WASHINGTON STATE UNIVERSITY
Energy Program

Energy Code Hot Topics

2-21-2023 Lunch and Learn

Jonathan P Jones
Program Coordinator,
Washington State University's
Energy Program

Jonathan P Jones

&

Landon E Jones

(Future Coug)

Washington State University's Energy Program

Energy Code Program Coordinator

Advanced Homes Program Coordinator

- Little bit of history:
  - QA and Trainer for RESNET HERS Rater(s) and advanced home programs
  - Some OJT: 20+yrs (ish)
    - Appraiser
    - Broker
    - Builder
    - Drafter/Consultant
    - Verifier/QA/QA Trainer

WASHINGTON STATE UNIVERSITY
Energy Program

2023 Trainings

Virtual Educations:

- Open office hours 12-2pm
  - 1st Thursday of each month
- Monthly Lunch and Learns
  - 3rd Tuesday of each month
- General Energy Code 12-2pm
  - 3rd Thursday of each month
- Virtual Classes per request.

2023 Trainings

In Person:

WABO Conference

Local AHJ training

In person classes per request

Table of Contents

Current Hot Topics

- HSPF2
- Ventilation
- Air Barriers & Air sealing

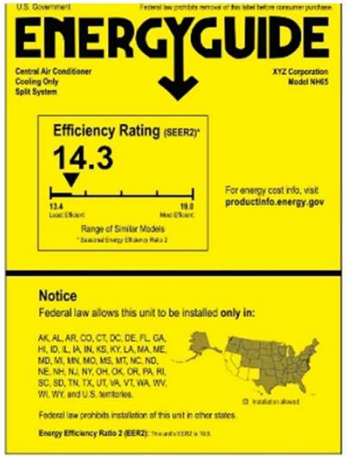
WSEC-R HSPF2

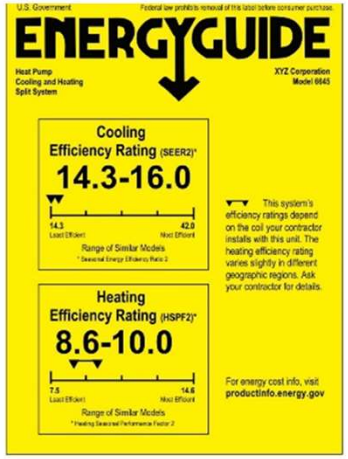
SEER	Ducted SEER2	Ductless SEER2
14.0	13.4	14.0
14.5	13.8	14.5
15.0	14.3	15.0
15.5	14.8	15.5
16.0	15.2	16.0
17.0	16.2	17.0
17.5	16.7	17.5
18.0	17.2	18.0
19.0	18.1	19.0
20.0	19.0	20.0

EER	Ducted EER2	Ductless EER2
10.2	9.8	10.2
11.0	10.5	11.0
11.5	11.0	11.5
11.7	11.2	11.7
12.0	11.5	12.0
12.2	11.5	12.2
12.5	12.0	12.5
13.0	12.5	13.0

HSPF	Ducted Split HSPF2	Ducted Package HSPF2	Ductless HSPF2
8.0	6.8	6.7	7.7
8.2	7.0	6.9	7.9
8.8	7.5	7.4	8.4
9.0	7.7	7.6	8.6
9.5	8.1	8.0	9.1
10.0	8.5	8.4	9.5
11.0	9.4	9.2	10.4

NOTE: The cross references for efficiency in the above tables should be noted as approximate.





Sticker & Charts:

Use the crosswalk to select your equipment for the 2018 WSEC-R Code.

Make sure your sticker has the correct location selected on the map.

Energy Modelers

HSPF2 Conversions for 2023

- Addendum 71

Table 4.4.4.1(1) SEER2 and HSPF2 Conversion Factors

(Informative Note) Conversion factors developed by AHRI, and adopted by RESNET.

Equipment Type	SEER2/SEER	EER2/EER	HSPF2/HSPF
Ductless Systems	1.00	1.00	0.90
Ducted Split System	0.95	0.95	0.85
Ducted ~~Single~~ Packaged System	0.~~96~~95	0.95	0.84
Small Duct High Velocity System	1.00	Not Applicable	0.85
Ducted Space-Constrained Air Conditioner	0.97	Not Applicable	Not Applicable
Ducted ~~Space~~ Space-Constrained Heat Pump	0.99	Not Applicable	0.85

[1] EER and EER2 are not required in this Standard for equipment relevant to this table, but the values are shared here for informative purposes.

