2015 Amendments to the Washington State Energy Code

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Energy Code Support in WA State

Residential

- Washington State University Energy Program
- 360-956-2042
- energycode@energy.wsu.edu
- www.energy.wsu.edu/code
- Gary Nordeen, Luke Howard, Tanya Beavers

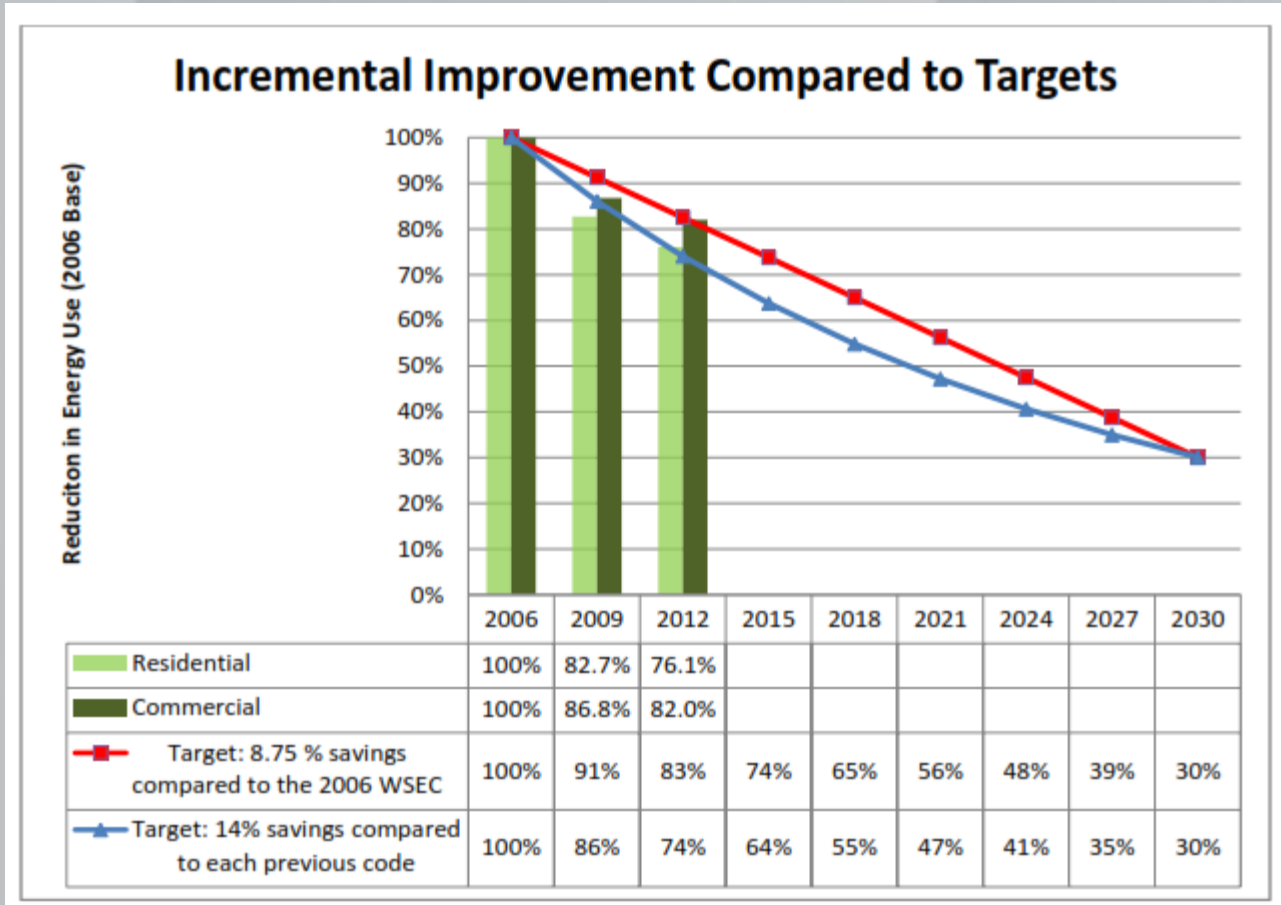
Non-residential

- Northwest Energy Efficiency Council
- Lisa Rosenow
- 206-624-0283
- wsec@putnamprice.com
- www.neec.net

Model Codes (ICC) are adopted on a 3 year cycle

- Code change proposals received by SBCC from Jan 1 to March 1
- Tech Advisory Groups review proposals and forward them to SBCC
- SBCC puts together model codes integrated with proposed changes
- Public hearings in Sept and Oct.
- Council votes in November

Where are we at?



	2006	2009	2012	2015	2018	2021	2024	2027	2030
Residential	100%	82.7%	76.1%						
Commercial	100%	86.8%	82.0%						
Target: 8.75 % savings compared to the 2006 WSEC	100%	91%	83%	74%	65%	56%	48%	39%	30%
Target: 14% savings compared to each previous code	100%	86%	74%	64%	55%	47%	41%	35%	30%

R101.2 Scope

Residential buildings and their associated:

- Sites
- Systems
- Equipment
- Includes R-2, R-3 and R-4 Three stories or less above grade

This code shall be the maximum and minimum energy code for residential construction in each town, city and county.

R2, R3 and R4 Defined

- **R-2. Apartments, Convents, Sororities, etc.**
  Residential occupancies containing *sleeping units* or more than two *dwelling units* where the occupants are primarily permanent in nature.

- **R-3. Detached Single-Family and Duplex, Townhomes**
  Residential occupancies where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4

- **R-4. Assisted Living, Rehab Centers, Halfway Houses, etc.**
  Buildings for more than five but not more than 16 persons, excluding staff, who reside on a 24-hour basis in a supervised residential environment and receive *custodial care*.

CHAPTER 1 [RE]
SCOPE AND ADMINISTRATION

- All code sections relating to additions, alterations, mechanical systems have been moved to Chapter 5 (new)

- I don’t know why

R303.1.3 Fenestration product rating.

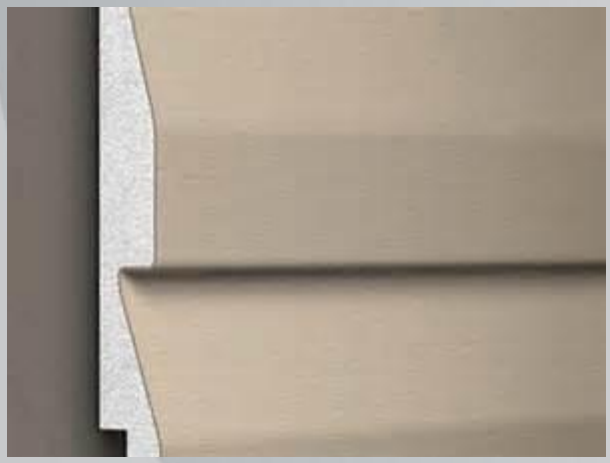
- *U*-factors of fenestration products (windows, doors and skylights) shall be determined in accordance with NFRC 100.
- **Exception:** Where required, garage door U-factors shall be determined in accordance with either NFRC 100 or ANSI/DASMA 105 .
- U-factors shall be determined by an accredited, independent laboratory, and *labeled* and certified by the manufacturer.

R303.1.4 Insulation product rating

Really?

"The double-sided foam core is around 8 Millimeters thick and has an actual R-Value of around 3 conservatively."

- The R-value of insulation shall be determined in accordance with the FTC R-value rule (C.F.R. Title 16, Part 460).
  - **R303.1.4.1 Insulated siding.** The R-value of insulated siding shall be determined in accordance with ASTM C1363.



