



2018 WSEC-R Updates & Discussions

Effective February 1, 2021

Michael Lubliner, Senior Building Science Specialist

WSU Energy Program

December 8, 2020



WSEC-R Presentation Agenda

- Introduction - 40 Years of Building Science “BS”
- Recorded Webinar - 2018 WSEC Overview
- Demo - Prescriptive Single & Multifamily Worksheets
- Demo - WSEC-R Compliance Certificate
- Q&A - Discussion of challenges and opportunities

Recorded Webinar: 2018 WSEC Overview

Training Opportunities

In-person training has been replaced by recorded webinars until further notice.

Residential Energy Code Compliance

The 2018 Washington State Energy Code (WSEC) will take effect on February 1, 2021. This recorded presentation provides an overview of WSEC 2018 changes. It is designed for building department staff, builders, sub-contractors, architects, and any other building industry professionals wishing to gain a proficient understanding of this code. Once you have watched this training, you are invited to send your questions to energycode@energy.wsu.edu.

[2018 WSEC-R – Presentation](#) (1 hr)



[2018 WSEC-R – Slides](#) (pdf)

Multifamily Resources

The following webinars provide guidance about multifamily components of the 2018 WSEC-R.

[2018 WSEC-R Multifamily Updates](#) (1 hr 11 min): Presentation by Mike Lubliner to the Housing Development Consortium of Seattle – King County, July 2020

[MF Build Tight, Ventilate Right](#) (1.5 hrs): Presentation by Mike Lubliner and Dr. Iain Walker to the Seattle Building Enclosure Council, October 2020

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

WSUEP Assistance to AHJ & WABO (CYA)

Our WSEC-Residential technical support team is not an affiliate of, nor do we speak for, the Washington State Building Code Council (SBCC). Official opinions of WSEC intent are made only by the SBCC in response to official inquiries submitted to the SBCC by authorities having jurisdiction. While we try to stay aligned with the SBCC, the technical support we provide is advisory only and non-binding on authorities having jurisdiction, builders, designers, and the building trades personnel involved with construction and remodeling of residential structures.

Introduction – 40 years of Building Science “BS”

- Nationally recognized for RD&D and MTV:
 - Single family
 - Multifamily
 - Site built
 - Manufactured homes (HUD and modular)
 - Affordable housing (PHA, HFH, etc.)
 - HVAC systems
 - Energy efficiency
 - Indoor air quality
- USDOE Building America & USEPA ENERGY STAR homes
- Super Good Cents PNW utility program (RCDP/RSDP)
- 35-year ASHRAE member (Standards: 62.2, 90.2)

Introduction – 40 years of Building Science “BS” (cont.)

- Member of:
 - ACCA Manual S Committee (sizing)
 - WA LNI Factory Assembled Structures Advisory Board
 - WA SBCC Energy & MVE TAG
 - HUD’s Manufactured Housing Consensus Committee (federal advisory committee)
- Voting member of the Residential Energy Service Network (RESNET)
- Five-time NAHB Energy Value Housing Awards Judge

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 ^a	U-Factor ^a
Fenestration U-Factor ^b	n/a	0.30
Skylight U-Factor	n/a	0.50
Glazed Fenestration SHGC ^{b,a}	n/a	n/a
Ceiling ^c	4 ^d	0.026
Wood Frame Wall ^{b,m}	21 int	0.056
Mass Wall R-Value ⁱ	21/21 ^k	0.056
Floor	30 ^d	0.029
Below Grade Wall ^{b,m}	10/15/21 int + TB	0.042
Slab ^d 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:

☐ **1. 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.

☐ **2. 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.

☐ **3. Large Dwelling Unit: 4.5 credits**
Dwelling units exceeding 5000 square feet of conditioned floor area.

