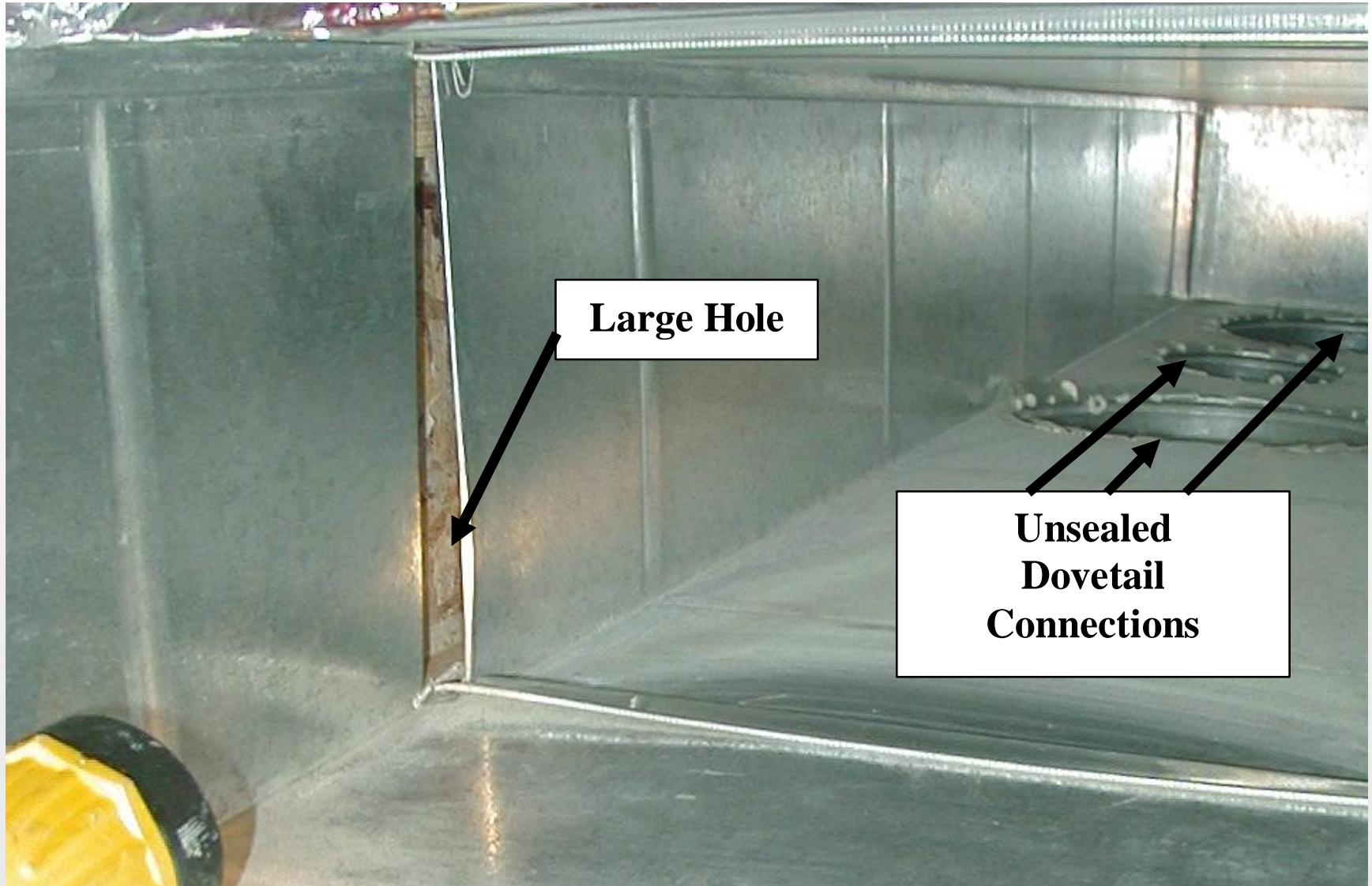


# System Deficiencies



**Hole at dovetail  
connection**





**Large Hole**

**Unsealed  
Dovetail  
Connections**

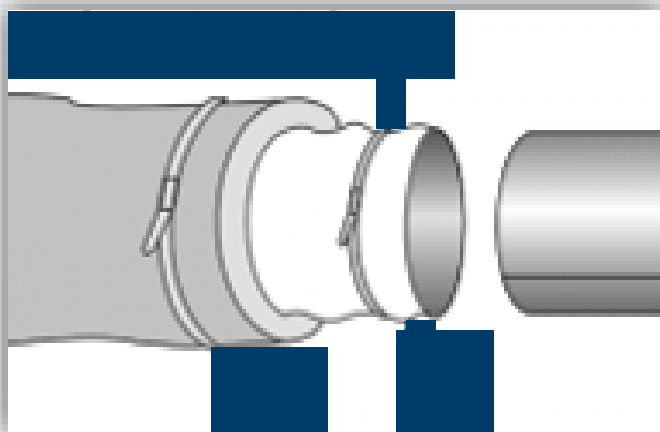




**Large hole where  
down drafting  
furnace connects to  
supply plenum**

# Mechanical Fastening

Mechanically fastened joint using “the right tool for the job” per UL flex duct listing using approved Panduit strapping gun!!