R401.3 Compliance

Projects shall comply with Sections identified as "mandatory" and with either:

- Prescriptive
- Total UA Alternative (R402.1.4)
- Simulated Performance Alternative (R405)

In addition, projects shall comply with Section R406

Note: Energy Rating Index (ERI/HERS Index) is not an approved compliance path in WA State

R401.2 Tools for Compliance

- Prescriptive – WSU form
- Total UA Alternative – WSU form *
- Performance Approach – as required in R405

Check WSU's Energy Code webpage for compliance tool information as it becomes available:
www.energy.wsu.edu/code

*REScheck no longer available in WA State

Prescriptive Form

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 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,e]	n/a	n/a
Ceiling[k]	49[i]	0.026
Wood Frame Wall[g,m,n]	21 int	0.056
Mass Wall R-Value[j]	21[21h]	0.056
Floor	30[g]	0.029
Below Grade Wall[c,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	☐		
2c	Air Leakage Control and Efficient Ventilation 2c	1.5	☐		
3a	High Efficiency HVAC 3a	1.0	☐		
3b	High Efficiency HVAC 3b	1.0	☐		
3c	High Efficiency HVAC 3c	1.5	☐		
3d	High Efficiency HVAC 3d	1.0	☐		
4	High Efficiency HVAC Distribution System	1.0	☐		
5a	Efficient Water Heating 5a	0.5	☐		
5b	Efficient Water Heating 5b	1.0	☐		
5c	Efficient Water Heating 5c	1.5	☐		
5d	Efficient Water Heating 5d	0.5	☐		
6	Renewable Electric Energy	0.5		*1200 kwh	0.0
Total Credits					**0.00**

*Please refer to Table R406.2 for complete option descriptions

TABLE R402.1.1
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	5 AND MARINE 4
FENESTRATION U-FACTOR[b]	0.30
SKYLIGHT[b] U-FACTOR	0.50
GLAZED FENESTRATION SHGC[b, e]	NR
CEILING R-VALUE[k]	49
WOOD FRAME WALL[g, m,n] R-VALUE	21 int
Mass Wall R-Value[i]	21/21[h]
FLOOR R-VALUE	30[g]
BELOW-GRADE[c,m] WALL R-VALUE	10/15/21 int + TB
SLAB[d] R-VALUE & DEPTH	10, 2 ft

No change

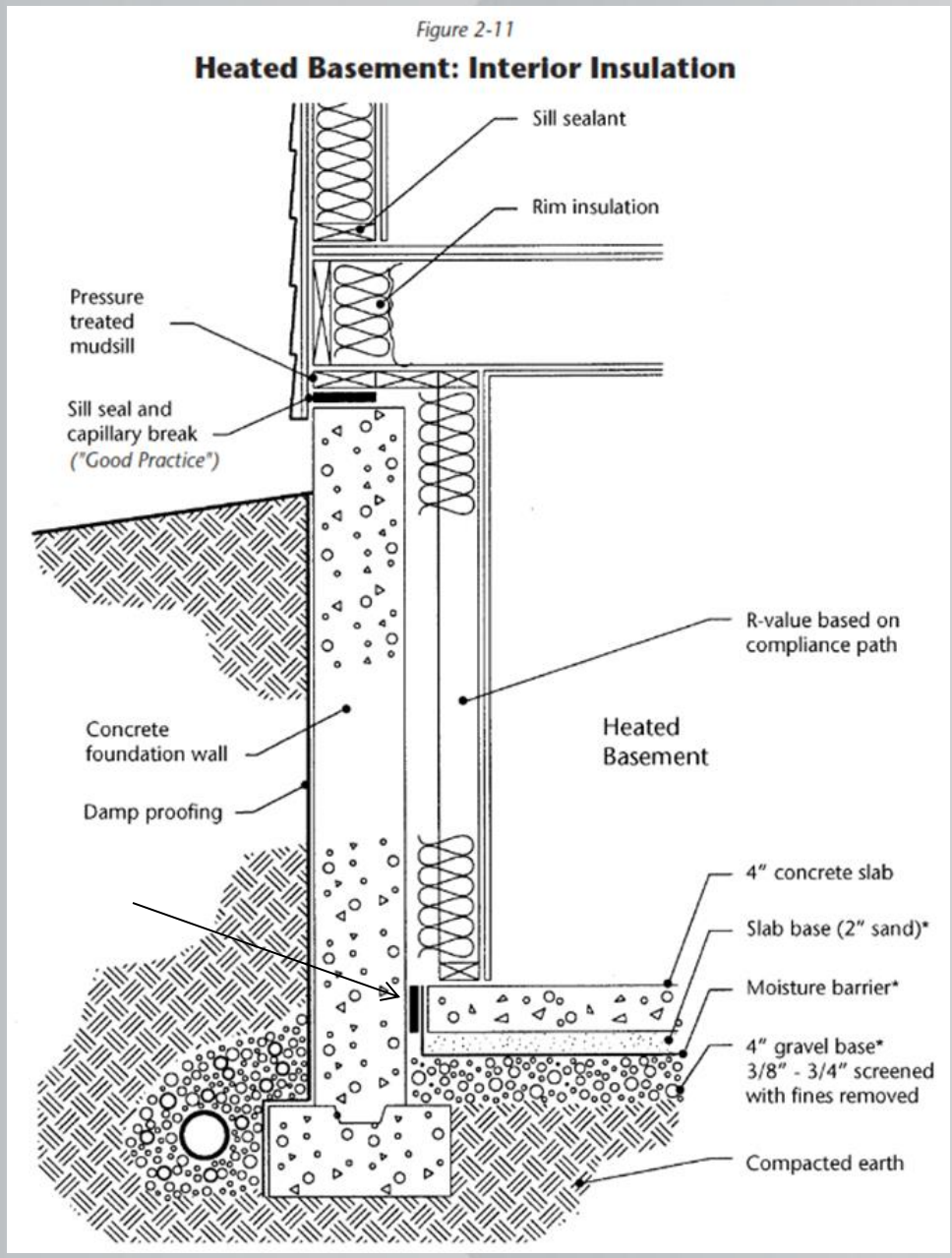
Footnotes

BELOW-GRADE[c,m] WALL R-VALUE	10/15/21 int + TB

- [c] "10/15/21 +TB" means R-10 continuous insulation on the exterior of the wall, or R-15 on the continuous insulation on the interior of the wall, or R-21 cavity insulation plus a thermal break between the slab and the basement wall at the interior of the basement wall. "10/15/21 +TB" shall be permitted to be met with R-13 cavity insulation on the interior of the basement wall plus R-5 continuous insulation on the interior or exterior of the wall. "TB" means thermal break between floor slab and basement wall.

- R-21 + TB at basement to slab joint

- R-5 thermal break (TB)