☐ **4. Additions less than 500 square feet: .5 credits**

Table R406.2 Summary

Option	Description	Credit(s)
1a	Efficient Building Envelope 1a	0.5
1b	Efficient Building Envelope 1b	1.0
1c	Efficient Building Envelope 1c	2.0
1d	Efficient Building Envelope 1d	0.5
2a	Air Leakage Control and Efficient Ventilation 2a	0.5
2b	Air Leakage Control and Efficient Ventilation 2b	1.0

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 February 1, 2021)

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:

• 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 ^a	0.0	
2	Heat pump ⁱ	1.0	
3	Electric resistance heat only - furnace or zonal	-1.0	
4	DHP with zonal electric resistance per option 3.4	na	
5	All other heating systems	-0.5	

Energy Options

Energy Options	Energy Credit Option Descriptions	Credits - select ONE energy option from each category ⁱ	User Notes
1.1	Efficient Building Envelope	0.5	
1.2	Efficient Building Envelope	1.0	
1.4	Efficient Building Envelope	1.0	
1.5	Efficient Building Envelope	1.5	
1.6	Efficient Building Envelope	2.0	
1.7	Efficient Building Envelope	0.5	
2.1	Air Leakage Control and Efficient Ventilation	1.0	
2.2	Air Leakage Control and Efficient Ventilation	1.5	
2.3	Air Leakage Control and Efficient Ventilation	2.0	
2.4	Air Leakage Control and Efficient Ventilation	2.5	
3.1*	High Efficiency HVAC	1.0	
3.3*	High Efficiency HVAC	1.0	
3.4	High Efficiency HVAC	2.0	
3.6*	High Efficiency HVAC	3.0	
4.1	High Efficiency HVAC Distribution System	0.5	
5.1*	Efficient Water Heating	0.5	
5.2	Efficient Water Heating	0.5	
5.3	Efficient Water Heating	1.0	
5.4	Efficient Water Heating	2.0	
5.5	Efficient Water Heating	2.5	
5.6	Efficient Water Heating	3.0	
6.1*	Renewable Electric Energy (3 credits max)	1.0	
7.1	Appliance Package	1.5	
Total Credits		0.0	CLEAR FORM

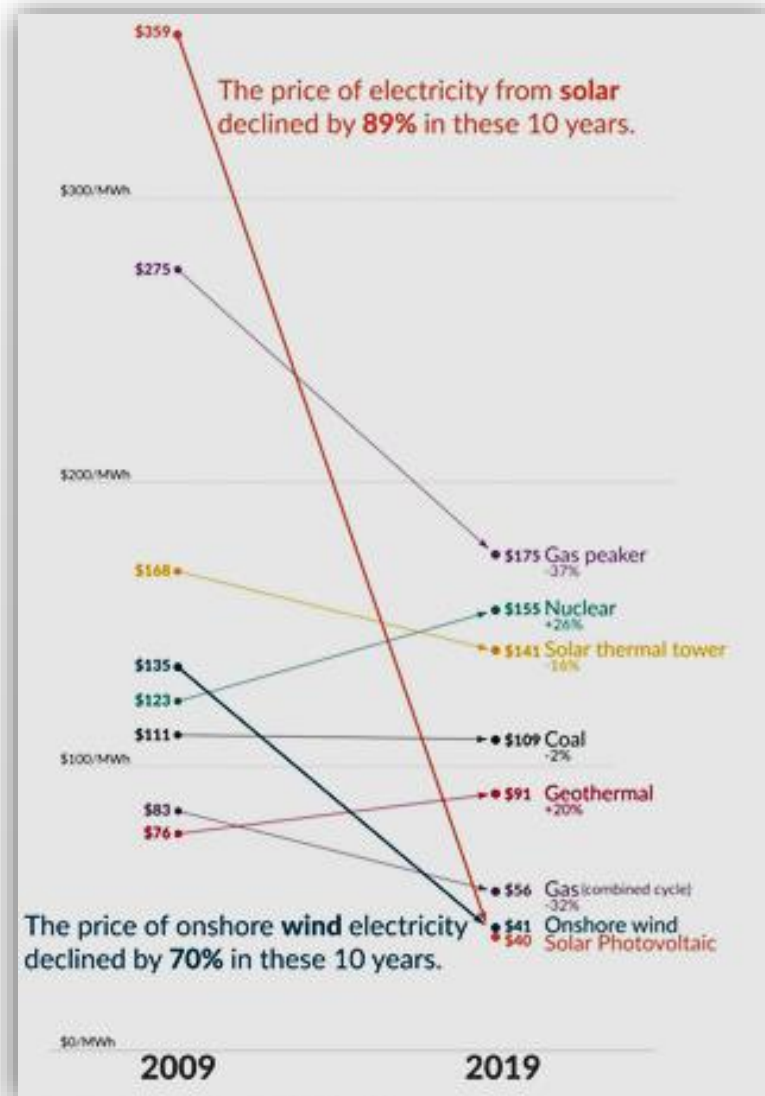
a. An alternative heating source sized at a maximum of 0.5 W/sf (equivalent) of heated floor area or 500 W, whichever is bigger, may be installed in the dwelling unit.
b. Equipment listed in Table C403.3.2(4) or C403.3.2(5).
c. Equipment listed in Table C403.3.2(1) or C403.3.2(2).
d. You cannot select 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.