# “Currently Unattached”



# Duct Testing Standards

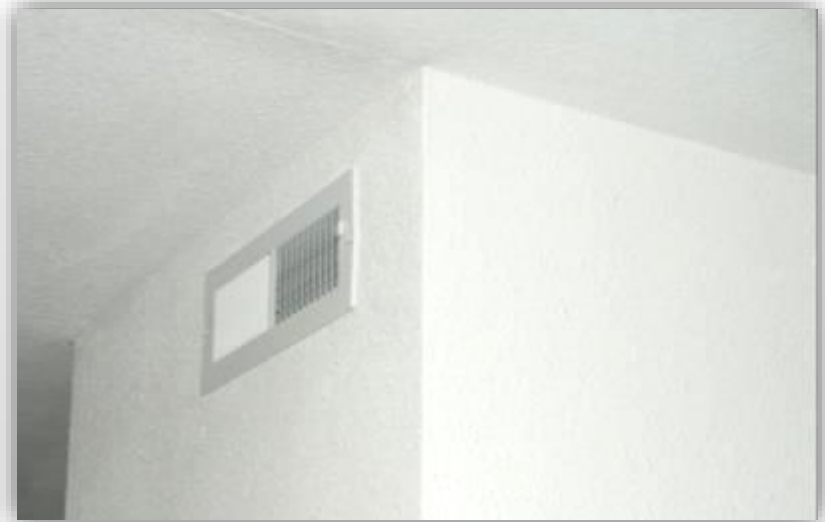
## Exception

Duct tightness test is not required if:

- The air handler and all ducts are located within conditioned space
- 10 ft of return ducts and 5 ft of supply ducts are allowed to be outside the conditioned space



# A Better Way: Move the Ducts Inside!



- Habitat for Humanity
- First WA ENERGY STAR
- All ducts Inside
- 1,000 sf
- All electric < \$40/month





