Building Pathways to High Performance

Sam Friesen, William Ranson

Framing the Path Way

Review Energy Star 3.2

IECC 2021 for Walls

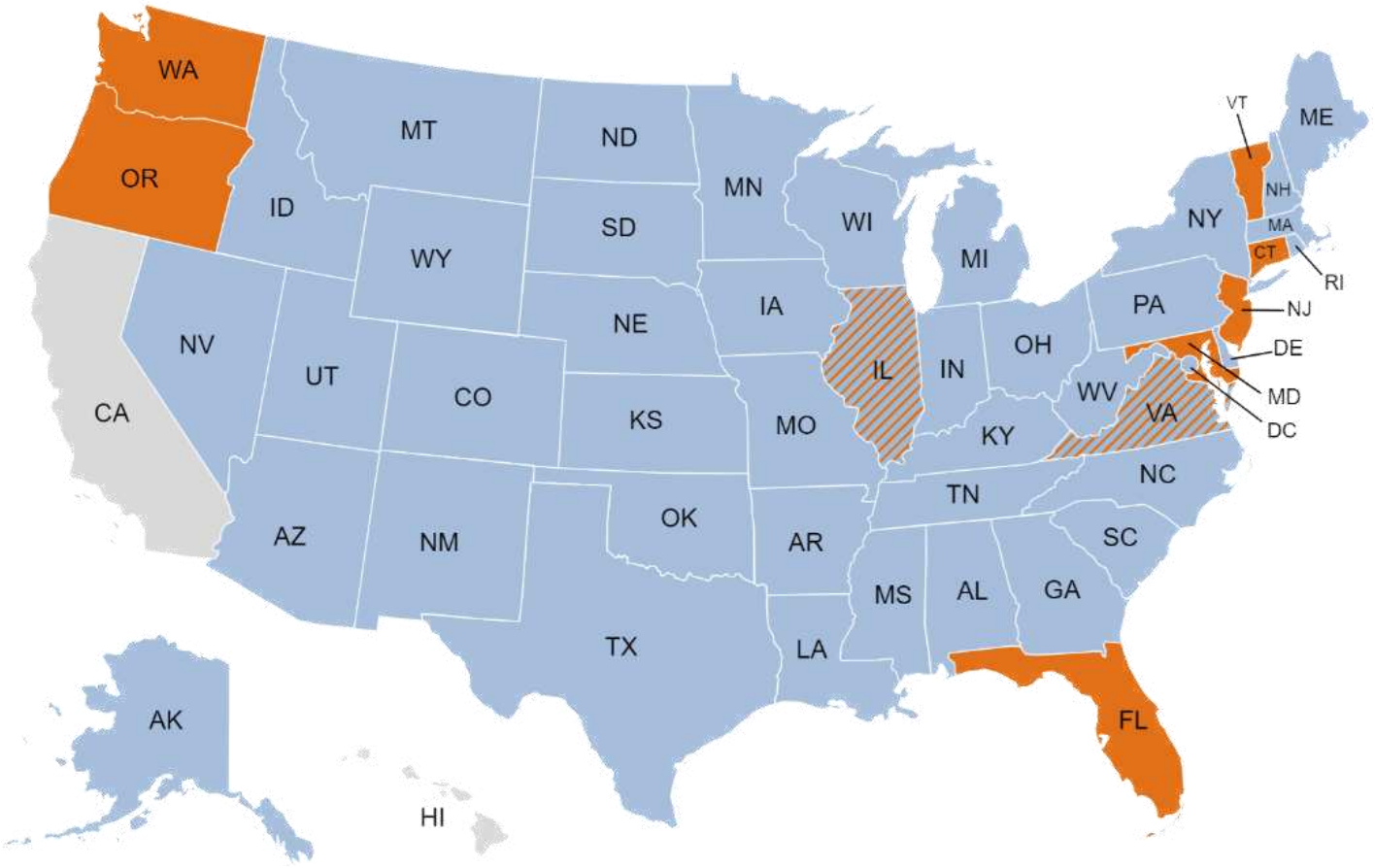
UA calculator to start thinking of Trade Off