**TABLE R406.2
FUEL NORMALIZATION CREDITS**

System Type	Description of Primary Heating Source	Credits	
		All Other	Group R-2
1	Combustion heating equipment meeting minimum federal efficiency standards for the equipment listed in Table C403.3.2(4) or C403.3.2(5)	0	0
2	For an initial heating system using a heat pump that meets federal standards for the equipment listed in Table C403.3.2(1)C or C403.3.2(2) or Air to water heat pump units that are configured to provide both heating and cooling and are rated in accordance with AHRI 550/590	1.0	1.0
3	For heating system based on electric resistance only (either forced air or Zonal)	-1.0	-1.0
4	For heating system based on electric resistance with a ductless mini-split heat pump system in accordance with Section R403.7.1 including the exception	0.5	N/A
5	All other heating systems	-1	-0.5

Fuel Normalization Credit – Challenge



SECTION R406 ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS

R406.1 Scope. This section establishes additional energy efficiency requirements for all new construction covered by this code, including additions subject to Section R502 and change of occupancy or use subject to Section R505 unless specifically exempted in Section R406. Credit from both Sections R406.2 and R406.3 are required.

R406.2 Carbon emission equalization. This section establishes a base equalization between fuels used to define the equivalent carbon emissions of the options specified. The permit shall define the base fuel selection to be used and the points specified in Table R406.2 shall be used to modify the requirements in Section R406.3. The sum of credits from Tables R406.2 and R406.3 shall meet the requirements of Section R406.3.

R406.3 Additional energy efficiency requirements. 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:

1. Small Dwelling Unit: 3.0 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 greater than 500 square feet of heated floor area but less than 1500 square feet.
2. Medium Dwelling Unit: 6.0 credits
All dwelling units that are not included in #1, #3 or #4.
3. Large Dwelling Unit: 7.0 credits
Dwelling units exceeding 5000 square feet of conditioned floor area.
4. Dwelling units serving R-2 occupancies: 4.5 credits
5. Additions less than or equal to 500 square feet: 1.5 credits

The drawings included with the building permit application shall identify which options have been selected and the point value of each option, regardless of whether separate mechanical, plumbing, electrical, or other permits are utilized for the project.

Energy Credits

1. Efficient Envelope Options

Only one option from Items 1.1 through 1.7 may be selected in this category.

Compliance with the conductive UA targets is demonstrated using Section R402.1.4, Total UA alternative, where

$[1 - (\text{Proposed UA} / \text{Target UA})] > \text{the required \% UA reduction}$

Energy Credits (cont.)

- 2. Air Leakage Control & Efficient Ventilation Options**
- 3. High-Efficiency HVAC Equipment Options**
- 4. High-Efficiency HVAC Distribution System Options**

Energy Credits (cont.)

5. Efficient Water Heating Options

Only one option from Items 5.2 through 5.6 may be selected in this category. Item 5.1 may be combined with any option.

6. Renewable Electric Energy Option

Up to 3 credits = 3kW PV power = 800-1,200 kWh/year/1kW power

7. Appliance Package Option

Energy Star refrigerator, dishwasher & vent-less dryer

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 February 1, 2021

Property address: _____

Builder/registered design professional name: _____

Builder/reg. design pro. signature: _____

Conditioned floor area: _____ ft² (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 area weighted U-value from Glazing Worksheet Average U- ____

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

System Type Number (1 to 5) _____ (Select one)
Energy Credits selected (1 to 7) _____
Fuel Normalization Credit _____ + Total Energy Credits _____ = Total Credits _____

Heating, Cooling and Domestic Hot Water

System	Type (Manufacturer and Model Number)	Efficiency
Heating		
Cooling		
DHW		
Drain water heat recovery		