**Ducts in dropped ceiling in hall**

**After drywall**





**Air handler inside**

**Supply register in wall**



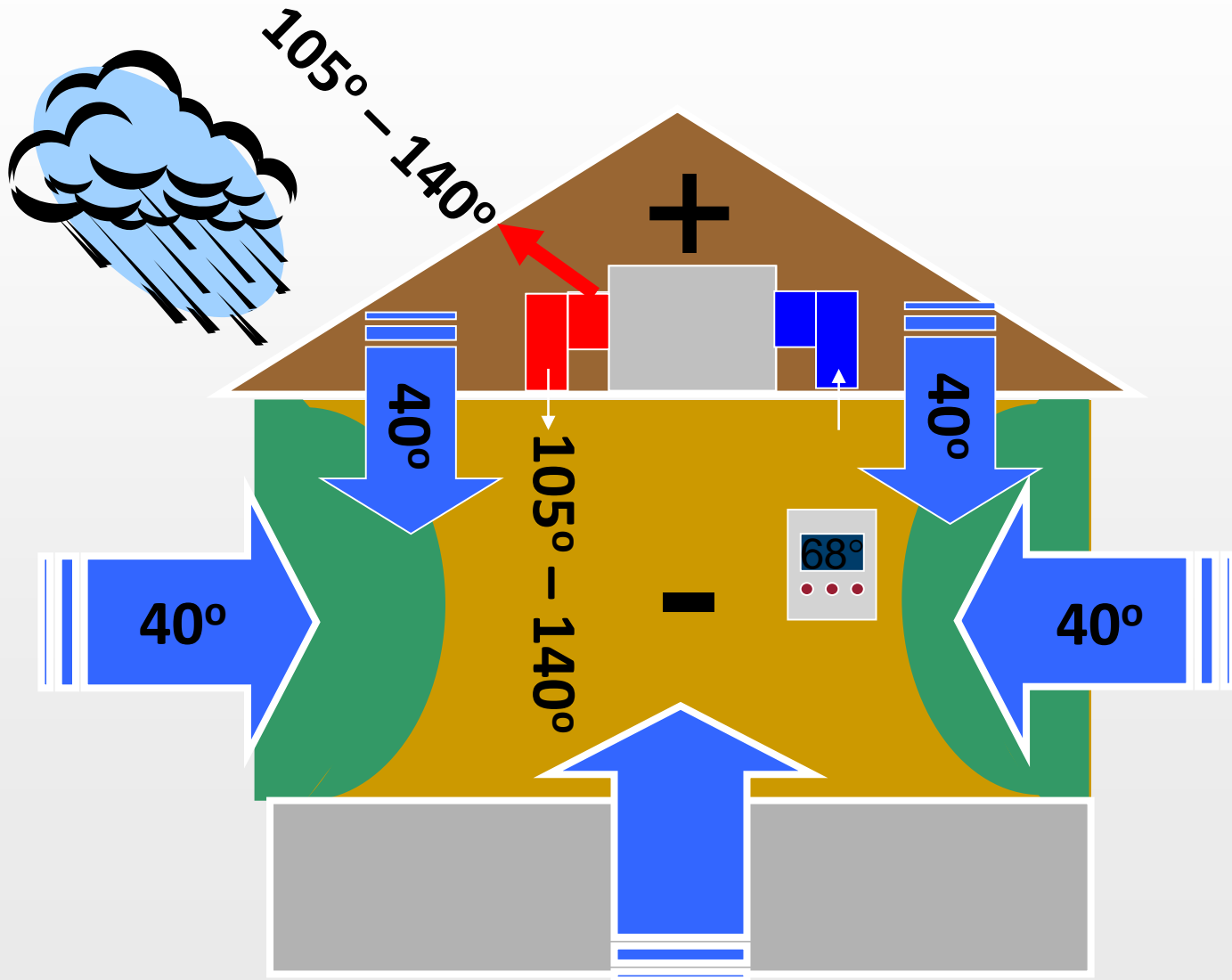


## Dropped soffit with duct in bathroom

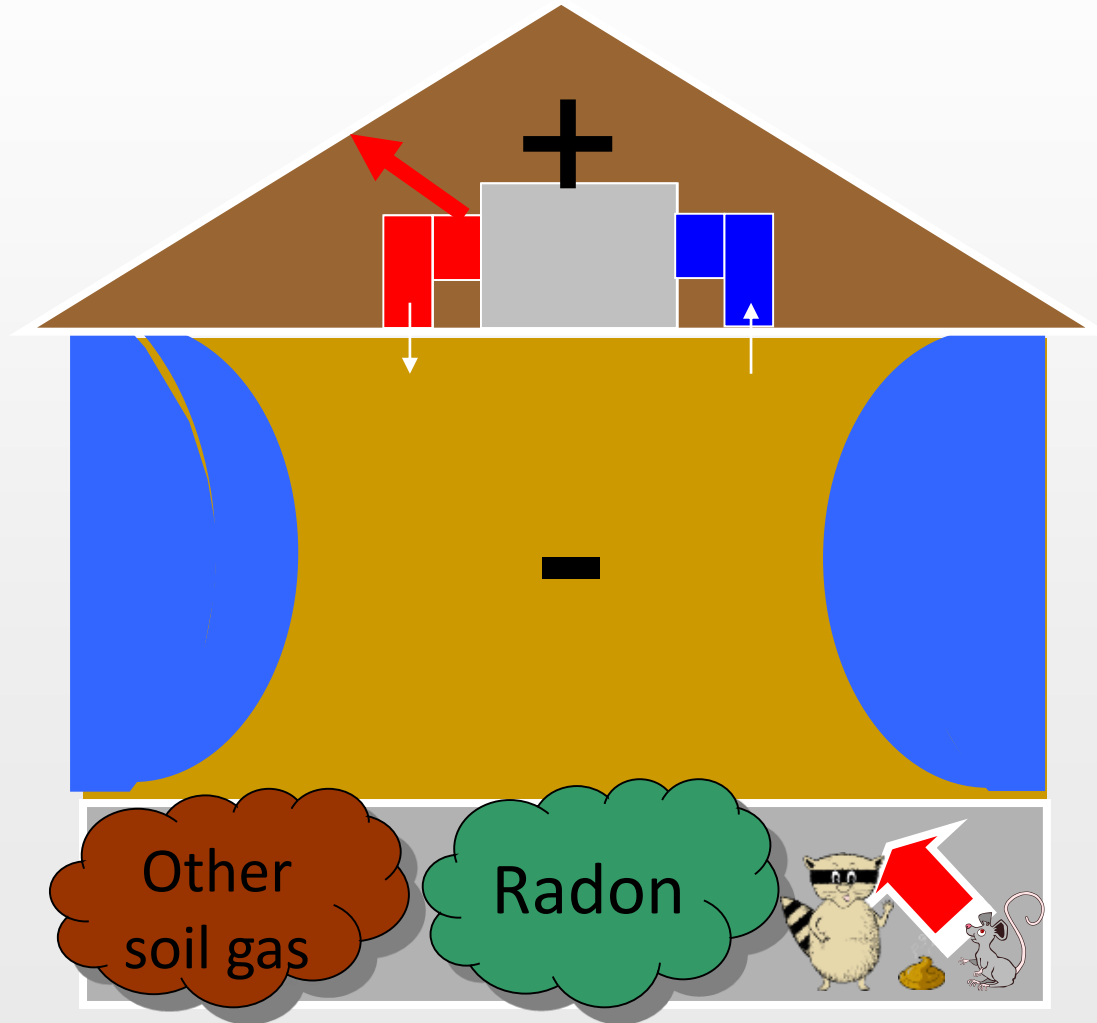




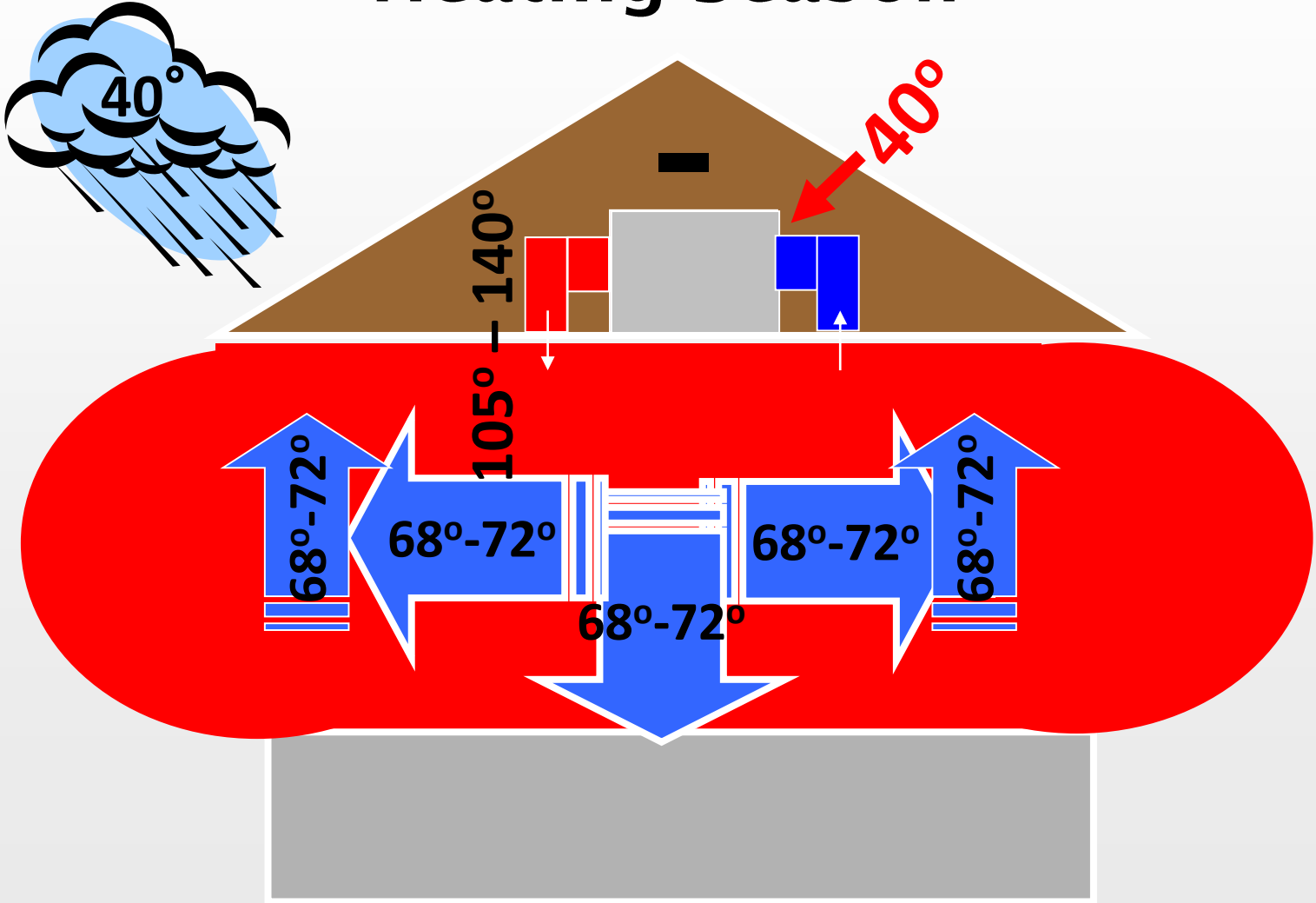
# Duct System Supply Leakage



# Where is the Air Coming From?



# Duct System Return Leakage in Heating Season





**Ducts between floors**



**High-efficiency furnace  
inside the structure**



# Code Compliance Calculator

## WSU Code Compliance Calculator - WSEC 2015 & 2018

(C) 2021

Washington State University Energy Program

For assistance contact: [energycode@energy.wsu.edu](mailto:energycode@energy.wsu.edu)

### Welcome to the WSU Code Compliance Calculator

This worksheet is designed to document the qualification of building designs by the (1) R402.1.1 prescriptive path, including the R406.3 UA percent trade off for Option 1 envelope measures, and (2) R402.1.4 Total UA Alternative (component performance). These are both based on the requirements of the 2015 and the 2018 editions of the Washington State Energy Code (WSEC). This tool can also calculate Efficient Building Envelope Options 1.3 – 1.6 for 2018 and Options 1a to 1c for 2015.

**We appreciate your feedback!** Send us your suggestions, comments and bug reports to the email above.

**ENABLE MACROS: Macros must be enabled for this tool to function properly.**

**Office 365 Users: Save this file to your LOCAL drive.**

**Calculator tabs will open when macros are enabled.**

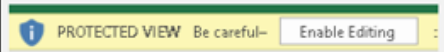
**If the tool does not open:**

\* **Have you enabled editing? Have you enabled macros? Have you saved to your harddrive?**

- See the text box "Excel Start Up Tips" to the right
- If you missed clicking "Enable Macros" just below the Excel ribbon, close this file and open again.

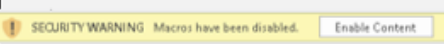
### Excel Start Up Tips

If you open this file from an email, you will be prompted to Enable Editing and then to save to your computer.



If you are using Office 365, save the file to your local drive.

Next Excel will prompt you to enable macros, usually just below the Excel ribbon. Click Enable Content.



Next click OK to accept the Terms of Use when prompted.



When exiting, you will be prompted to save this file, even if you already have. This will

Initializing

Copyright

Getting Started

+

*Our goal is to complete beta testing and make this tool available on our website by Feb. 1, 2021*

# Energy Code Support in Washington

## Residential

WSU Energy Program

360-956-2042