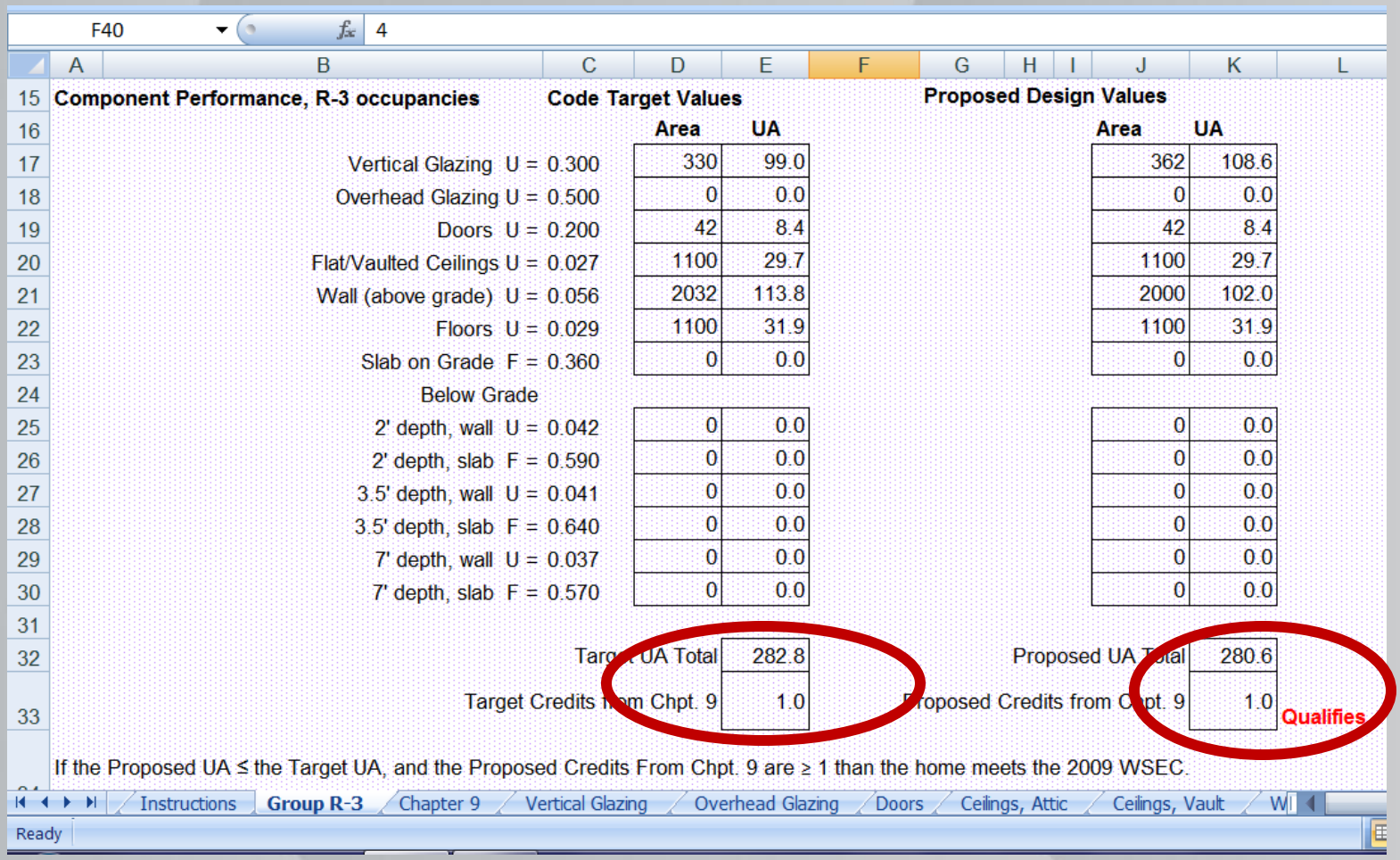


R402.1.4 Total UA Alternative

- Total UA Alternative is formerly known as Component Performance (2009 WSEC).
- The U-factors for typical construction assemblies are included in Appendix A. Appendix A contains default U-factors from 2009 WSEC Chapter 10.
- Language was added with a 15% maximum glazing area for the target house when using the “Total UA Alternative” (Component Performance). 15% is the glazing percentage in RCW 19.27A.

UA Alternative

Building Envelope Trade-Off



F40 | 4

	A	B	C	D	E	F	G	H	I	J	K	L
15	**Component Performance, R-3 occupancies**		**Code Target Values**				**Proposed Design Values**					
16				**Area**	**UA**					**Area**	**UA**	
17		Vertical Glazing U = 0.300		330	99.0					362	108.6	
18		Overhead Glazing U = 0.500		0	0.0					0	0.0	
19		Doors U = 0.200		42	8.4					42	8.4	
20		Flat/Vaulted Ceilings U = 0.027		1100	29.7					1100	29.7	
21		Wall (above grade) U = 0.056		2032	113.8					2000	102.0	
22		Floors U = 0.029		1100	31.9					1100	31.9	
23		Slab on Grade F = 0.360		0	0.0					0	0.0	
24		Below Grade										
25		2' depth, wall U = 0.042		0	0.0					0	0.0	
26		2' depth, slab F = 0.590		0	0.0					0	0.0	
27		3.5' depth, wall U = 0.041		0	0.0					0	0.0	
28		3.5' depth, slab F = 0.640		0	0.0					0	0.0	
29		7' depth, wall U = 0.037		0	0.0					0	0.0	
30		7' depth, slab F = 0.570		0	0.0					0	0.0	
31												
32			Target UA Total		282.8				Proposed UA Total		280.6	
33			Target Credits from Chpt. 9		1.0				Proposed Credits from Chpt. 9		1.0	Qualifies

If the Proposed UA ≤ the Target UA, and the Proposed Credits From Chpt. 9 are ≥ 1 than the home meets the 2009 WSEC.

Instructions | Group R-3 | Chapter 9 | Vertical Glazing | Overhead Glazing | Doors | Ceilings, Attic | Ceilings, Vault | W

Ready

R303.1.3 Fenestration product rating.

- Owner-built, nonoperable wood frame window consisting of a double pane unit with low-*e*, ½-inch airspace with argon fill.

Below Grade Wall Insulation

- Exterior Insulation
  - R-10 Continuous

or

- Interior Insulation
  - R-15 Continuous

or

R-21 Cavity
(allowed but not recommended)

R-5 Foam

Wall vapor retarders below grade are <u>not</u> recommended

R702.7 Vapor retarders. Class I or II vapor retarders are required on the interior side of frame walls in Climate Zones 5, 6, 7, 8 and Marine 4.

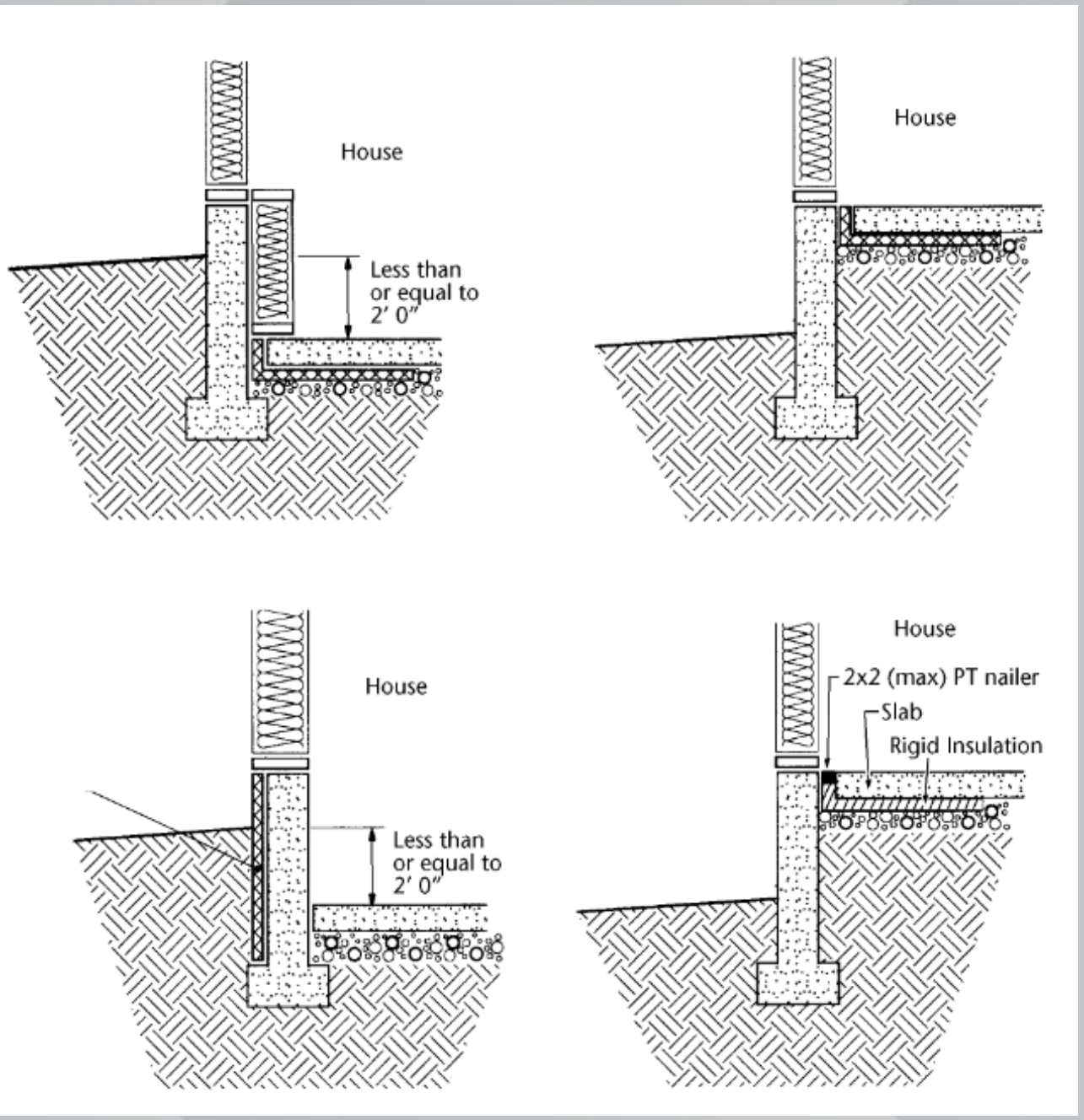
Exceptions:

1. Basement walls.
2. Below grade portion of any wall.
3. Construction where moisture or its freezing will not damage the materials.

2012 INTERNATIONAL RESIDENTIAL CODE®

[d] R-10 continuous insulation is required under heated slab on grade floors. See R402.2.9.1.

The entire area of a radiant slab shall be thermally isolated from the soil with a minimum of R-10 insulation.


House
Less than
or equal to
2' 0"
House
House
Less than
or equal to
2' 0"
House
2x2 (max) PT nailer
Slab
Rigid Insulation

[e] There are no SHGC requirements in the Marine Zone.

CLIMATE ZONE	5 AND MARINE 4
FENESTRATION U-FACTOR[b]	0.30
SKYLIGHT[b] U-FACTOR	0.50
GLAZED FENESTRATION SHGC[b, e]	NR

[k] For single rafter- or joist-vaulted ceilings, the insulation may be reduced to R-38.