Onsite Renewable Energy Electric Power System

System type _____ System design capacity _____ kW
Rated annual generation _____ kWh/yr

Dish washer _____
Refrigerator _____
Washer _____
Dryer _____
Gas fireplace / heater _____
Heating or Dehumidifier _____

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

All ductwork and air handler in conditioned space? (See Option 4.2) Y or N
All ductwork in unconditioned spaces buried and tested at 3% total leakage, and air handler in conditioned space? (See Option 4.1.) Y or N
All ductwork & air handler outside conditioned space insulated to minimum R-8? Y or N
Air handler present at duct leakage test? (Total leakage 4% if yes, 3% if no) Y or N
HVAC leakage to outside test conducted at final? 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)

Dwelling unit leakage test calculated design target: _____ ACH @ 50 Pa
Dwelling unit leakage test, measured results: _____ ACH @ 50 Pa
Whole Building Leakage test (R2 corridor only) design target: _____ CFM/sf @ 50 Pa
Whole Building Leakage test (R2 corridor only) measured: _____ CFM/sf @ 50 Pa

Do building leakage tests include GPS and time stamp verification? Y or N

Whole House Ventilation System Measured Flow Rates (M1505.4 IRC-WA) Circle one

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

Whole House Ventilation System Type: (Circle one)
(1) Whole house exhaust fan, location _____
(2) Balanced HRV/ ERV, location _____
For R2 low-rise, serves more than one unit? Y or N
(3) Supply or HRV WHV integral to the air handler. Describe system control sequence of operations or reference to design submittal: _____

Specify run-time: _____ hours per day _____ CFM

Onsite Renewable Energy Electric Power System

Enter information about renewable energy electric power systems installed (option 6).

Onsite Renewable Energy Electric Power System

System type: _____ System design capacity _____ kW
Rated annual generation _____ kWh/yr

Specify the system type (e.g., wind or solar PV) and provide the system design capacity in kW. Also, enter the rated annual generation in kWh per year. For solar electric systems, confirm the rated annual generation and system capacity with the calculation submitted as part of the plan review using NREL's pvWatts solar calculator available at <https://pvwatts.nrel.gov/> or an approved alternate. For guidance on determining the rated annual generation of wind systems, refer to Option 6.1 in Table R406.3.

Prescriptive Checklist for 2018 WSEC-R

- Chapter 51-11R WAC
- State Building Code Council Adoption and Amendment of the 2018 International Energy Conservation Code, Residential Provisions
- New checklist and other tools and links available on 2018 WSEC-R web page: www.energycode.wsu.edu

All Electric Heat Pump

1,500 to 5,000 sf homes (6.0 credits)

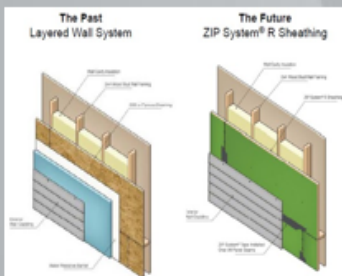


Opt	Description – Feb. 1, 2021	Pts
3.2 (a)	HSPF 9.5 centrally ducted heat pump	1.0
4.2	All ducts and furnace inside the conditioned space	1.0
2.1	3 ACH ₅₀ , Energy Star 0.3 cfm/sf	0.5
1.3	R-38 floors (R10 under slab) and U-0.28 windows and door average	0.5
5.5	Heat pump water heater NEEA Tier III	2.0
Heat HP	Fuel normalization heat pump credit	1.0
Total		6.0



Heat Pump & Gas DHW

1,500 to 5,000 sf homes (6.0 credits)

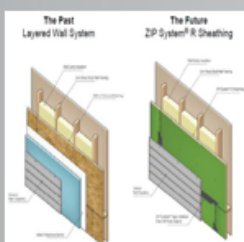


Opt	Description – Feb. 1, 2021	Pts
3.5a	11.0 HSPF centrally ducted heat pump	1.5
4.2	All ducts and furnace inside conditioned space	1.0
2.1	3 ACH ₅₀ , Energy Star 0.3 cfm/sf	0.5
1.4	U-0.25 windows, R38 crawl/R10 under slab, R21 with R4 CI on exterior walls	1.0
5b	Gas water heater ≥ 0.91 UEF	1.0
Heat HP	Fuel normalization heat pump credit	1.0
Total		6.0