[energycode@energy.wsu.edu](mailto:energycode@energy.wsu.edu)

[www.energy.wsu.edu/code](http://www.energy.wsu.edu/code)

*Mike Lubliner, Melinda Spencer,  
Carolyn Roos*

## Non-residential

Evergreen Technology Consulting

360-539-5202

[com.techsupport@waenergycodes.com](mailto:com.techsupport@waenergycodes.com)

<http://waenergycodes.com>

*Lisa Rosenow*

**Spend an hour on our web page!**

The screenshot shows the WSU Energy Program Building Efficiency website. The header includes the WSU logo and the text 'Energy Program WASHINGTON STATE UNIVERSITY' and 'WSU Energy Program Building Efficiency'. The main content area features a navigation menu on the left with links for 'Green Transportation Program', 'Renewable Energy', 'Energy Code', 'Energy Questions?', and 'COVID-19 Resources'. The main text area is titled '2018 Washington State Energy Code' and contains the following information:

On Jan. 8, 2021, the State Building Code Council voted to delay implementation of the 2018 WSEC to July 1, 2021. [SBCC announcement](#)

Our energy code team provides support to those who use the residential sections of the Washington State Energy Code (WSEC-R).

- If your building permit is submitted *on or after* July 1, 2021, it must meet requirements of [2018 WSEC-R](#). You may also need to refer to the:
  - [International Mechanical Code –WA Amendments](#) and/or the [International Residential Code – WA Amendments](#)
- If your building permit is submitted *before* July 1, 2021, it must meet requirements of [2015 WSEC-R](#)

**For assistance and updates:**

- Email [energycode@energy.wsu.edu](mailto:energycode@energy.wsu.edu)
- Call the WSEC Residential Code Hotline at 360-956-2042
- Join our distribution list at [energycode@energy.wsu.edu](mailto:energycode@energy.wsu.edu) to get updates about tools and training opportunities

**2018 WSEC-R Training Opportunities**

Please review our [webinars](#) on residential energy code compliance and duct testing before beginning work on your permit application documents.



# Design & Construction of High-Performing Energy-Efficient Homes

## OUTLINE

### COMPETENCY GAPS

Energy Modeling and Simulation

Environmental Control Systems

Smart Building Technologies

Envelope and Structural Systems

Performance Benchmarks

Measured Performance Data

### COURSES

Energy Modeling 01

Energy Modeling 02

Fundamentals of Env. Cont.

Active Env. Cont. Systems

Passive Env. Cont. Systems

Smart Systems for Residential Bldgs.

Comprehensive Design Experience

Envelope Assemblies

Advanced Residential Construction

Modular Off-site Construction

Residential Codes, Standards, Rtg. Sys.