WHOLE-HOUSE MECHANICAL VENTILATION AIRFLOW RATE

DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0 - 1	2	3	4	5 or more
	Airflow in cfm				
< 500	30	30	35	45	50
501 - 1,000	30	35	40	50	55
1,001 — 1,500	30	40	45	55	60
1,501 - 2,000	35	45	50	60	65
2,001 - 2,500	40	50	55	65	70
2,501 - 3,000	45	55	60	70	75
3,001 - 3,500	50	60	65	75	80
3,501 — 4,000	55	65	70	80	85
4,001 — 4,500	60	70	75	85	90
4,501 — 5,000	65	75	80	90	95

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

TABLE M1505.4.3(2)

SYSTEM COEFFICIENT C_{system})

SYSTEM TYPE	DISTRIBUTED	NOT DISTRIBUTED
Balanced	1.0	1.25
Not balanced	1.25	1.5

TABLE M1505.4.3(3)

INTERMITTENT OFF WHOLE-HOUSE MECHANICAL VENTILATION RATE FACTORS[a,b]

RUN-TIME % IN EACH 4-HOUR SEGMENT	50%	66%	75%	100%
Factor[a]	2	1.5	1.3	1.0

Ventilation

Single Family:

Must design as balanced and distributed.

You are not required to install HRV or ERV's

You may install exhaust only or supply only

To do so take the quality adjustments

R-406.3 dictates ERV's and HRV's requirements

WHOLE-HOUSE MECHANICAL VENTILATION AIRFLOW RATE

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2,501 - 3,000	45	55	60	70	75
3,001 - 3,500	50	60	65	75	80
3,501 — 4,000	55	65	70	80	85
4,001 — 4,500	60	70	75	85	90
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Factor[a]	2	1.5	1.3	1.0

Ventilation

Multifamily:

Must design as balanced and distributed.

You are not required to install HRV or ERV's

Commercial Energy Code MF units are required to install 60% + efficient HRV or ERV

You must install a balanced system

To not distribute you must take the quality adjustment

R-406.3 dictates ERV's and HRV's requirements for residential code

TABLE R402.4.1.1
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION CRITERIA[a]
General Requirements	A continuous air barrier shall be installed in the building envelope. Exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed.	Air-permeable insulation shall not be used as a sealing material.
Cavity insulation installation		All cavities in the thermal envelope shall be filled with insulation. The density of the insulation shall be at the manufacturers' product recommendation and said density shall be maintained for all volume of each cavity. Batt type insulation will show no voids or gaps and maintain an even density for the entire cavity. Batt insulation shall be installed in the recommended cavity depth. Where an obstruction in the cavity due to services, blocking, bracing or other obstruction exists, the batt product will be cut to fit the remaining depth of the cavity. Where the batt is cut around obstructions, loose fill insulation shall be placed to fill any surface or concealed voids, and at the manufacturers' specified density. Where faced batt is used, the installation tabs must be stapled to the face of the stud. There shall be no compression to the batt at the edges of the cavity due to inset stapling installation tabs. Insulation that upon installation readily conforms to available space shall be installed filling the entire cavity and within the manufacturers' density recommendation.
Ceiling/attic	The air barrier in any dropped ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier sealed. Access openings, drop down stair or knee wall doors to unconditioned attic spaces shall be sealed.	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier Batt insulation installed in attic roof assemblies may be compressed at exterior wall lines to allow for required attic ventilation.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and top of exterior walls shall be sealed. Knee walls shall be sealed.	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of R-3 per inch minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier.
Windows, skylights and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	

Air Barriers & Air Sealing

R402.4.1 Building Thermal Envelope The building thermal envelope shall comply with Sections R402.4.1.1 and R402.4.1.2.

