CONDENSATION IN WALL ASSEMBLIES: MAINTAINING LOW LEVELS OF RISK THROUGH NON-TRADITIONAL INSULATION PACKAGES

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SOPREMA

THERMAL BRIDGING AND CONTINUOUS INSULATION

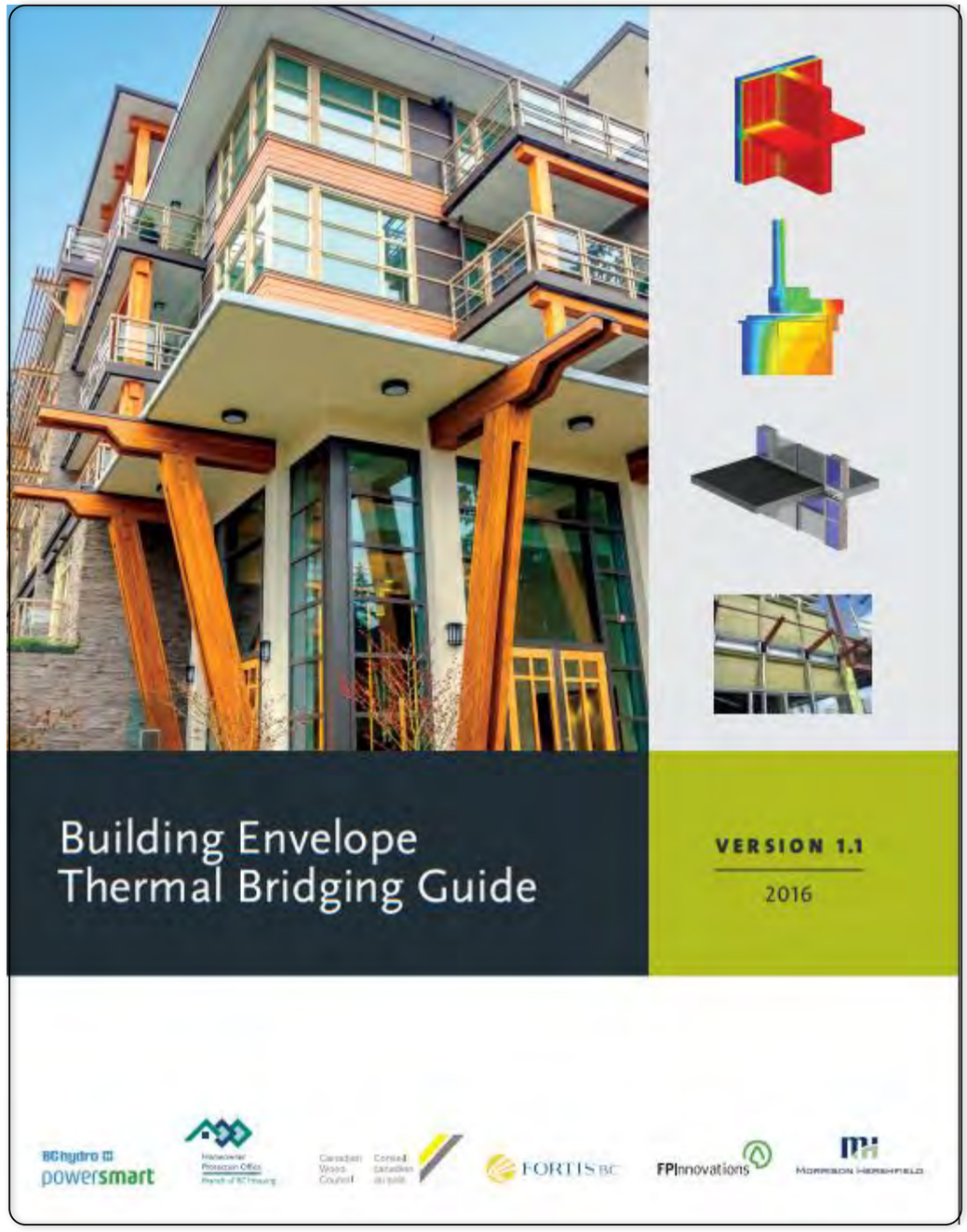
Codes impose thermal performance level requirements in many areas