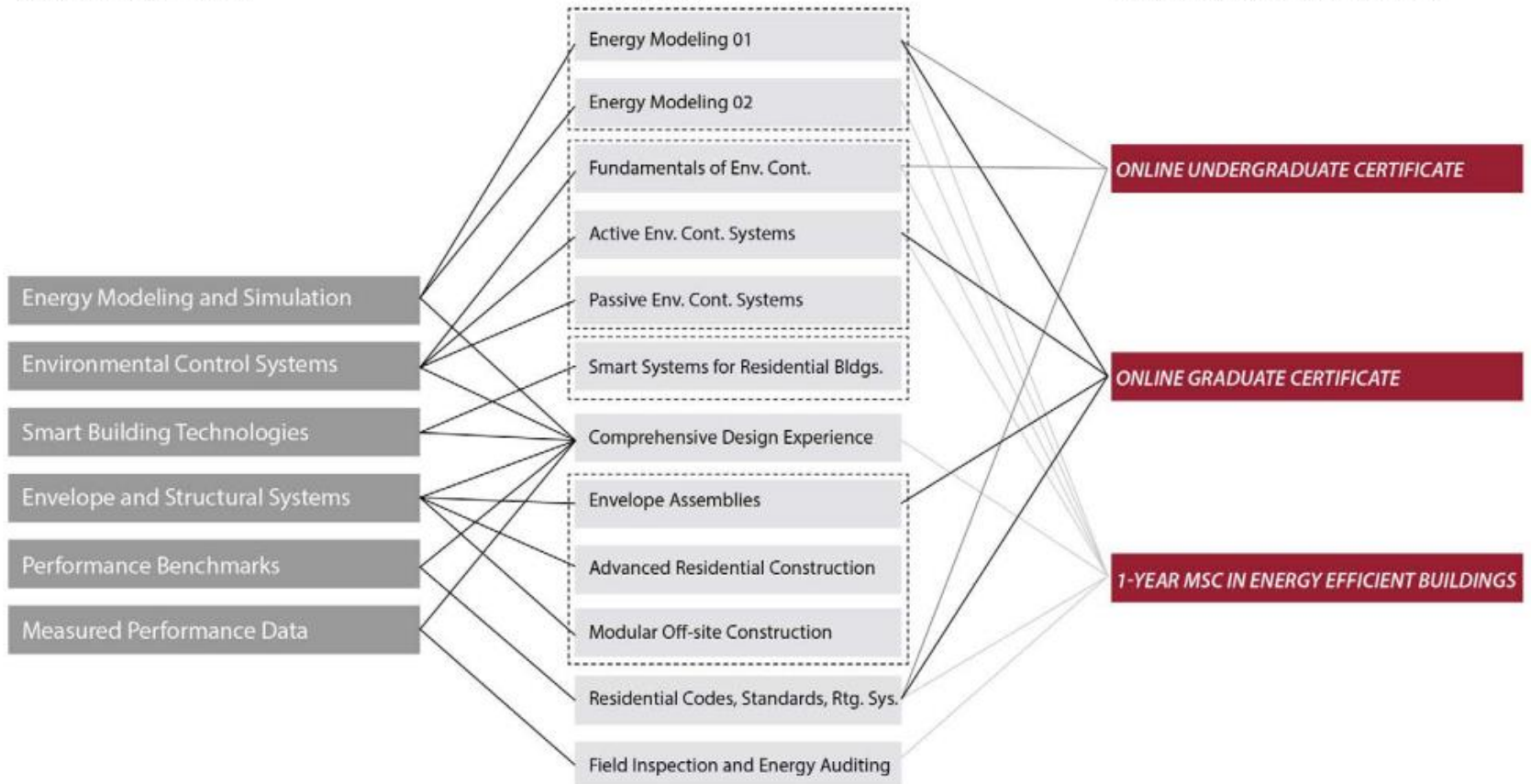
Field Inspection and Energy Auditing

### CERTIFICATES AND DEGREES

ONLINE UNDERGRADUATE CERTIFICATE

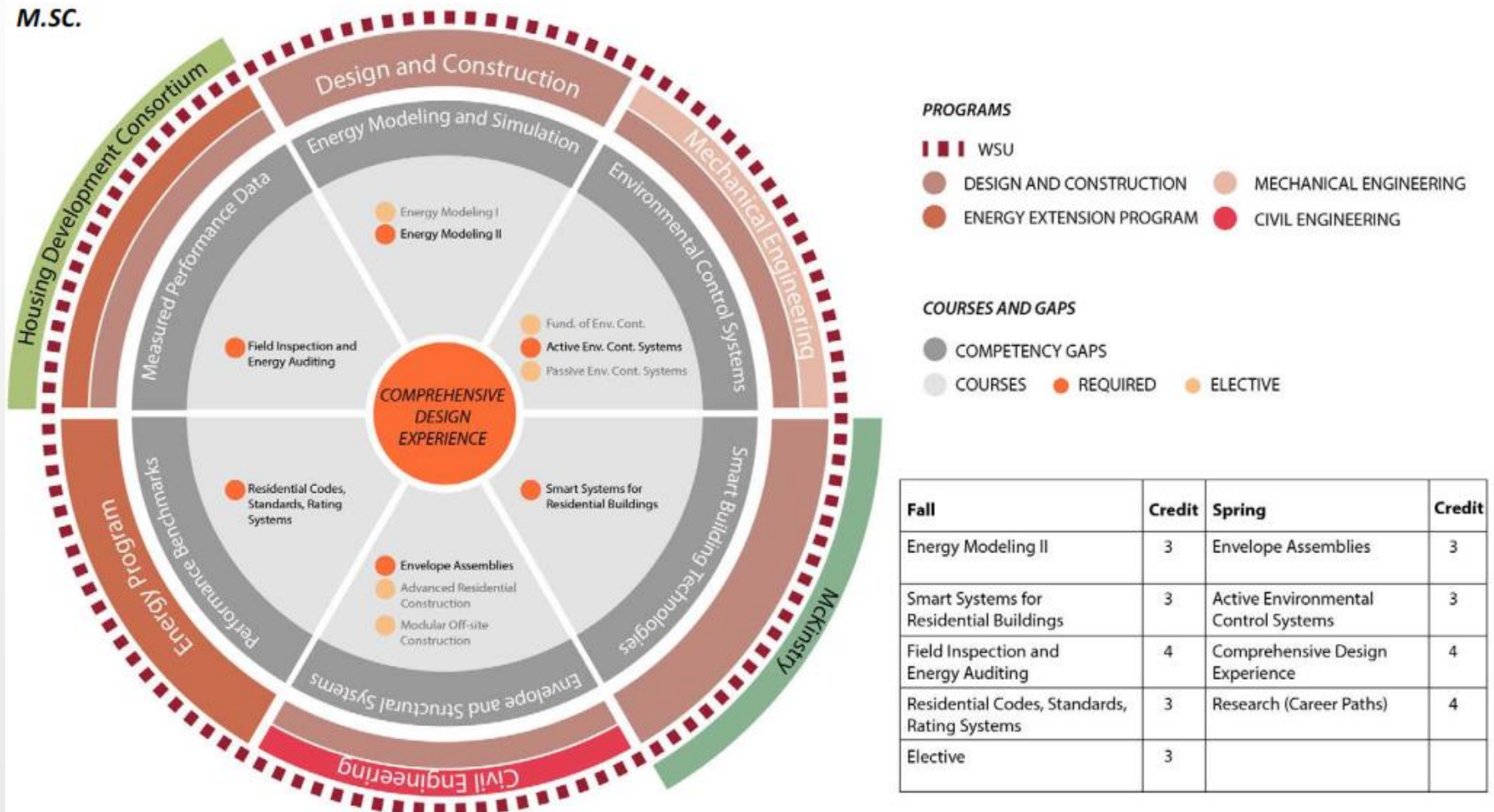
ONLINE GRADUATE CERTIFICATE

1-YEAR MSC IN ENERGY EFFICIENT BUILDINGS



# Design & Construction of High-Performing Energy-Efficient Homes

M.Sc.



Fall	Credit	Spring	Credit
Energy Modeling II	3	Envelope Assemblies	3
Smart Systems for Residential Buildings	3	Active Environmental Control Systems	3
Field Inspection and Energy Auditing	4	Comprehensive Design Experience	4
Residential Codes, Standards, Rating Systems	3	Research (Career Paths)	4
Elective	3		



**Thank You!**

Send questions and comments to:

**Michael Lubliner**

360-956-2042

Join our update list:

[energycode@energy.wsu.edu](mailto:energycode@energy.wsu.edu)



**Energy Program**

WASHINGTON STATE UNIVERSITY



# WSEC-R SBCC #20-11 Interpretations



## Washington State Building Code Council

*Improving the built environment by promoting health, safety and welfare*

1500 Jefferson Street SE • P.O. Box 41449 • Olympia, Washington 98504  
(360) 407-9277 • e-mail sbcc@des.wa.gov • www.sbcc.wa.gov

### STATE BUILDING CODE OPINION NO. 20-11

**CODE:** 2018 Washington State Energy Code, Residential

**SECTION:** Table R406.2, Fuel Normalization Credits

**QUESTION 1:** Does fuel normalization credit system type 2 apply for a PTAC HP that meets minimum federal standards?

**ANSWER 1:** No. PTAC units would be considered system type 5, Other, since they are not listed in the equipment efficiency tables [C403.3.2(1)C; C403.3.2(2)] cited by system type 2. To be considered system type 2, through the wall heat pumps would need to meet all requirements in the referenced tables C403.3.2(1)C and C403.3.2(2), including HSPF rating and listing per AHRI 210/240.

**QUESTION 2:** Does fuel normalization credit system type 2 apply to central ducted residential heat pumps that meet minimum federal standards when used with supplemental gas heating meeting the requirements of Section R403.1.2?