The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

TABLE R402.4.1.1 (continued)
AIR BARRIER AND INSULATION INSTALLATION

COMPONENT	AIR BARRIER CRITERIA[a]	INSULATION CRITERIA[a]
Rim Joists	Rim joists shall include the air barrier.	Rim joists shall be insulated.
Floors (including above garage and cantilevered floors)	The air barrier shall be installed at any exposed edge of insulation.	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subfloor decking or floor framing cavity insulation shall be permitted to be in contact with the topside of sheathing or continuous insulation installed on the underside of floor framing and extend from the bottom to the top of all perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class I, black vapor retarder with overlapping joints taped.	Where provided instead of floor insulation, insulation shall be permanently attached to the crawlspace walls.
Shafts, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.	
Narrow cavities		Batts in narrow cavities shall be cut to fit and installed to the correct density without any voids or gaps or compression, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	Air sealing shall be provided between the garage and conditioned spaces.	
Recessed lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.	Recessed light fixtures installed in the building thermal envelope shall be air tight and IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls. There shall be no voids or gaps or compression where cut to fit. Insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.
Electrical/phone box on exterior wall	The air barrier shall be installed behind electrical or communication boxes or air sealed boxes shall be installed.	
HVAC register boots	HVAC supply and return register boots shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.	
Concealed sprinklers	When required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.	

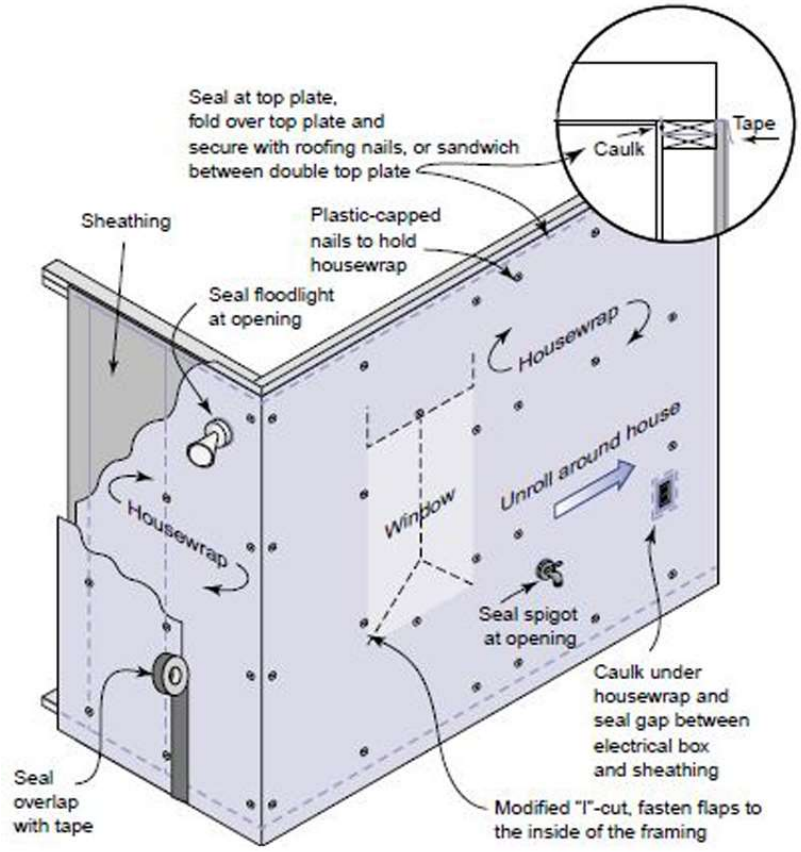
IC = insulation contact

a. In addition, inspection of log walls shall be in accordance with the provisions of ICC-400.

Air Barriers & Air Sealing

R402.4.1 Building Thermal Envelope The building thermal envelope shall comply with Sections R402.4.1.1 and R402.4.1.2.

The sealing methods between dissimilar materials shall allow for differential expansion and contraction.



https://basc.pnnl.gov/resource-guides

Air Barriers & Air Sealing

Air Barrier

One or more materials joined together in a continuous manner to restrict or prevent the passage of air through the building thermal envelope and its assemblies.

- R402.4.1 Building Thermal Envelope The building thermal envelope shall comply with Sections R402.4.1.1 and R402.4.1.2.
- The sealing methods between dissimilar materials shall allow for differential expansion and contraction.

Air Barriers & Air Sealing

Scope

Install an air barrier behind showers and tubs installed on exterior walls.

Install insulation without misalignments, compressions, gaps, or voids in all exterior wall cavities behind tubs and showers.