Getting the wall right enables SO much more

EEBA
Energy & Environmental Building Alliance

Energy Star Version Requirements by State for Certified Home and 45L Eligibility

Effective Jan 1, 2025



CT, FL, MD, NJ, VT, OR, WA
(IL, VA 2026)

Use **Energy Star v3.2 to be eligible for 45L Tax Credit** for homes **acquired** on or after 1/1/2025

Use **Energy Star v3.2** for homes **permitted** on or after 1/1/2025 to be eligible for Energy Star Certified home

All other states *minus CA, HI*

Use **Energy Star v3.2 to be eligible for 45L Tax Credit** for homes **acquired** on or after 1/1/2025

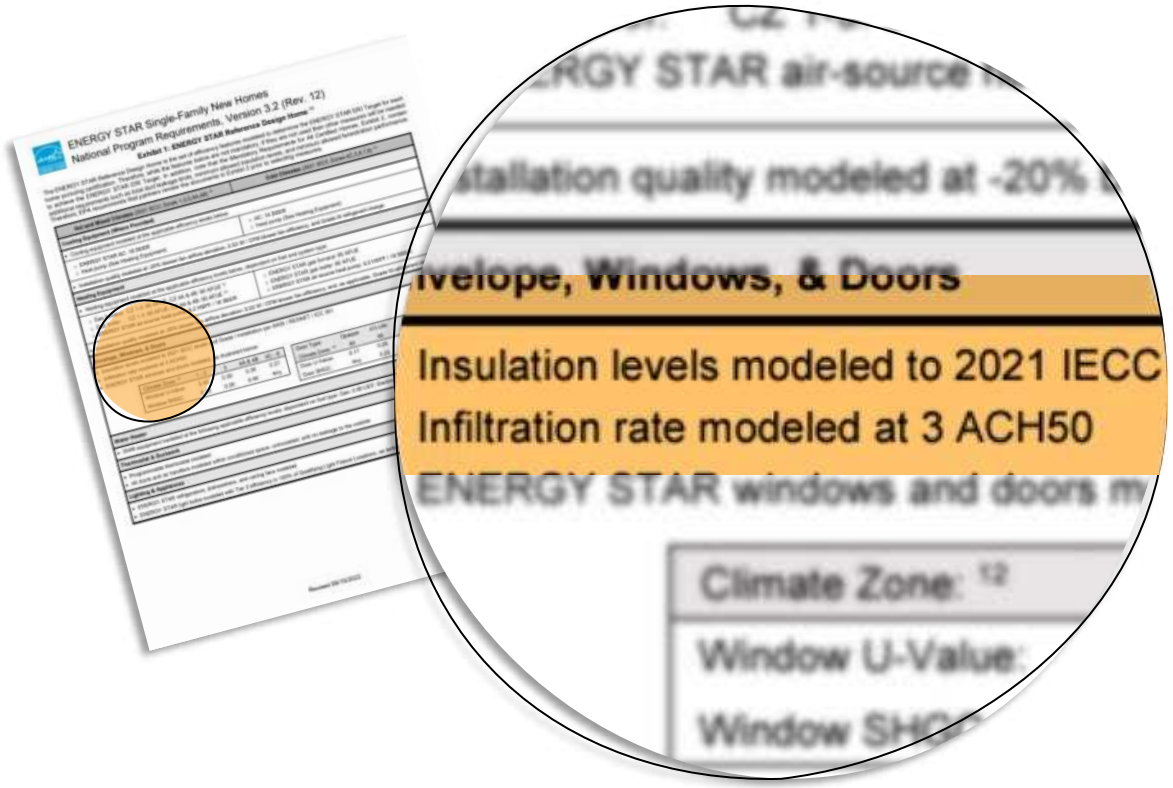
Use **Energy Star v3.1 Rev 13** for homes **permitted** on or after 1/1/2025 to be eligible for Energy Star Certified home

Energy Star & DOE Builder – 2025 requirement

By 2025, **all builders** aiming to meet ENERGY STAR or Zero-Energy Ready Homes *and be eligible for the IRA tax credit* will be **required to meet 2021 IECC for insulation**, *regardless of state / local adoption**

*All states **except CA & HI** will move to SFNH National v.3.2, which calls out insulation levels modeled to 2021 IECC.
CA and HI have separate SFNH program versions and may be different.