**ANSWER 2:** Yes, when installed per Section R403.1.2 with controls that prevent supplemental heater operation above 40°F. At final inspection the auxiliary heat lock out control shall be set to 35°F or less.

**QUESTION 3:** What fuel normalization credit is taken if the electric resistance heat does not exceed 2 kW per dwelling?

**ANSWER 3:** For single-family, duplex and townhouse dwellings, system type 4, as it references those systems meeting Section R403.7.1 including the exception for total installed electric resistance heating not exceeding 2 kW per dwelling, would apply. For R-2 dwellings, it would be system type 3.

**SUPERSEDES:** None

**REQUESTED BY:** Kitsap County

# WSEC–R SBCC 20–11 Interpretations

- Gas furnace on HP is OK for HP fuel credits (type 2) IF the gas furnace back-up is locked out above 35° F, per R403.1.2 *Supplemental Heat*. To field verify lockout, you need access to the thermostat settings set by the HVAC contractor.
- PTHP w/o HSPF test uses fuel type 4 (other). AHJ to verify HSPF test provided with AHRI directory or equal. IR thermal bridge and air leakage issues – FYI (Clark County experience).

# Programmable T-Stats

- Primary space conditioning systems in each dwelling unit require a programmable thermostat
- Heat pumps with supplemental electric resistance heaters shall have strip heat lockout controls
  - Max. setting of 40° F
  - Set to 35° F or less at final inspection



# WSEC-R SBCC #20-12 Interpretations



## Washington State Building Code Council

*Improving the built environment by promoting health, safety and welfare*

1500 Jefferson Street SE • P.O. Box 41449 • Olympia, Washington 98504  
(360) 407-9277 • e-mail sbcc@des.wa.gov • www.sbcc.wa.gov

### STATE BUILDING CODE OPINION NO. 20-12

**CODE:** 2018 Washington State Energy Code, Residential

**SECTION:** Table R406.3, Energy Credits

**QUESTION:** Can the appliance credit 7.1 be taken for each residential multi-family unit if there is a central laundry facility in the building? If so, how would one determine compliance with CEF testing or equivalent energy efficiency metric to determine compliance with CEF testing?