TABLE A102.1
DEFAULT U-FACTORS FOR CEILINGS

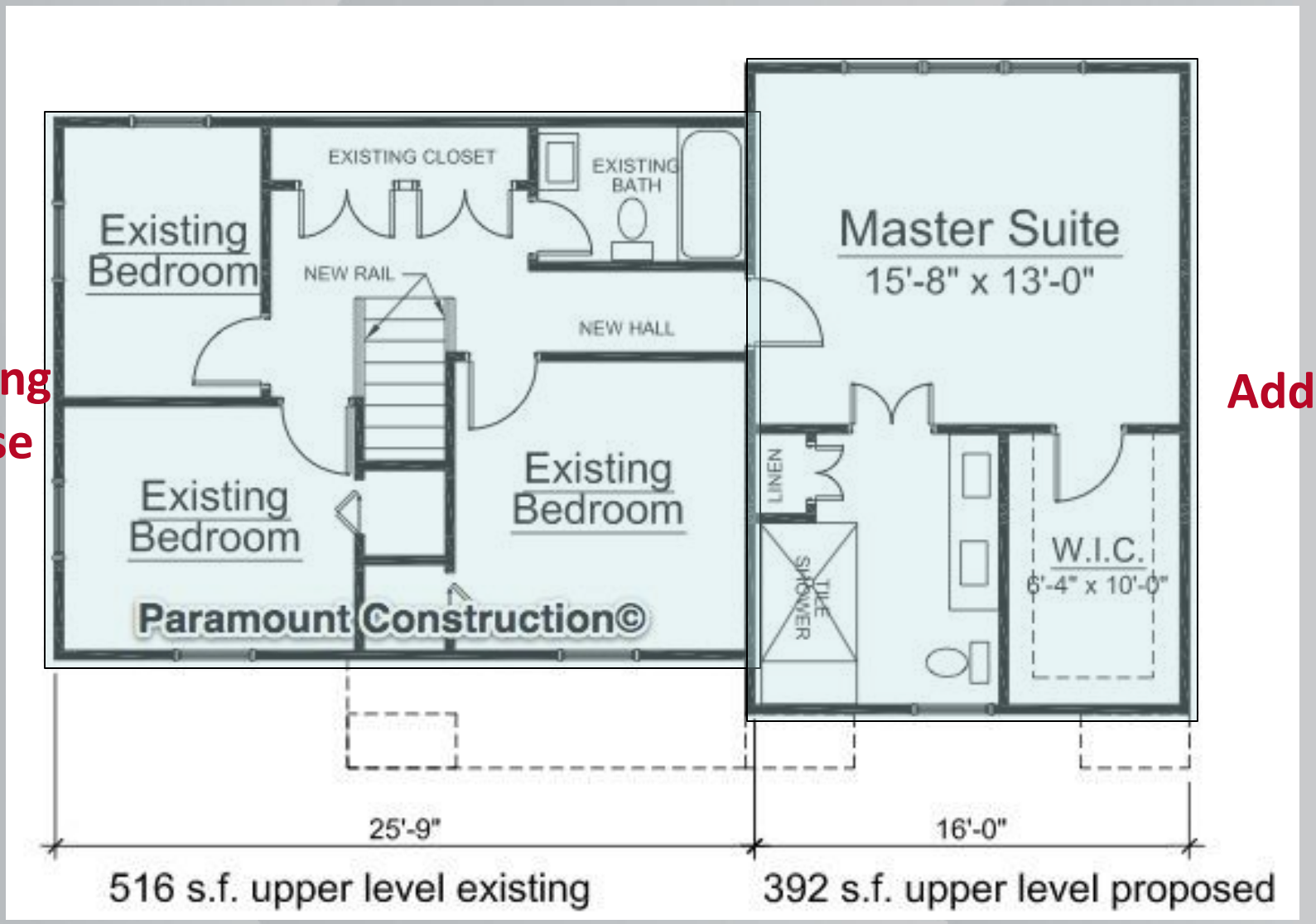
	Standard Frame	Advanced Frame
Ceilings Below Vented Attics		
Flat	**Baffled**	
R-19	0.049	0.047
R-30	0.036	0.032
R-38	0.031	0.026
R-49	0.027	0.026
R-60	0.025	0.017
Scissors Truss		
R-30 (4/12 roof pitch)	0.043	
R-38 (4/12 roof pitch)	0.040	
R-49 (4/12 roof pitch)	0.038	
R-30 (5/12 roof pitch)	0.039	
R-38 (5/12 roof pitch)	0.035	
R-49 (5/12 roof pitch)	0.032	
Vaulted Ceilings	**16" O.C.**	
Vented		
R-19 2x10 joist	0.049	
R-30 2x12 joist	0.034	
R-38 2x14 joist	0.027	
Unvented		
R-30 2x10 joist	0.034	
R-38 2x12 joist	0.029	
R-21 + R-21 2x12 joist	0.026	
Roof Deck	**4x Beams: 48" O.C.**	

Air Leakage Testing Exceptions

1. Additions less than 500 square feet of conditioned floor area.
2. Additions tested with the existing home having a combined maximum air leakage rate of 7 air changes per hour. To qualify for this exception, the date of construction of the existing house must be prior to the 2009 Washington State Energy Code.

Addition + existing house = 7.0 ACH

Existing house

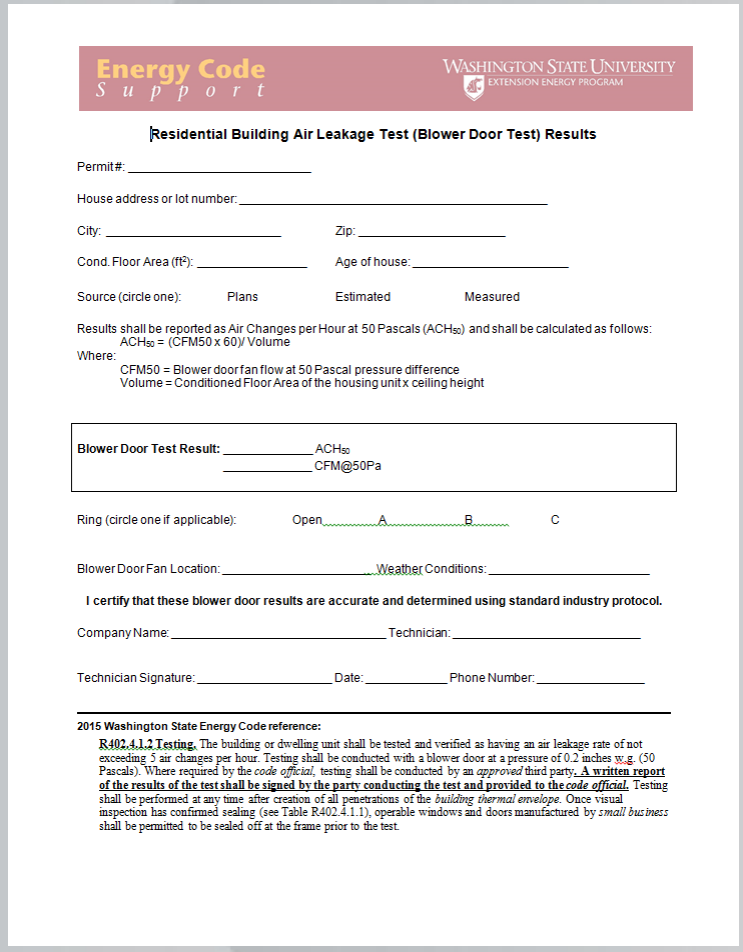


Addition

Addition only = 5.0 ACH

Air Leakage Testing

Where required by the *code official*, testing shall be conducted by an *approved* third party. A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*.



Energy Code Support

Washington State University Extension Energy Program

Residential Building Air Leakage Test (Blower Door Test) Results

Permit#: _____

House address or lot number: _____

City: _____ Zip: _____

Cond. Floor Area (ft²): _____ Age of house: _____

Source (circle one): Plans Estimated Measured

Results shall be reported as Air Changes per Hour at 50 Pascals (ACH_{50}) and shall be calculated as follows:
ACH_{50} = (CFM50 x 60)/ Volume
Where:
CFM50 = Blower door fan flow at 50 Pascal pressure difference
Volume = Conditioned Floor Area of the housing unit x ceiling height

Blower Door Test Result: _____ ACH_{50}
_____ CFM@50Pa

Ring (circle one if applicable): Open A B C

Blower Door Fan Location: _____ Weather Conditions: _____

I certify that these blower door results are accurate and determined using standard industry protocol.