ENERGY STAR
Single-Family New Homes National Program
Version 3.2 (Rev 12)



EEBA
Energy & Environmental Building Alliance

Energy Star & DOE Builder – 2025 requirement

By 2025, **all builders** aiming to meet ENERGY STAR or Zero-Energy Ready Homes *and be eligible for the IRA tax credit* will be **required to meet 2021 IECC for insulation**, *regardless of state / local adoption**

*All states **except CA & HI** will move to SFNH National v.3.2, which calls out insulation levels modeled to 2021 IECC.
CA and HI have separate SFNH program versions and may be different.

Why 2021?

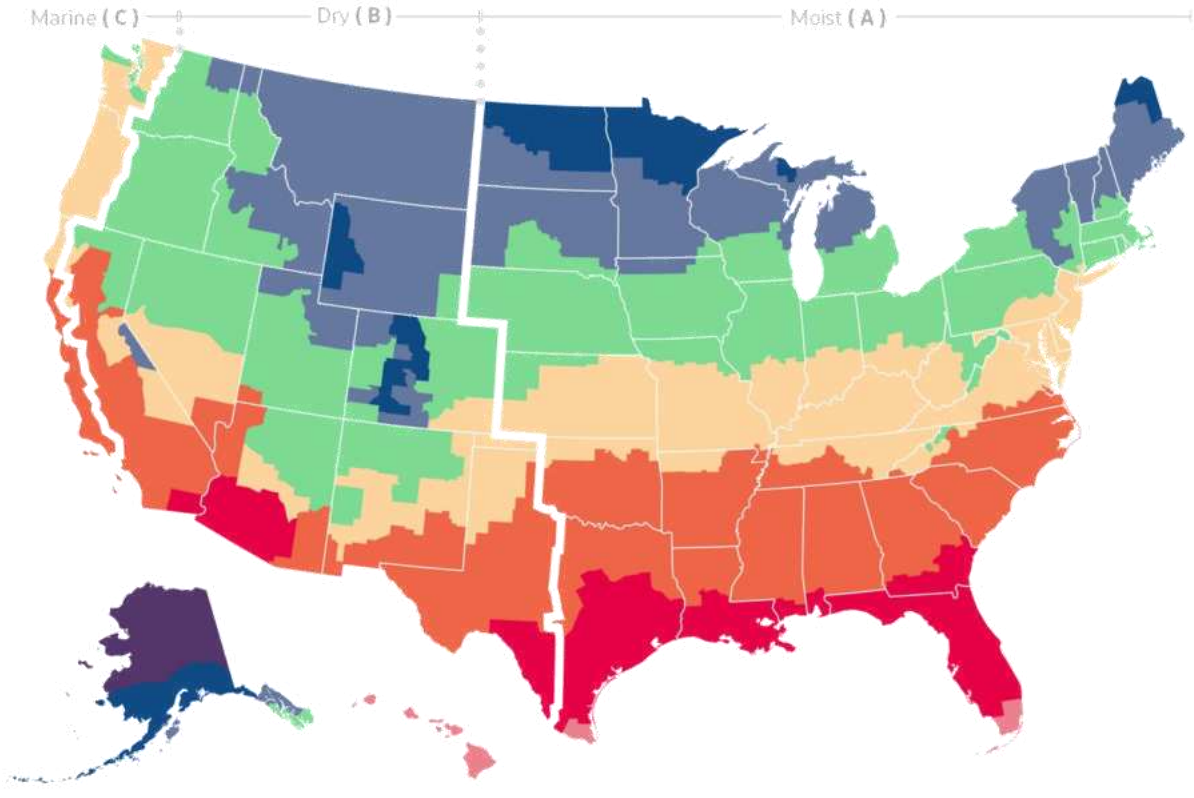
Likely no significant thermal wall code changes for multiple code cycles.
This means you can design your wall now and not have to significantly change it for years

EEBA
Energy & Environmental Building Alliance

2021 IECC Prescriptive R-Value Requirements:

Residential Wood Frame Walls

RESIDENTIAL BUILDING. *For this code, includes R-3 buildings, as well as R-2 and R-4 buildings three stories or less in height above grade.*