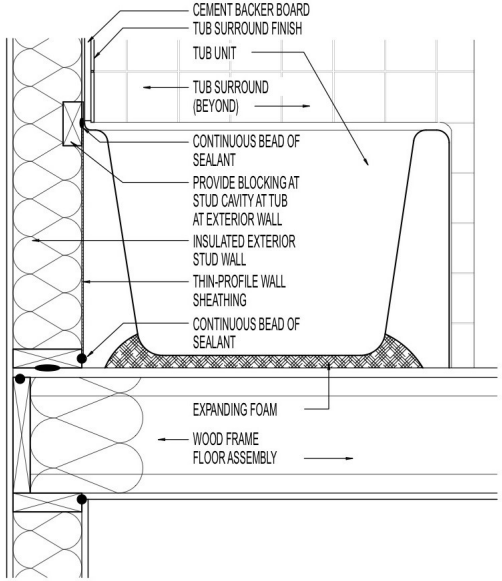
Cover the wall cavities with a rigid air barrier or other supporting material to prevent cavity insulation from sagging and to create a continuous thermal barrier.

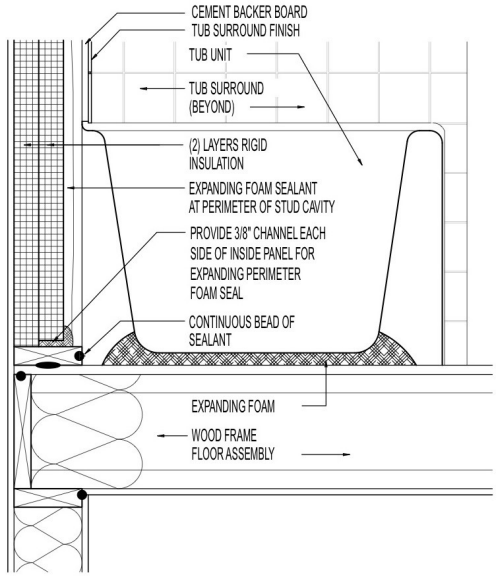
Seal all seams, gaps, and holes in the air barrier with caulk or foam before tub/shower installation. Rigid air barrier materials for use behind showers and tubs include fiber-cement, fiber-reinforced gypsum, glass mat gypsum, or fiber mat-reinforced cementitious backer panels.

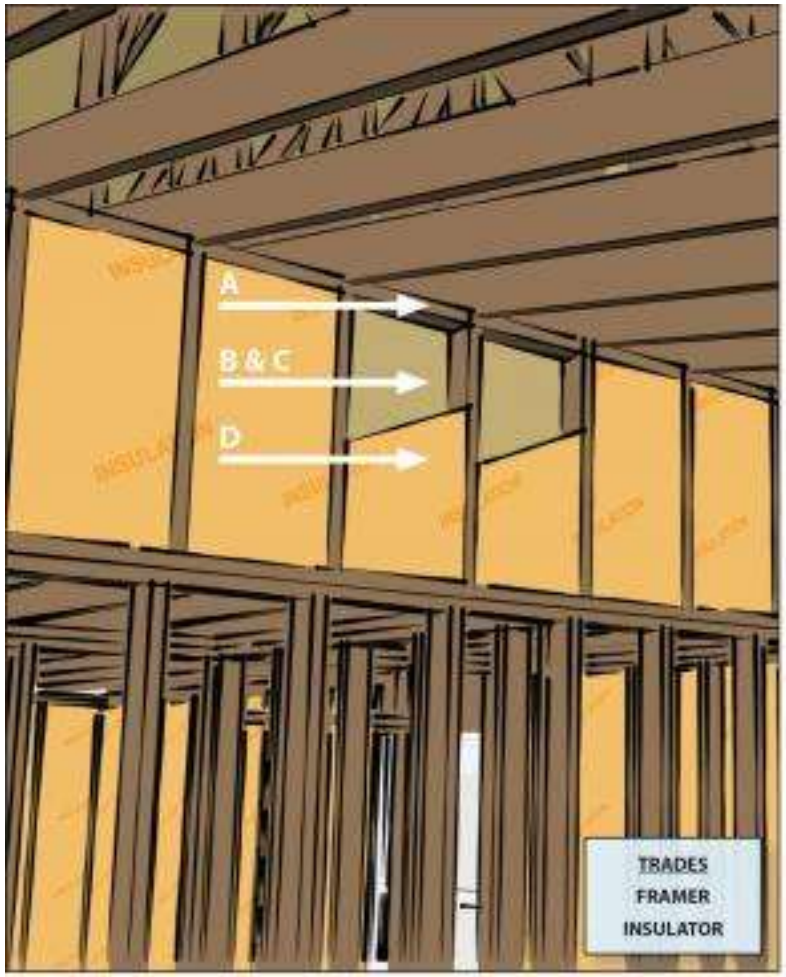
Air Barriers & Air Sealing

CAD detail

https://basc.pnnl.gov/resource-guides/walls-behind-showers-and-tubs#edit-group-cad







Air Barriers & Air Sealing

Scope

Install an air barrier on the exterior of attic knee wall insulation and to block open floor joist cavities under attic knee walls.