**ANSWER:** **No. All appliances must be installed in the dwelling unit to qualify for the credit. However, per Section R102, code officials may approve alternate means or design methods that are equivalent and meet the intent of the code. This could be applied to central laundry facilities with equivalent energy savings.**

**SUPERSEDES:** None

**REQUESTED BY:** Kitsap County

# WSEC-R SBCC 20-12 Interpretations

AHJ may approve central laundry for Energy Credit 7, if equivalent saving to vent-less dryer (CEF 5.2) in each unit.

- WSUEP is working on this research to determine equivalency and solutions: central laundry Energy Star washer?
  - Central laundry Energy Star dryer equal to CEF 5.2 ?
  - Waste water heat recovery per energy credit 5.1
  - Balanced heat recovery with HRV using energy credit options 2 - *Air Leakage and Efficient Ventilation*: 2.2 (65%), 2.3 (75%), 2.4 (80%) sensible heat recovery efficiencies



# WSEC-R SBCC #20-13 Interpretations



## Washington State Building Code Council

*Improving the built environment by promoting health, safety and welfare*

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### STATE BUILDING CODE OPINION NO. 20-13

**CODE:** 2018 Washington State Energy Code, Residential

**SECTION:** R402.4.1.2  
Table R406.3, Energy Credits

**QUESTION:** Does the Authority Having Jurisdiction have the authority to allow sampling to determine compliance with envelope tightness of R-2 low rise multifamily?

**ANSWER:** The local jurisdiction is the enforcement authority. It is up to them to set their own policies and acceptance criteria.

**SUPERSEDES:** None

**REQUESTED BY:** Kitsap County

# WSEC-R SBCC 20-13 Interpretations

- Corridor loaded: test whole building at once ( $ACH_{50}$  PA)
- Non-corridor “garden”: test each unit separately (cfm/sf SA)
- R2 low-rise residential dwellings require testing of each unit or building
- Working with AABA certification training for air barrier installer and air barrier air leakage testing companies. We hope to have AABA training available in mid-2021 (TBD)
- It is up to the AHJ to decide if sampling is acceptable
- If they fail, what do they do?  
Need FAQ: “What do we do if we fail the blower door test?”

# WSEC-R SBCC 20-13 Interpretations

- Root cause failure analysis and fix items identified before CO
- Root cause analysis and fix items identified on next unit/building
- Repair using Aero Barrier™ or other sealing systems to pass.  
Note: \$1 to \$2/sf is typical steady state range (TBD)
- Look at systems engineering approach: CI and air barrier details, window operator types, minimum envelope penetrations, HRV in conditioned space, etc.

## WSEC-R Gray Area - Option 4

- Can HVAC location credits 4.1 & 4.2 apply to central ducted or hydronic heating only. (Yes)  
Energy savings credit for non-centrally ducted HVAC is already assumed to be contributing to the credits 3.4 DHP in primary or 3.6 DHP (or equal) in each zone. (Intent of energy credits)
- Can HVAC location energy credits option 4.1 and 4.2 can be used with energy credit 3.1, 3.2, 3.3, 3.5. (Yes)

# Gray Areas &/or Interpretations

- Definitions of "primary" for a space heating system when zonal electric. It is the largest load? (Yes?)
- Does energy credit Option 4 require that the HRV/ERV be located within conditioned space? (Yes?)
- Does a non-ducted or ducted cassette heat pump need to be located in conditioned space for energy credit Option 4? (Yes?)



# Gray Areas &/or Interpretations

- Do energy credits apply to conditioned den, shop, garage, ADU?  
– Chapter 5 Simulation R405 (WSU - check with AHJ)
- Is any software currently available that meets rulesets in R405?  
(WSU - check with AHJ)
- Can software that does not meet the ruleset be used for Chapter 5 compliance? (WSU - check with AHJ)
- Waste Water Heat Recovery (WWHX):
  - Can only one primary shower be connected to get the energy credit? (WSU - TBD?)
  - Can non-shower fixture drains (sink or toilet water) be connected to get the credit (WSU - yes)

# Moisture Management & WSEC-R



## Cautionary Case Studies: Damage in Northwest Multifamily Housing Walls With Vinyl Siding

**George Tsongas, Ph.D., P.E.**

Consulting Engineer and Building Scientist  
Professor Emeritus of Mechanical Engineering  
Portland State University

# Avoid Mold and Rot!

**“VAPOR MIGRATION” is the migration of water vapor through walls by a combination of vapor diffusion and air movement that carries water vapor in the air with it**

- When indoor temperatures are warmer than outdoor conditions, vapor drive is on balance from indoors (warmer) to outdoors (colder)

# Avoid Mold and Rot!

## Vapor drive is occurring in all walls

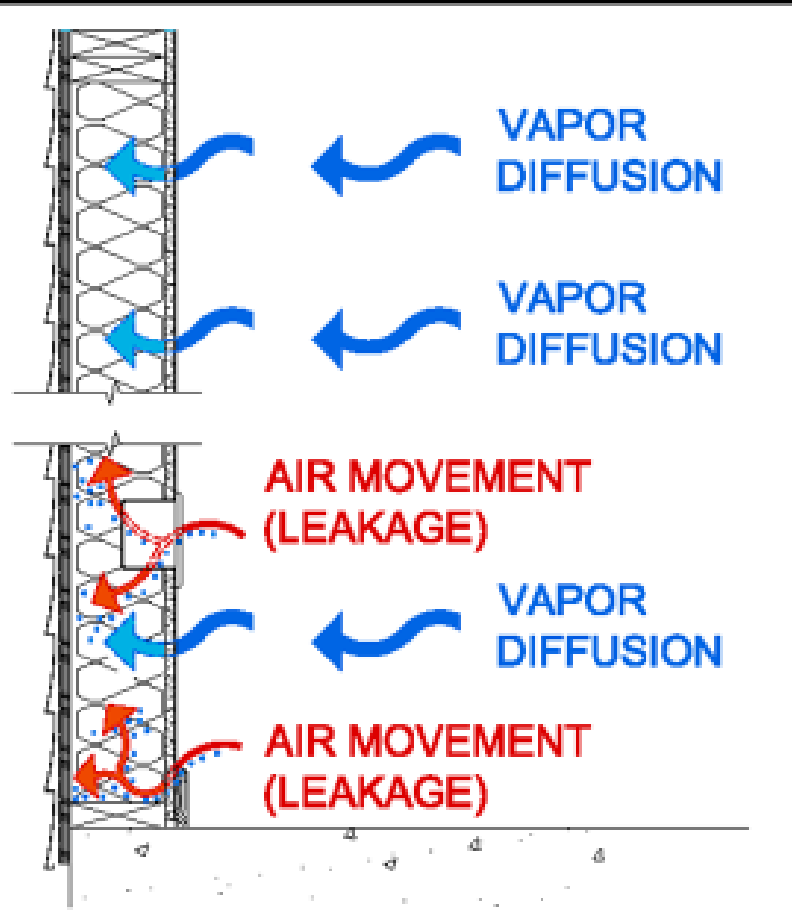
- It is a normal mechanism for removal from housing of moisture generated by occupants and their activities
  - A family of 3-4 persons generates about 3 gallons per day of water vapor as a result of breathing, perspiration & indoor activities
    - All this moisture has to be removed from the indoor spaces
      - Mostly by air leakage