2021 IECC R-Value Prescriptive Requirements
Wood-Framed Wall

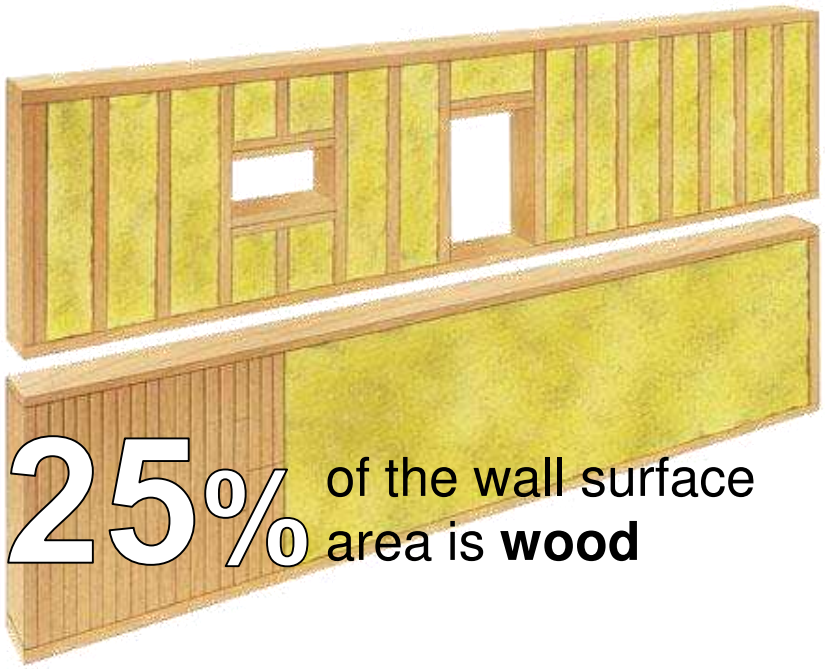
Climate Zone	***2x4 Options***	***2x6 Options***
8, 7, 6	30 or 13+**10**ci or 0+**20**ci	30 or 20+**5**ci
5 + Marine 4	30 or 13+**10**ci or 0+**20**ci	30 or 20+**5**ci
4		
3, 2	20 or 13+**5**ci or 0+**15**ci	20
1	13 or 0+**10**ci	