Company Name: _____ Technician: _____

Technician Signature: _____ Date: _____ Phone Number: _____

2015 Washington State Energy Code reference:

R402.4.1.2 Testing. The building or dwelling unit shall be tested and verified as having an air leakage rate of not exceeding 5 air changes per hour. Testing shall be conducted with a blower door at a pressure of 0.2 inches w.g. (50 Pascals). Where required by the *code official*, testing shall be conducted by an *approved* third party. **A written report of the results of the test shall be signed by the party conducting the test and provided to the *code official*.** Testing shall be performed at any time after creation of all penetrations of the *building thermal envelope*. Once visual inspection has confirmed sealing (see Table R402.4.1.1), operable windows and doors manufactured by *small business* shall be permitted to be sealed off at the frame prior to the test.

We have no idea how this stuff works

Combustion Air (R402.4.4)

- Mechanical rooms with outside combustion air are outside the building thermal envelope and shall be insulated, sealed and have a door meeting the prescriptive requirements.

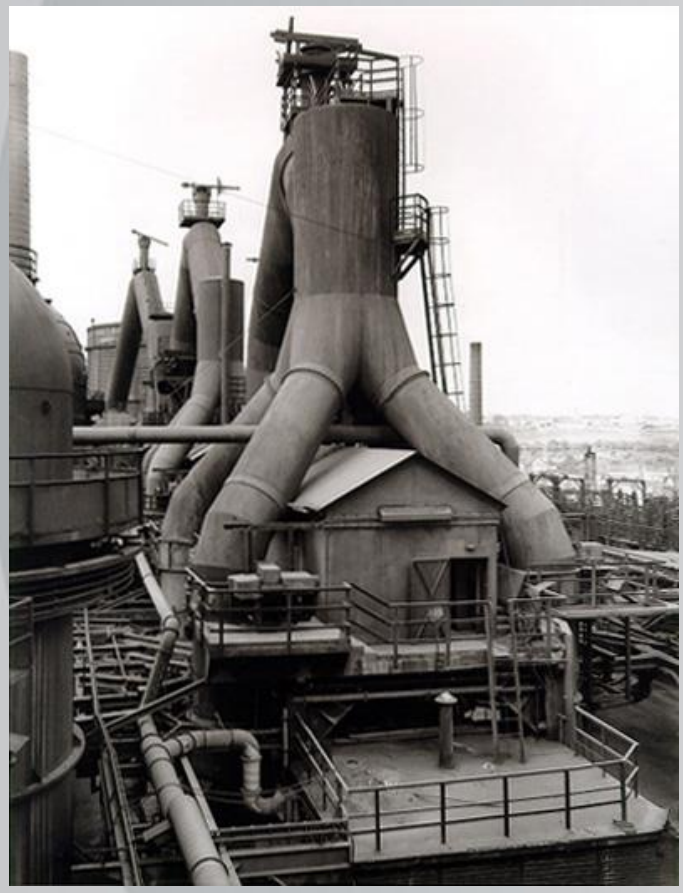
- Combustion air ducts located inside the conditioned space shall be insulated to R-8

Mechanical Piping Insulation

- Mechanical system piping capable of carrying fluids above 105F (41C) or below 55F (13C) shall be insulated to a minimum of R-6.
- **Exception**: Up to 200 feet of hydronic system piping installed within the conditioned space may be insulated with a minimum of ½-inch insulation.

Heating System Sizing

- The output capacity of heating and cooling equipment shall not be greater than that of the smallest available equipment size that exceeds the loads calculated, including allowable oversizing limits.



R403.3.1 Insulation (Prescriptive)

Ducts outside the building thermal envelope shall be insulated to a minimum of R-8.

Ducts within a concrete slab or in the ground shall be insulation to **R-10** with insulation designed to be used below grade.

2” extruded foam

Duct Testing (R403.3.3)

Duct testing is not required when ducts and air handlers are located entirely within the building thermal envelope.

- A maximum of 10 linear feet of return ducts and 5 linear feet of supply ducts may be located outside the conditioned space and still qualify for this exception to testing.

R403.5.4 Drain water heat recovery units.

Drain water heat recovery units shall comply with CSA 55.2. Drain water heat recovery units shall be in accordance with CSA 55.1.

R403.7.1 Electric resistance zone heated units.

All detached one- and two-family dwellings and multiple single-family dwellings (townhouses) up to three stories in height above grade plane using electric zonal heating as the primary heat source shall install an inverter-driven ductless mini-split heat pump in the largest zone in the dwelling.*

*1.0 credits allowed from options package 3d

Additional Energy Credits Table 406.2

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

- This includes multifamily 3-stories or less

Additional Energy Credits

Small Dwelling Unit

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.

- *This includes multifamily 3-stories or less*

1.5 Credits

Additional Energy Credits

Medium Dwelling Units

- All dwelling units that are not included in #1 or #3.
- **Exception:** Dwelling units serving R-2 occupancies shall require 2.5 credits.

3.5 Credits

Additional Energy Credits

Large Dwelling Units

- Dwelling units exceeding 5000 square feet of conditioned floor area.
- **Exception:** Dwelling units serving R-2 occupancies shall require 2.5 credits.

4.5 Credits

Additional Energy Credits

Additions

Additions less than 500 square feet

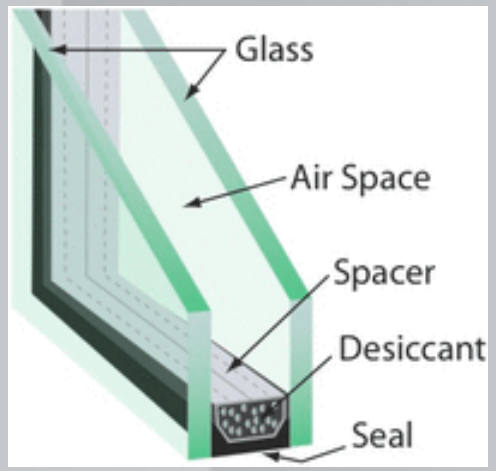
0.5 Credit

Option 1a (easy)

R-38 floor insulation

U-.28 windows

.5 Credits



Option 1b (not so easy)

R-38 floor insulation

U-.25 windows

R-21 + R-4 foam sheathing*

1.0 Credits

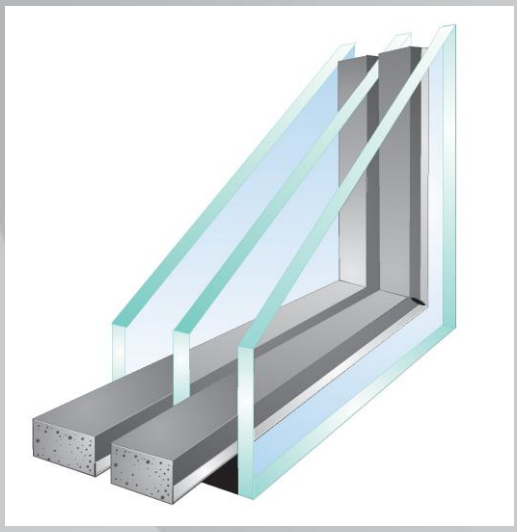
* Thermal Break Shear Wall:
A Case Study of Rigid Foam Insulation between Frame and Sheathing

Option 1c (not easy)

R-38 floor insulation

U-.22 windows

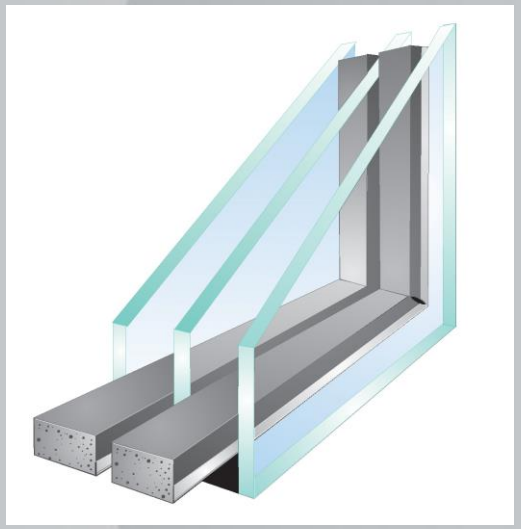
R-21 + R-12 foam sheathing



2.0 Credits

Option 1d

U-.24 windows



.5 Credits

Option 2a (easy?)