# Avoid Mold and Rot!

**If during cold weather the inside surface of sheathing is below the dew point temperature of the indoor air and its water vapor that is migrating through the wall cavity, then the water vapor will “condense” on the sheathing (which is the first cold condensing surface), be absorbed into the wood and raise its moisture content**



## Wintertime vapor movement in walls



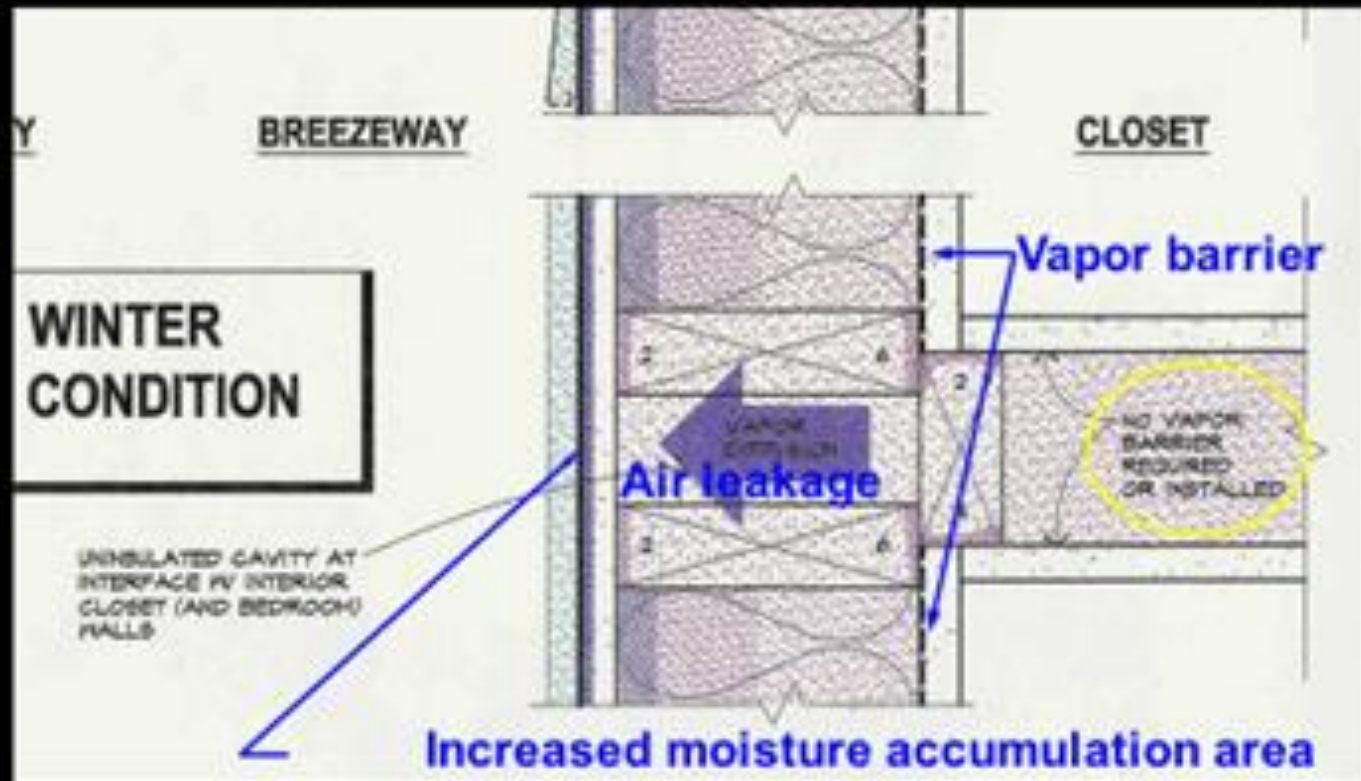
# Avoid Mold and Rot!

**Most of the vapor drive in walls is  
by air leakage**

- Especially for walls with an interior vapor retarder such as asphalt-impregnated kraft paper backing on fiberglass insulation or a poly vapor barrier
  - Greatly reduces the amount of vapor diffusion

## Breezeway wall construction observation

- Units 302 & 303: Insulation and vapor barrier were missing at the intersection of the exterior wall cavity and the interior demising walls and closet walls (observed from breezeway)



# Results of the Perfect Storm

**Worse damage on inside face of OSB**



# Results of the Perfect Storm

## Damage to gypsum sheathing & TJI decay behind vinyl siding

Between 2<sup>nd</sup> & 3<sup>rd</sup> stories of 3-story apartment



Colville, Washington multifamily housing



# Don't miss these!

- *Good Ventilation (Beach Boys Parody)*  
[https://youtu.be/ese2x4\\_3UfE](https://youtu.be/ese2x4_3UfE)
- *James Brown Blower Door video*  
<https://youtu.be/Xsp3yCxoYOA>