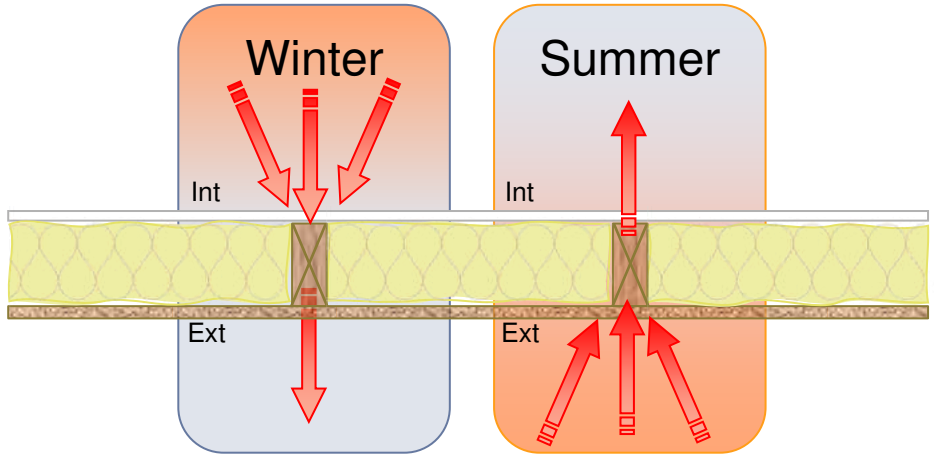
Orange = More stringent *vs 2018 IECC*

Blue = New option *vs 2018 IECC*

EEBA
Energy & Environmental Building Alliance

Thermal Bridging / Surface Area



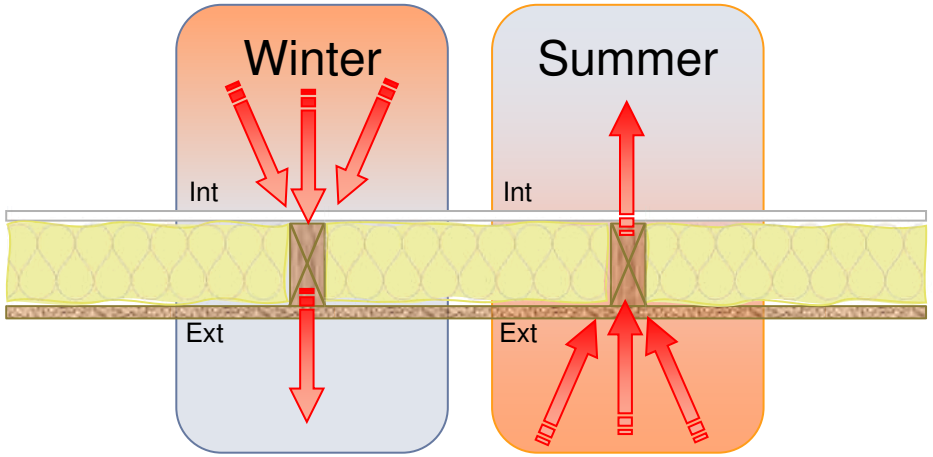


Heat flow increases with temperature differential (ΔT)

EEBA
Energy & Environmental Building Alliance

Thermal Bridging

Conductive heat loss

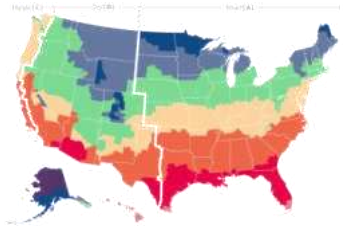


Heat flow increases with temperature differential (ΔT)

EEBA
Energy & Environmental Building Alliance

2021 IECC Prescriptive R-Value Requirements:

Basement Walls



Climate Zone	*2021 IECC* ***Basement Wall*** *R-Value Requirements*
1	0
2	
3	**10**ci 2ft
X Marine 4	
4	**10**ci or 13
+ Marine 4	
5	
6	**15**ci or 19 or 13+**5**ci
7	
8	

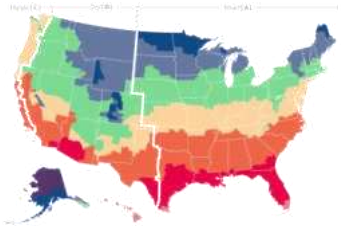
New Option vs. 2018 IECC

Blue = New option *vs 2018 IECC*

EEBA
Energy & Environmental Building Alliance

2021 IECC Prescriptive R-Value Requirements:

Slab



Climate Zone	*2021 IECC* ***Slab*** *R-Value Requirements*
1	0
2	0
3	**10**ci 2ft
4 X Marine 4	**10**ci 4ft
5 + Marine 4	
6	**10**ci 4ft
7	
8	

Orange = More stringent *vs 2018 IECC*

More stringent vs. 2018 IECC

EEBA
Energy & Environmental Building Alliance

Why are we talking about UA calculators?

Prescriptive

- Meet or exceed the mandatory and prescriptive requirements in the code
- Doesn't require an additional consultant to show compliance

Total UA

- Alternative to Prescriptive method for insulation components
- Allows more flexibility by allowing trade-offs for insulation only (CI vs. stud cavity, roof, slab, etc.)

Simulated Performance

- Compares modeled energy cost of designed building with a reference home
- Most flexibility in selecting equipment, insulation, and windows
- Do not need to follow any prescriptive requirements
- Ex. REScheck

Energy Rating Index (ERI)

- Meet or exceed code requires ERI

[ICC Digital Codes - Home (iccsafe.org)]

EEBA
Energy & Environmental Building Alliance

What is a UA calculator?

R-value is better to define materials.

U-Value is better to define systems.