Reduce air leakage to 3.0 ACH50

Install good ventilation fan

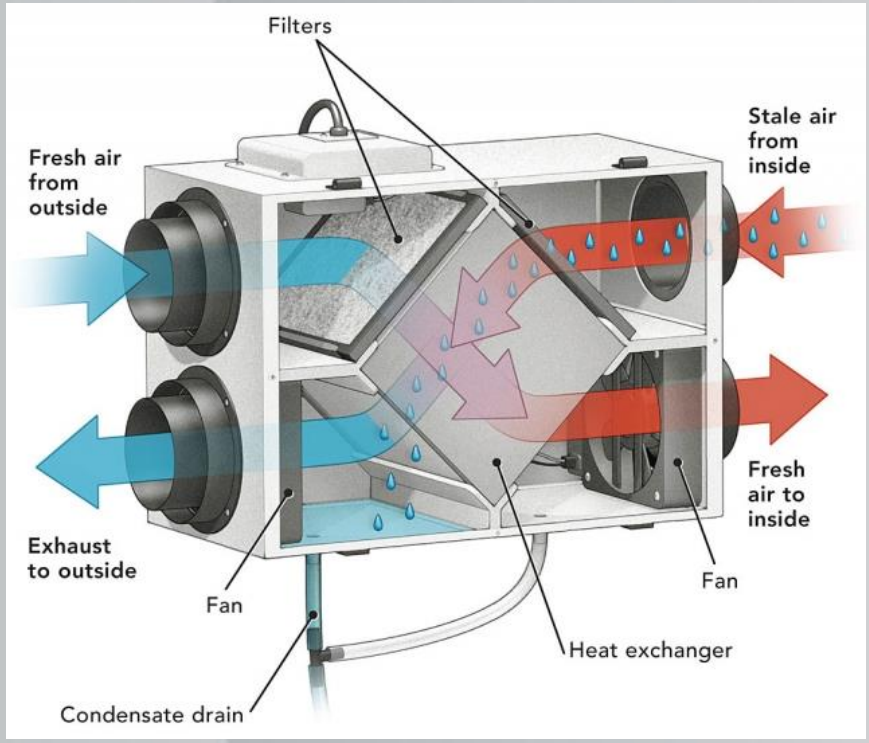
.5 Credits

Option 2b (not so easy)

Reduce air leakage to 2.0 ACH50

Install HRV with efficiency of .70

1.0 Credits

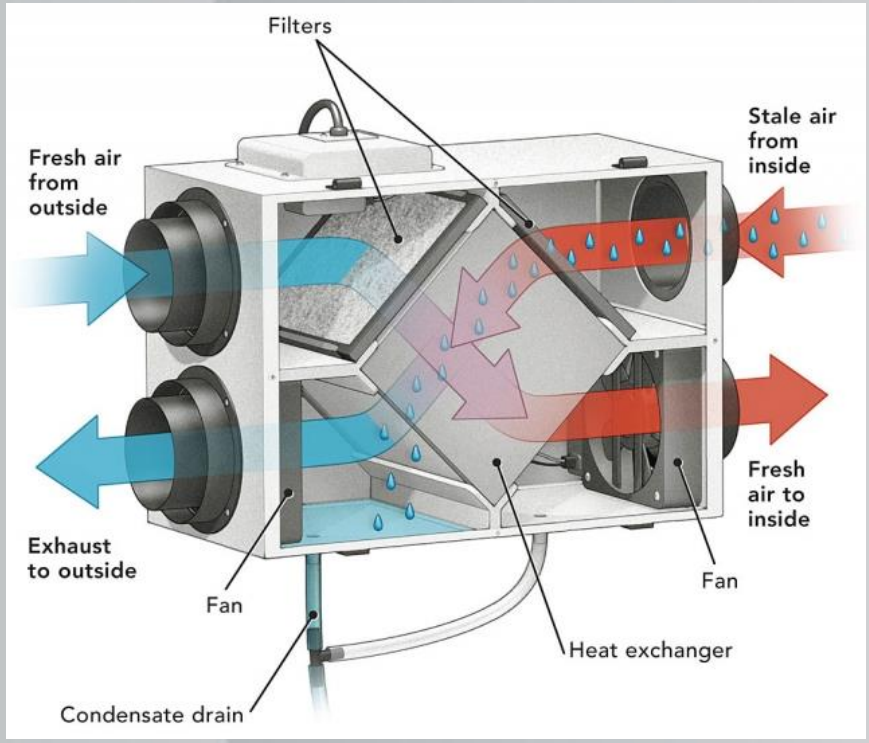


Option 2c (not easy)

Reduce air leakage to 1.5 ACH50

Install HRV with efficiency of .85

1.5 Credits



Option 3a (easy)

Install a high efficiency furnace
AFUE 94% min.

Install a high efficiency boiler
AFUE 92% min.

1.0 Credits

Option 3b (easy)

Install a high efficiency heat pump

Min HSPF of 9.0

1.0 Credits

Option 3c (expensive)

Install a ground or water source heat pump

Min COP of 3.3 (ground)
Min COP of 3.6 (water)

1.5 Credits

Option 3d (easy)

Install a ductless split system heat pump

Must be home where the primary space heating system is electric zonal

Shall be installed and provide heating to the largest zone of the house

1.0 Credit

Option 4 (might be easy)

All ducts, heating and cooling components inside the conditioned space. Also includes boilers and hydronic piping, radiators, etc.

1.0 Credits

Option 5a (really easy)

Install flow restrictor on kitchen faucet and shower heads

.5 Credits

Option 5b (easy)

Install gas, oil, or propane water heater. Min EF .74

1.0 Credits

Option 5c (easy)

Install gas, oil, or propane water heater. Min EF .91

Solar water heating

Heat Pump water heater

1.5 Credits

Option 5d (easy but expensive)

Install a drain water heat recovery unit

.5 Credits

Option 6

Install a solar PV system

Up to 3.0 Credits

Table 406.2
How to meet the mark
1,501–5,000 sf homes (3.5 credits)

Opt	Description	Pts
3a or **3b**	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
4	All ducts and furnace located inside the conditioned space	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5b	Gas water heater ≥ 0.74 EF	1.0
	Total	**3.5**

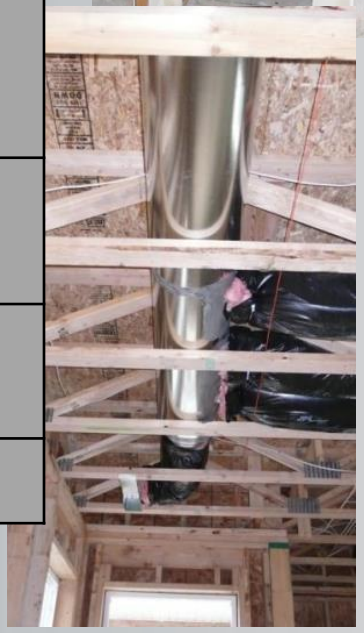


Table 406.2
How to meet the mark
1,501–5,000 sf homes (3.5 credits)

Opt	Description	Pts
1a	R-38 Floors and U-0.28 Windows	0.5
3a or **3b**	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5c	Gas water heater ≥ 0.91 EF or Electric water heater ≥ 2.0 EF	1.5
	Total	**3.5**

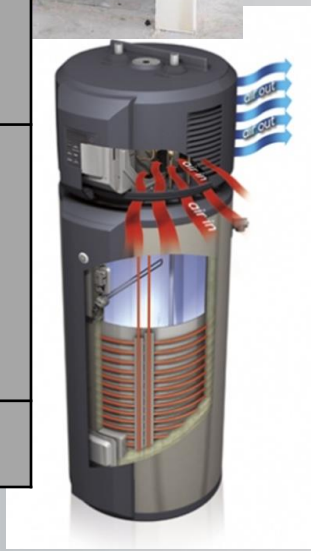
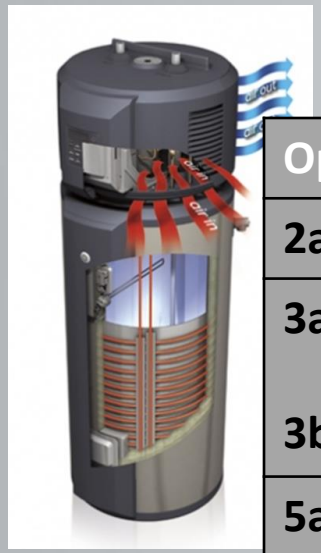


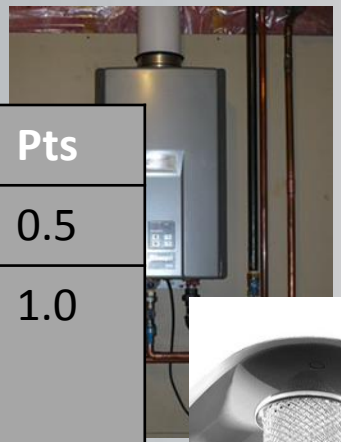
Table 406.2
How to meet the mark
1,501–5,000 sf homes (3.5 credits