Gas Heat + HPWH

1,500 to 5,000 sf homes (6.0 credits)



Opt	Description – Feb. 1, 2021	Pts
3.1a	95% AFUE gas furnace	1.0
4.2	All ducts and furnace inside conditioned space	1.0
2.1	3 ACH ₅₀ , Energy Star 0.3 cfm/sf	0.5
1.4	U-0.25 windows, R38 crawl/R10 under slab, R21 with R4 CI exterior walls	1.0
7.1	Appliance Credit: Energy Star dishwasher, washer, refrigerator (if provided) and vent-less dryer (CEF 5.2)	0.5
5b	Heat pump water heater NEEA Tier III	2.0
	Total	6.0

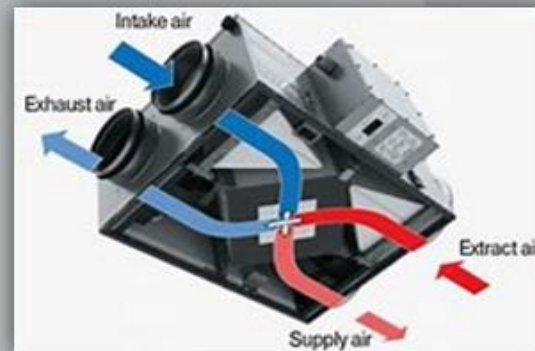


DHP + Electric Heat

Multifamily – Low-Rise R2



Opt	Description – Feb. 1, 2021	Pts
3.4	DHP with electric resistance	2.0
1.2	Triple pane window U=0.22	1.0
2.1	0.25 cfm50/sf unit sf (or 2 ACH ₅₀) + 65% HRV/ERV – tested!!!	1.5
Total		4.5



HSPF 10 VRF-HP

Multifamily – Low-Rise R2

Opt	Description – Feb. 1, 2021	Pts
2	Fuel normalization – HP	1.0
3.6	All HSPF 10 (ducted cassette)	3.0
2.2	0.25 cfm 50/sf unit sf (or 2 ACH ₅₀) + 65% HRV/ERV – tested!!!	1.5
	Total	5.5



Overview – WA IRC and IMC Ventilation Changes

Single Family:

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

R2 – Low-Rise Multifamily:

- IMC-WA does **not** allow 62.2 rates
- IMC-WA requires balanced systems
- IMC-WA does **not** allow "exhaust only"
- Most will have balanced HRV/ERV (PTAC/HP?)
- Compartmentalization (leakage to outside and other)

Building Science

Top 10 Best Practices to Avoid Mold

1. Vapor retarders limit moisture condensation
2. Warm surfaces limit moisture condensation
3. R4-6 Pipe and R8-10 HVAC duct insulation limits moisture condensation
4. Water Resistive Barriers (WRB) limit wind and rain
5. “Build Tight & Ventilate Right” in modern homes – Why?

Building Science

Top 10 Best Practices to Avoid Mold


(cont.)

6. Use a blower door to reduce envelope leakage
7. Locate ducts and HVAC within conditioned space
8. Use a duct blaster to reduce duct leakage
9. Design, install, commission and O&M to ventilate right
10. Use a systems approach for moisture management

HERs & PTCS HVAC Training

Technical Assistance and Testing Resources

Duct Testers

This  [list of duct testers](#) includes individuals who attended the one-day duct testing training offered by the WSU Energy Program or completed the online training, and meet the minimum requirements to test ducts for the WSEC.

Technicians who can verify that they have successfully completed duct testing training provided by the Northwest ENERGY STAR Program or Performance Tested Comfort Systems (PTCS) may also be qualified to test ducts under the WSEC.

[Database of PTCS Technicians](#)

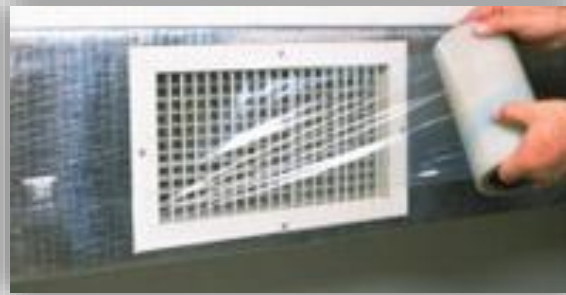
[PTCS Training](#)

Home Energy Raters (HERS)

This list provides [contact information for certified home energy raters](#). For more details, contact us at energycode@energy.wsu.edu.