U = 1 / R

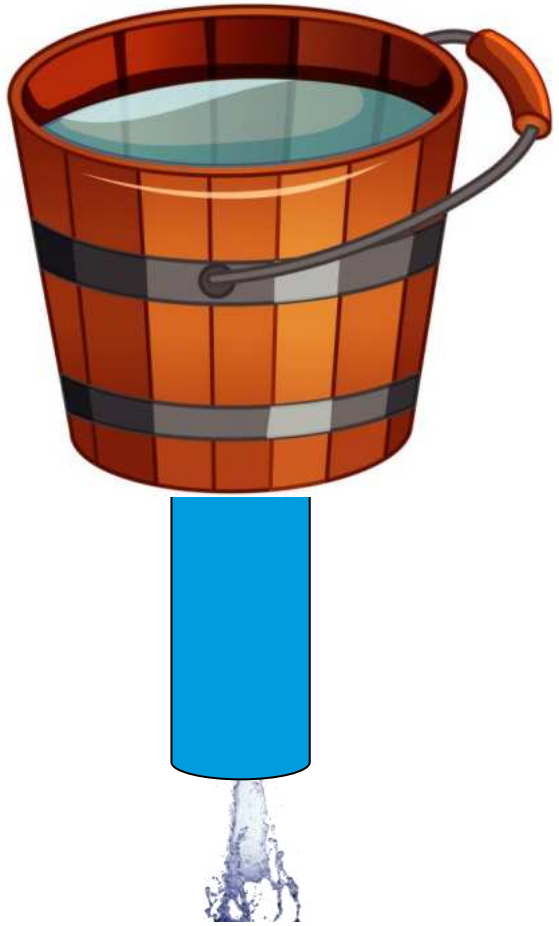
R-total = R-top board + R-bottom board
(Higher is better for insulation)

What is the heat flow of this assembly?
(what is overall resistance to heat flow)

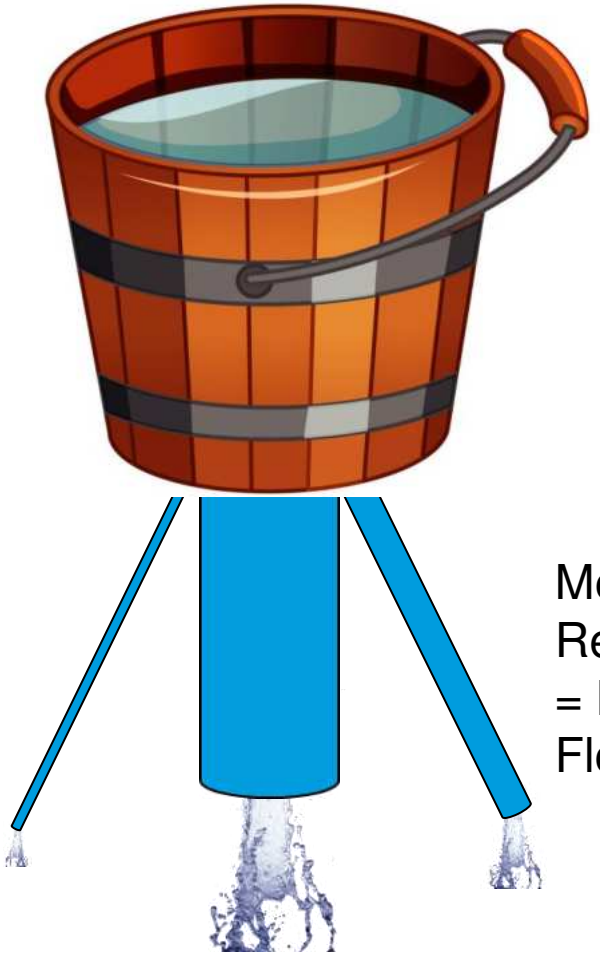
R1+R2 doesn't work here

EEBA
Energy & Environmental Building Alliance

What do U mean?