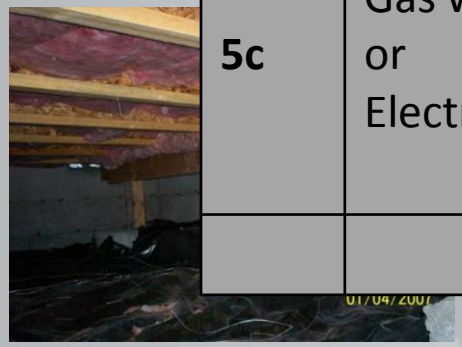
Opt	Description	Pts
1a	R-38 Floors and U-0.28 Windows	0.5
2a	Air leakage ≤ 3.0 ACH @ 50pa	0.5
3a **or** **3b**	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5b	Gas water heater ≥ 0.74 EF	1.0
	Total	**3.5**

Table 406.2
How to meet the mark
1,501–5,000 sf homes (3.5 credits)



Opt	Description	Pts
2a	Air leakage ≤ 3.0 ACH @ 50pa	0.5
3a or **3b**	94 AFUE Gas Furnace or 9.0 HSPF heat pump	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5c	Gas water heater ≥ 0.91 EF or Electric water heater ≥ 2.0 EF	1.5
	Total	**3.5**





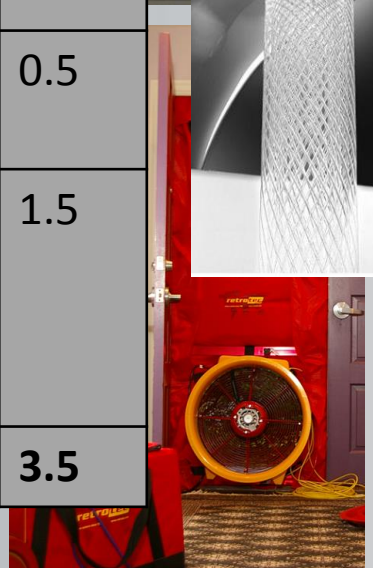
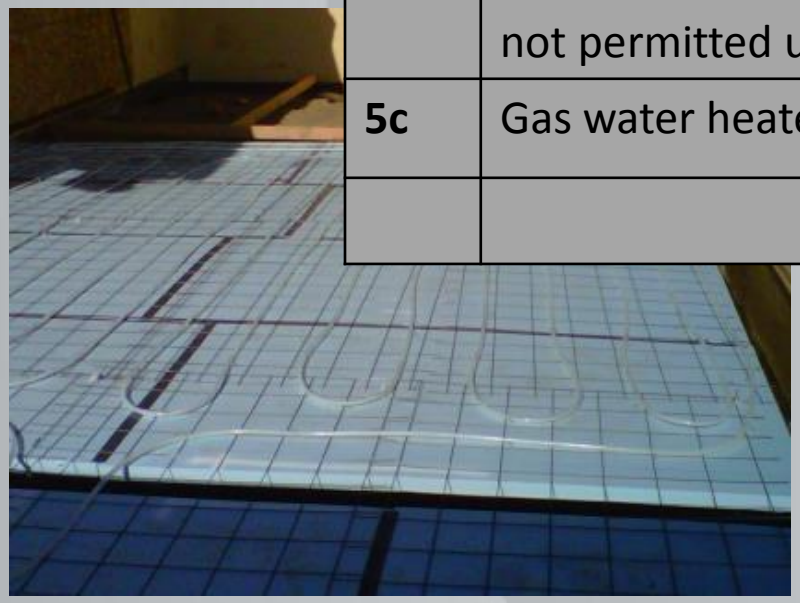


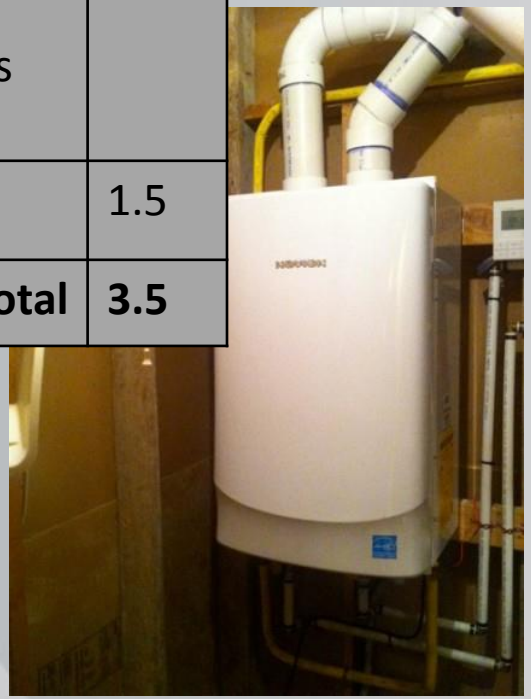
Table 406.2
How to meet the mark
1,501–5,000 sf homes (3.5 credits)

Opt	Description	Pts
1a	R-38 Floors and U-0.28 Windows	0.5
3d	Ductless Heat Pump	1.0
5a	Kitchen sink and showerheads ≤ 1.75 GPM, lavatory faucets ≤ 1.0 GPM	0.5
5c	Electric water heater ≥ 2.0 EF	1.5
	Total	**3.5**

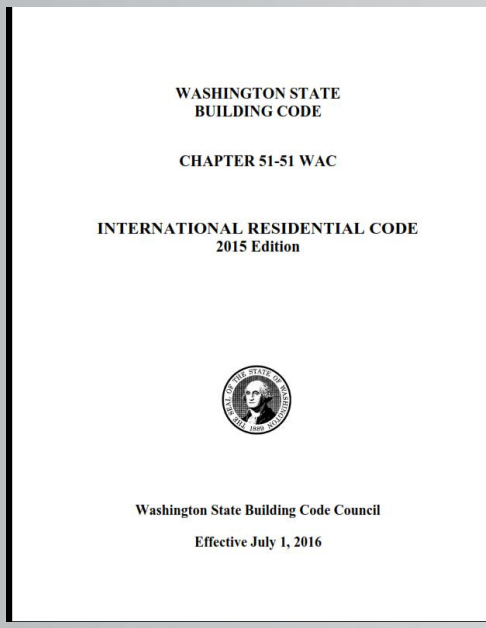
Table 406.2
How to meet the mark
1,501–5,000 sf homes (3.5 credits)

Opt	Description	Pts
3a	92 AFUE Gas Boiler	1.0
4	All heating and cooling system components installed within the conditioned space. Electric resistance and ductless heat pumps not permitted under this option.	1.0
5c	Gas water heater ≥ 0.91 EF	1.5
	Total	**3.5**





Whole House Ventilation Standards


WASHINGTON STATE
BUILDING CODE

CHAPTER 51-51 WAC

INTERNATIONAL RESIDENTIAL CODE
2015 Edition

Washington State Building Code Council

Effective July 1, 2016

- Each dwelling unit equipped with a ventilation system complying with Section M1507.3.4, M1507.3.5, M1507.3.6 or M1507.3.7.

- Compliance is also permitted using state amendments to the IMC sections 403.8.1 through 403.8.11 or ASHRAE Standard 62.2.

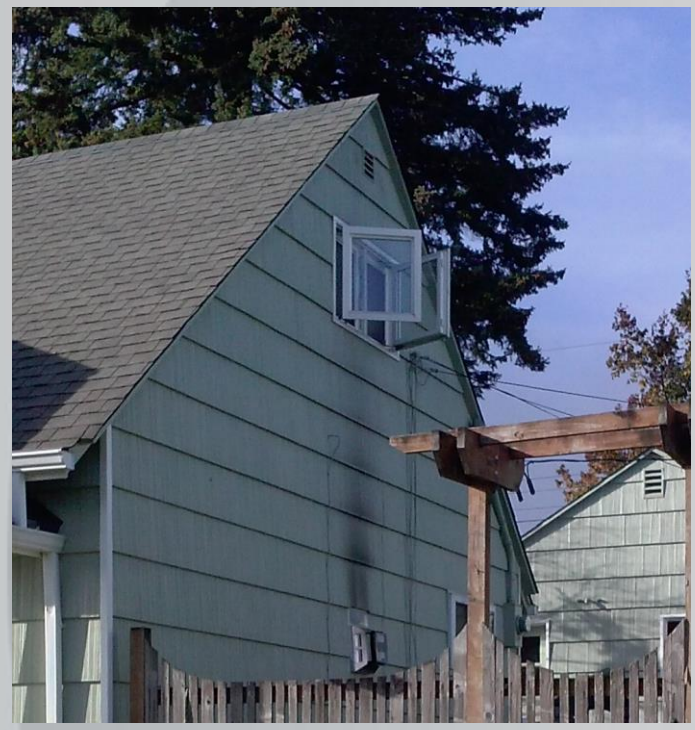
Alternative to State Ventilation Standards

ASHRAE Standard 62.2

- Fan flow rate table contains higher flow rates than IRC table
- Requires fan flow testing
- Allows for an infiltration credit which may or may not lower flow rate

Outdoor air for exhaust only systems

OR



M1507.3.4.4 Ventilation openings. Each habitable space shall be provided with outdoor air inlets or operable windows with an openable area not less than 4 square inches of net free area of opening for each 10 cfm of outdoor are required by Table M1507.3.3(1)

Outdoor air for exhaust only systems

4 square inches of net free area of opening for each 10 cfm of outdoor are required by Table M1507.3.3(1)

TABLE M1507.3.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m^2, 1 cubic foot per minute = 0.0004719 m^3/s.