Duct Testing Equipment

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



fan & rings

Duct Leakage to the Exterior



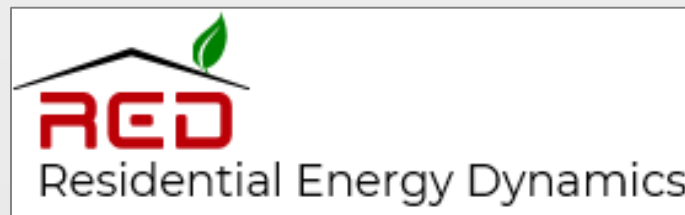
and



Yields duct leakage CFM to the exterior

RETROTEC, RED & TEC

- 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/>



Resources for Standard & Testing



Duct Leakage Affidavit (New Construction)

P Permit #: _____

House address or lot number: _____

City: _____ Zip: _____

Cond. Floor Area (ft²): _____ Source (circle one): Plans Estimated Measured

☐ Duct tightness testing is not required. The total leakage test is not required for ducts and air handlers located entirely within the building thermal envelope. Ducts located in crawl spaces do not qualify for this exception.

Air Handler in conditioned space? ☐ yes ☐ no Air Handler present during test? ☐ yes ☐ no

Circle Test Method: Leakage to Outside Total Leakage

Maximum duct leakage:
 Post Construction, total duct leakage: (floor area x .04) = _____ CFM@25 Pa
 Post Construction, leakage to outdoors: (floor area x .04) = _____ CFM@25 Pa
 Rough-In, total duct leakage with air handler installed: (floor area x .04) = _____ CFM@25 Pa
 Rough-In, total duct leakage with air handler not installed: (floor area x .03) = _____ CFM@25 Pa

Test Result: _____ CFM@25Pa

Ring (circle one if applicable): Open 1 2 3

Duct Tester Location: _____ Pressure Tap Location: _____

I certify that these duct leakage rates are accurate and determined using standard duct testing protocol.

Company Name: _____ Technician: _____

Technician Signature: _____

Date: _____

Phone Number: _____

Duct Testing Affidavit

Duct Testing Calculator (New Construction)

House address or lot #: _____

Conditioned Floor Area: _____

Duct tester location: _____

Pressure tap location: _____

Ring (if applicable): Open ☐ 1 ☐ 2 ☐ 3 ☐

At Rough-In or Post Construction

Test Method	Standard ¹	Calculated Target	Test ¹ CFM ₂₅
Air Handler Present (Leakage to Exterior or Total Leakage)	≤ 4 CFM ₂₅ per 100 sf of CFA		
Air Handler <u>not</u> Present (Leakage to Exterior or Total Leakage)	≤ 3 CFM ₂₅ per 100 sf of CFA		

1. Test CFM₂₅ must be equal to or less than the calculated target.

Air Leakage testing Calculator (Blower Door Test)