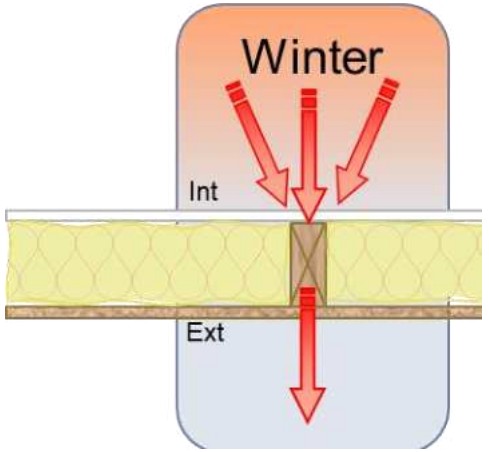


High
Resistance
= Low Flow



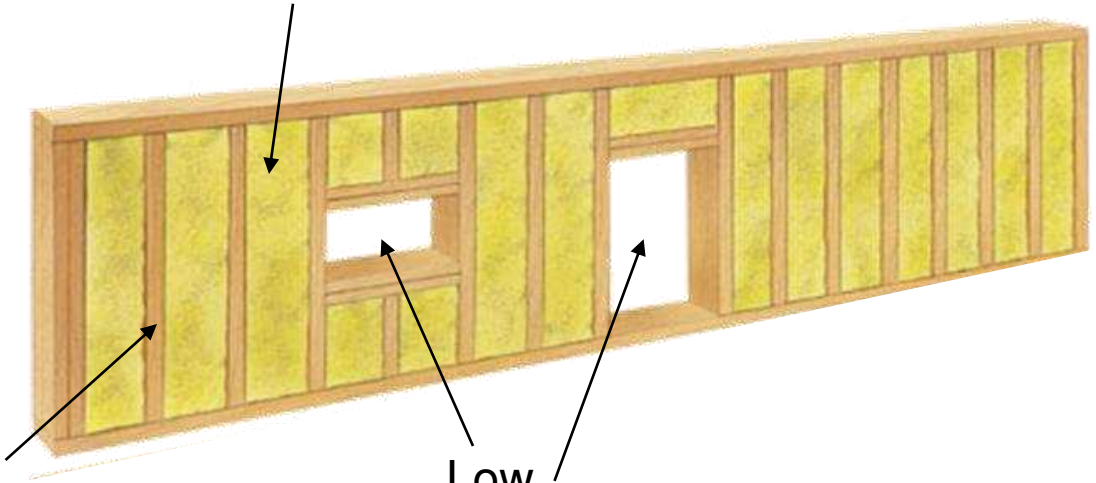
Medium
Resistance
= Medium
Flow

Low
Resistance
= High Flow



EEBA
Energy & Environmental Building Alliance

What do U mean?



U-Value is a system Property.

U = 1 / R

UA is the U value times Area

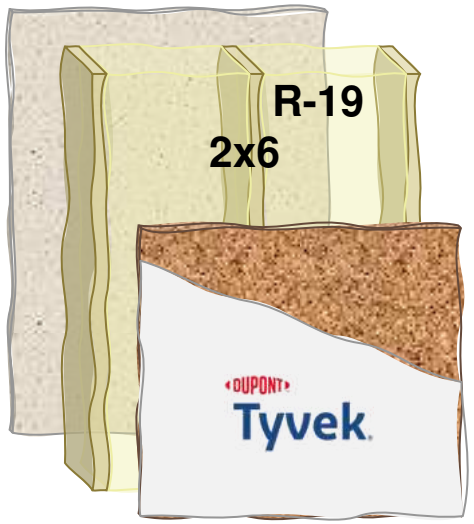
Total UA would be:

Stud U x Stud Area
+
Batt U x Batt Area
+
Window U x Window Area
+
Door U x Door Area

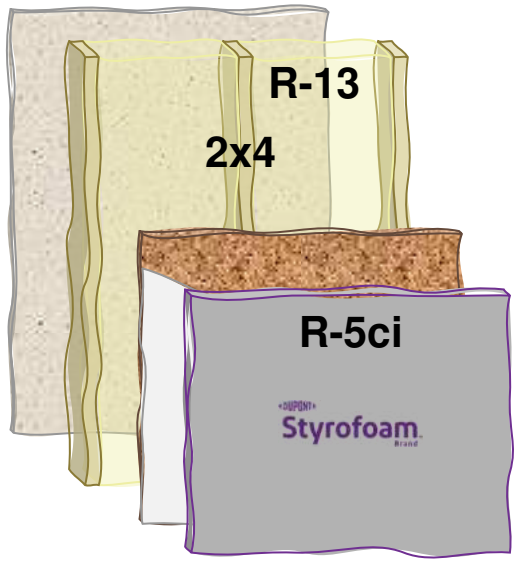
EEBA
Energy & Environmental Building Alliance

Meeting code for Walls is just the start

Effective
R-9.9



Effective
R-14.1



Effective
R-14.9

EEBA
Energy & Environmental Building Alliance