1501-3000sf, 2-3 bedroom = 60 CFM of air flow

Net free area = 60/10*4

= 6*4

= 24 square inches

Outdoor air for integrated ventilation systems

403.8.3 Outdoor air intake locations.

8. Intake openings shall not be located on asphalt roofs unless it is shown that no other location is permissible. In such cases, the inlet openings shall be located a minimum of 2 feet from the nearest surface of the asphalt roofing, measured from the intake opening.

Flow Rates

Table M1507.3.3(1)
Continuous Whole-House Mechanical Ventilation System Airflow Rate Requirements

Dwelling Unit Floor Area (square feet)	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,501	105	120	135	150	165

Table M1507.3.3(2)
Intermittent Whole-House Mechanical Ventilation Rate Factors[a, b]

Run-Time Percentage in Each 4-Hour Segment	25%	33%	50%	66%	75%	100%
Factor[a]	4	3	2	1.5	1.3	1.0

a For ventilation system run time values between those given, the factors are permitted to be determined by interpolation.
b Extrapolation beyond the table is prohibited.

No Change from 2012

Ventilation Code Discrepancies Whole House Fan Flow Rate Table

- IMC Table 403.8.1 is intended for multi-family
- IRC Table 1507.3.3(1) is intended for single family

TABLE 403.8.1
VENTILATION RATES FOR ALL GROUP R PRIVATE DWELLINGS, SINGLE AND MULTIPLE
(Continuously Operating Systems)

Floor Area (ft^2)	Bedrooms[a]				
	0-1	2-3	4-5	6-7	>7
<500	30	40	45	55	60
500 - 1000	45	55	60	70	75
1001 - 1500	60	70	75	85	90
1501 - 2000	75	85	90	100	105
2001 - 2500					
2501 - 3000					
3001 - 3500					
>3500					

a. Ventilation ra
rates measure

TABLE M1507.3.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 - 1	2 - 3	4 - 5	6 - 7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501 - 3,000	45	60	75	90	105
3,001 - 4,500	60	75	90	105	120
4,501 - 6,000	75	90	105	120	135
6,001 - 7,500	90	105	120	135	150
> 7,500	105	120	135	150	165

For SI: 1 square foot = 0.0929 m^2, 1 cubic foot per minute = 0.0004719 m^3/s.

Local Exhaust

Minimum Required Local Exhaust Rates For One- and Two-Family Dwellings

Area to Be Exhausted	Exhaust Rates
Kitchens	100 cfm intermittent or 25 cfm continuous
Bathrooms - Toilet rooms Laundry rooms, indoor swimming pools, and spas	Mechanical exhaust capacity of 50 cfm intermittent or 20 cfm continuous

No Change from 2012

Ventilation Code Discrepancies
Exhaust Duct Design Table

- IMC Table 403.8.4.2 is intended for multi-family
- IRC Table 1506.2 is intended for single family

TABLE 403.8.4.2
PRESCRIPTIVE EXHAUST DUCT SIZING

Fan Tested cfm at 0.25 inches w.g.	Minimum Flex Diameter	Maximum Length in Feet	Minimum Smooth Diameter	Maximum Length in Feet	Maximum Elbows[a]
50	4 inches	25	4 inches	70	3
50	5 inches	90	5 inches	100	3
50	6 inches	No Limit	6 inches	No Limit	3
80	4 inches[b]	NA	4 inches	20	3
80	5 inches	15	5 inches	100	3
80	6 inches	90			
100	5 inches[b]	NA			
100	6 inches	45			
125	6 inches	15			
125	7 inches	70			

a. For each additional elbow, subtract 10 feet from l
b. Flex ducts of this diameter are not permitted with

TABLE M1506.2
DUCT LENGTH

DUCT TYPE	FLEX DUCT								SMOOTH-WALL DUCT							
Fan airflow rating (CFM @ 0.25 inch wc[a])	50	80	100	125	150	200	250	300	50	80	100	125	150	200	250	300
Diameter[b] (inches)	Maximum length[c, d, e] (feet)															
3	X	X	X	X	X	X	X	X	5	X	X	X	X	X	X	X
4	56	4	X	X	X	X	X	X	114	31	10	X	X	X	X	X
5	NL	81	42	16	2	X	X	X	NL	152	91	51	28	4	X	X
6	NL	NL	158	91	55	18	1	X	NL	NL	NL	168	112	53	25	9
7	NL	NL	NL	NL	161	78	40	19	NL	NL	NL	NL	NL	148	88	54
8 and above	NL	NL	NL	NL	NL	189	111	69	NL	NL	NL	NL	NL	NL	198	133

For SI: 1 foot = 304.8 mm.

a. Fan airflow rating shall be in acordance with ANSI/AMCA 210-ANSI/ASHRAE 51.
b. For noncircular ducts, calculate the diameter as four times the cross-sectional area divided by the perimeter.
c. This table assumes that elbows are not used. Fifteen feet of allowable duct length shall be deducted for each elbow installed in the duct run.
d. NL = no limit on duct length of this size.
e. X = not allowed. Any length of duct of this size with assumed turns and fittings will exceed the rated pressure drop.

Changes and Improvements to Solar Permitting Process

- Elimination of engineering calculations if solar PV systems meet certain requirements-IRC M2302
- Inclusion of Appendix U for “solar ready zone”
- Credits for energy code compliance using solar PV systems

Elimination of Engineering Requirements

- Solar PV systems may be installed on existing houses that meet the weight and height limits and meet the fire access requirements.
  - Saves the homeowner up to $2500 in additional costs
  - Can reduce project time by up to 8 weeks
  - “Over the counter” or online permits expedite the process

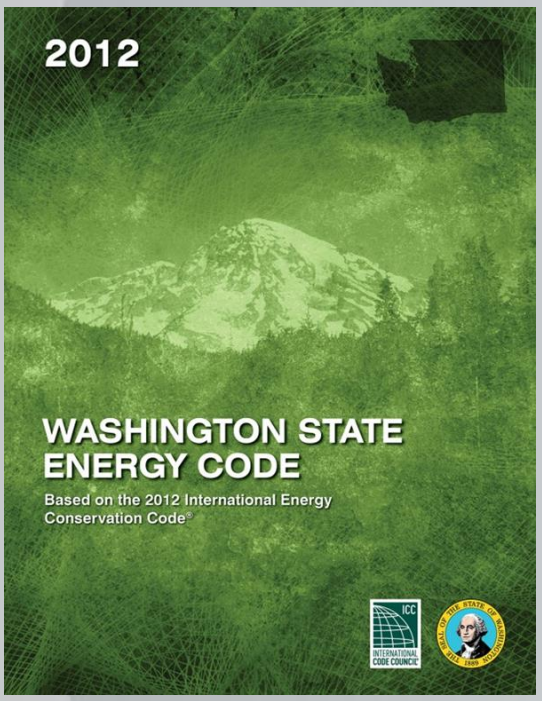
A New "Solar Ready" Appendix in the IRC*

- IRC Appendix "U" has been approved by the SBCC
  - Not mandatory but can be adopted by progressive jurisdictions
  - Reserves a zone on the house with solar access for future installation
  - Saves the homeowner money
    - No rerouting plumbing vents, chimneys or other obstructions at a later date
    - Location for production meter is reserved
    - A capped conduit is located in the solar ready zone for future wiring runs

*Effective July 1, 2016 if adopted by local

Credits for Compliance with the Energy Code for Solar PV

- Installing a PV system qualifies for energy credits required by code.
- Expedited solar permitting process will reduce work load for building department staff
- Reduces wait time for permit issuance



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