Install a top and bottom plate or blocking at the top and bottom of all knee wall cavities.

Install insulation without misalignments, compressions, gaps, or voids in all knee wall cavities.

Install a continuous air barrier on the exterior side of the attic knee wall framing with a rigid air barrier or other supporting material to prevent the knee wall cavity insulation from sagging and to create a continuous thermal barrier. Rigid air barrier material could include rigid foam insulation, drywall, plywood, or OSB, among others.

Seal all seams, gaps, and holes in the air barrier with caulk or foam.

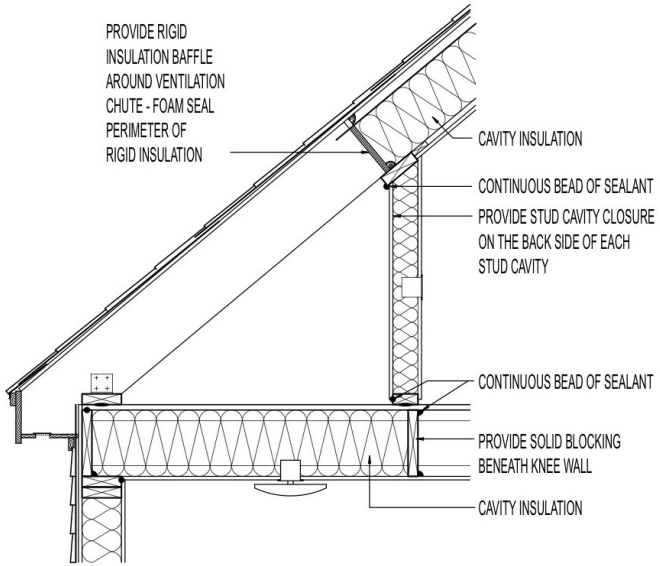
If spray foam insulation is used for the wall cavity insulation, the spray foam can serve as the air barrier if it is at least 5.5 inches thick if open-cell or at least 1.5 inches thick if closed-cell spray foam insulation.

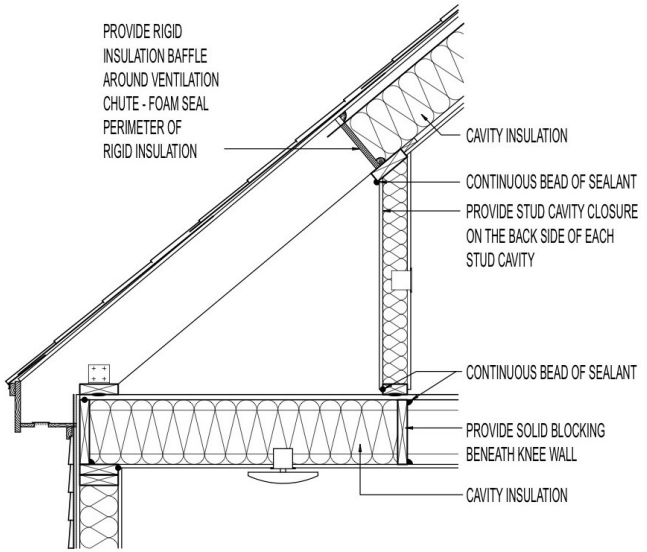
Install blocking in the joist bays below the knee walls to prevent air flow under the knee walls.

Air Barriers & Air Sealing

CAD detail

https://basc.pnnl.gov/resource-guides/attic-knee-walls





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Good Resources…

EPS Field

https://insider.energytrust.org/programs/eps-new-construction/eps-field-guide/

WSU's Prescriptive Checklist

https://www.energy.wsu.edu/BuildingEfficiency/EnergyCode.asp

End Credits:

Thank you to our sponsor!

https://neea.org/about-neea

About NEEA

Our Purpose - *The Northwest Energy Efficiency Alliance (NEEA) is an alliance of utilities and energy efficiency organizations that pools resources and shares risks to transform the market for energy efficiency to the benefit of consumers in the Northwest.*

End Credits:

Training Partners:

- Earth Advantage
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Hyperlinks in the image(s)

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WASHINGTON STATE UNIVERSITY
Energy Program

Thank You

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www.energy.wsu.edu

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