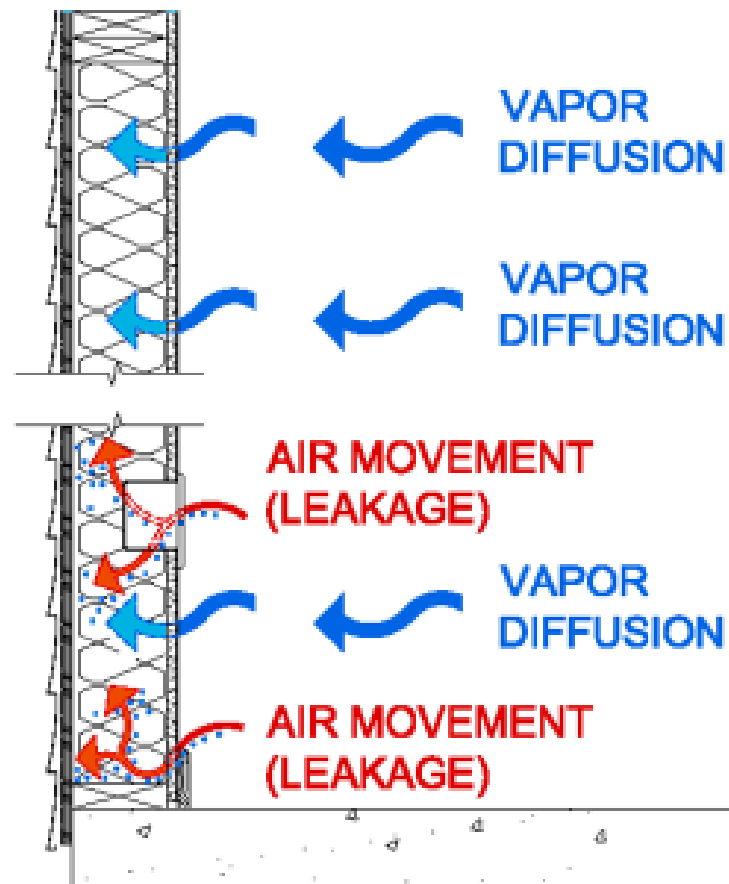
Conditioned Floor Area:	Calculated Volume (cubic feet)
Ceiling Height (ft)	0
Standard	Tested CFM ₅₀
≤5.0 ACH ₅₀ (CFM ₅₀ X 60 ÷ conditioned Volume)	Calculated Test Result (ACH ₅₀)

Glossary

- Rough-In:** After installation of the complete air distribution system but before installation of insulation and sheet rock. Allows for access to all duct seams and connections for re-evaluation of seal integrity if standard is not met in initial test.
- Post Construction:** At or near final inspection. The home must be complete enough to pressurize the home to 25 pa.
- Total Leakage:** Aggregation of the entire systems duct leakage in a duct test.
- Leakage to Exterior:** Aggregation of all duct system leaks to the exterior of the CFA in a duct test.
- Pascal (pa):** Unit of pressure
- CFA:** Conditioned floor area in square feet
- CFM₂₅:** Cubic feet per minute of air leakage at 25 pascals of pressure
- CFM₅₀:** Cubic feet per minute of air leakage at 50 pascals of pressure
- Conditioned Volume:** Volume of conditioned space (CFA X ceiling height)
- ACH₅₀:** Air changes per hour at 50 pascals of pressure

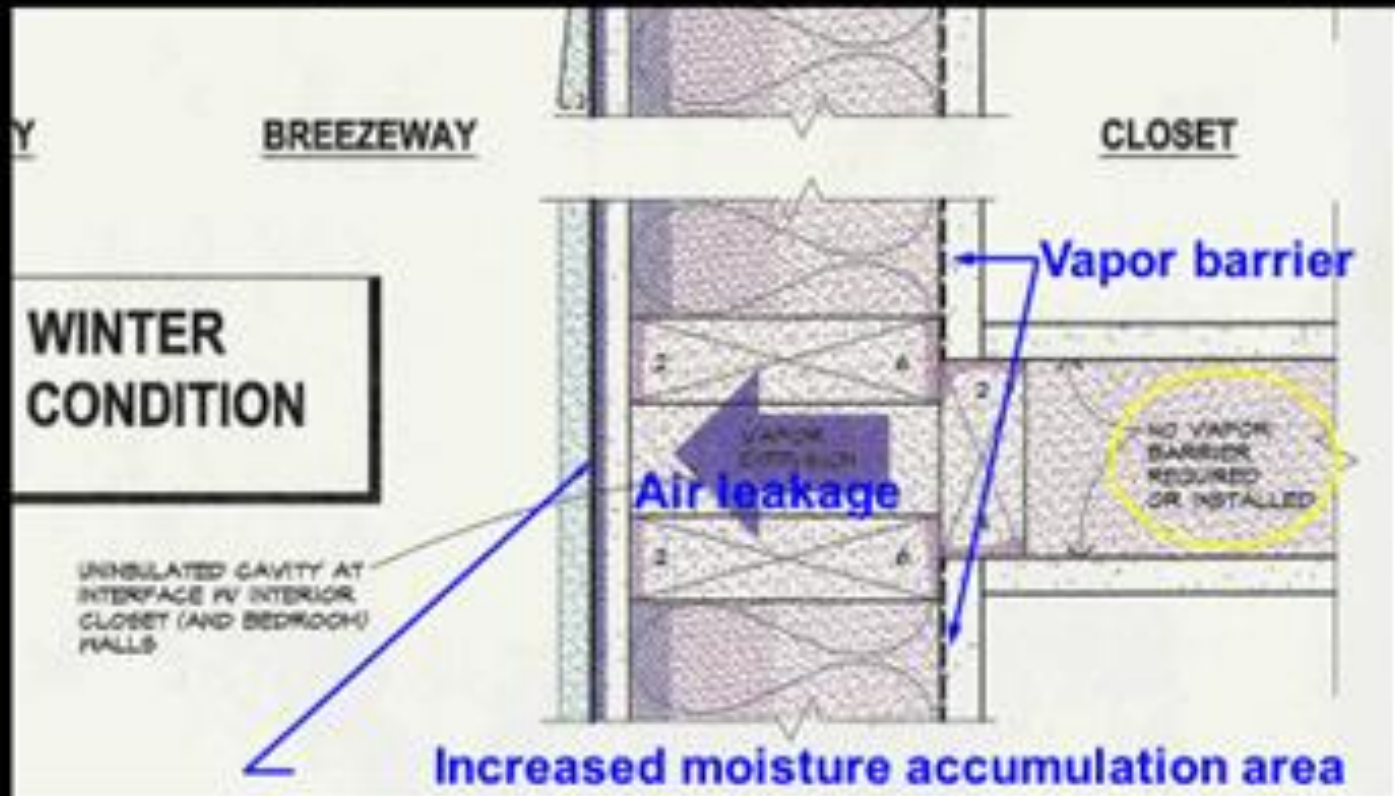
Test Result Calculator

Wintertime vapor movement in walls



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



Energy Code Support in Washington

Residential

WSU Energy Program

360-956-2042

energycode@energy.wsu.edu

Non-residential

Evergreen Technology Consulting

360-539-5300

com.techsupport@waenergycodes.com

Spend an hour on our web page!

The screenshot shows a web browser window displaying the 'WSU Energy Program Building Efficiency' page. The page has a dark blue header with the title. Below the header, there's a section for '2018 Washington State Energy Code' with a brief introduction and a bulleted list of requirements for permits submitted on or after February 1, 2021. It mentions the 2018 WSEC-R and the 2015 WSEC-R. A sidebar on the right contains links for '2018 WSEC-R Resources', 'Training Opportunities', 'Permit Application Documents', 'Tech Assistance & Testing Resources', and 'Additional Resources'. Below the sidebar, there's a section for 'Relationship with SBCC' explaining the team's role. The main content area also includes a section for '2018 WSEC-R Training Opportunities' and 'Questions About Commercial Portions of the WSEC?' with contact information for Evergreen Technology Consulting. At the bottom, there's a link for 'Permit Application Documents' and a small icon for '2018 WSEC-Commercial'.

WSU Energy Program
Building Efficiency

2018 Washington State Energy Code

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* February 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* February 1, 2021, it must meet requirements of [2015 WSEC-R](#).

For assistance and updates:

- Email energycode@energy.wsu.edu
- Call the WSEC Residential Code Hotline at 360-956-2042
- **Join our distribution list at 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.

Questions About Commercial Portions of the WSEC?

Contact [Evergreen Technology Consulting](#) at 360-539-5300 or email com.techsupport@WAenergycodes.com. If your project is a mixed use building, please contact Evergreen prior to working on residential low-rise R2 units.

[2018 WSEC-Commercial](#)

Permit Application Documents

2018 WSEC-R Resources

- [Training Opportunities](#)
- [Permit Application Documents](#)
- [Tech Assistance & Testing Resources](#)
- [Additional Resources](#)

Relationship with SBCC

The WSEC-R team is not an affiliate of, nor do we speak for, the Washington State Building Code Council (SBCC). Official opinions of WSEC intent are made only by the SBCC in response to official inquiries submitted to SBCC by authorities having jurisdiction (AHJ). While we try to stay aligned with SBCC, the technical support we provide is advisory only and non-binding on AHJ, builders, designers, and building trades personnel who build or remodel residential structures. Please contact the [State Building Code Council](#) to discuss concerns about the new code.



Thank You!

Send questions and comments to:

Michael Lubliner

360-956-2042

energycode@energy.wsu.edu

Email us to join our update list!



Energy Program

WASHINGTON STATE UNIVERSITY