Specific clauses impose the use of continuous insulation

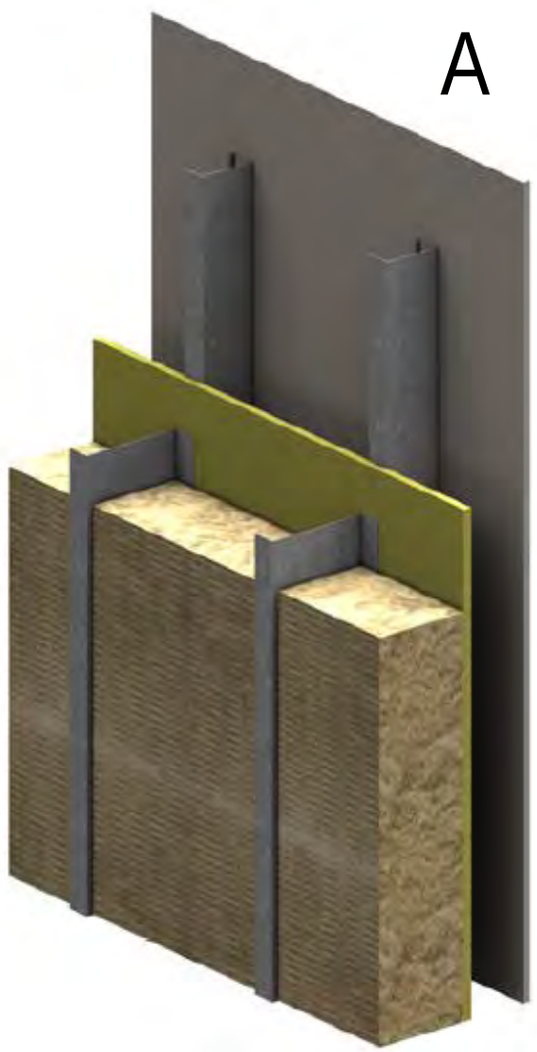
Reduction of thermal bridges

Some construction types pose challenges

THERMAL MODELING



THERMAL MODELING



Exterior-insulated 2 x 6 steel frame at 16" o.c.

Metal panel attached by vertical z-girts at 16" o.c.

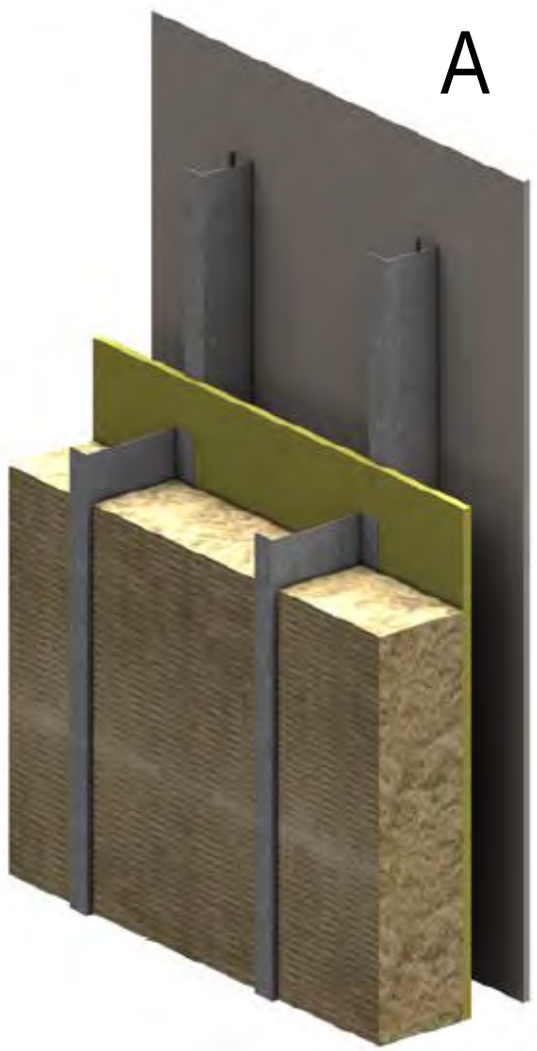
Generic exterior continuous insulation (R-25)

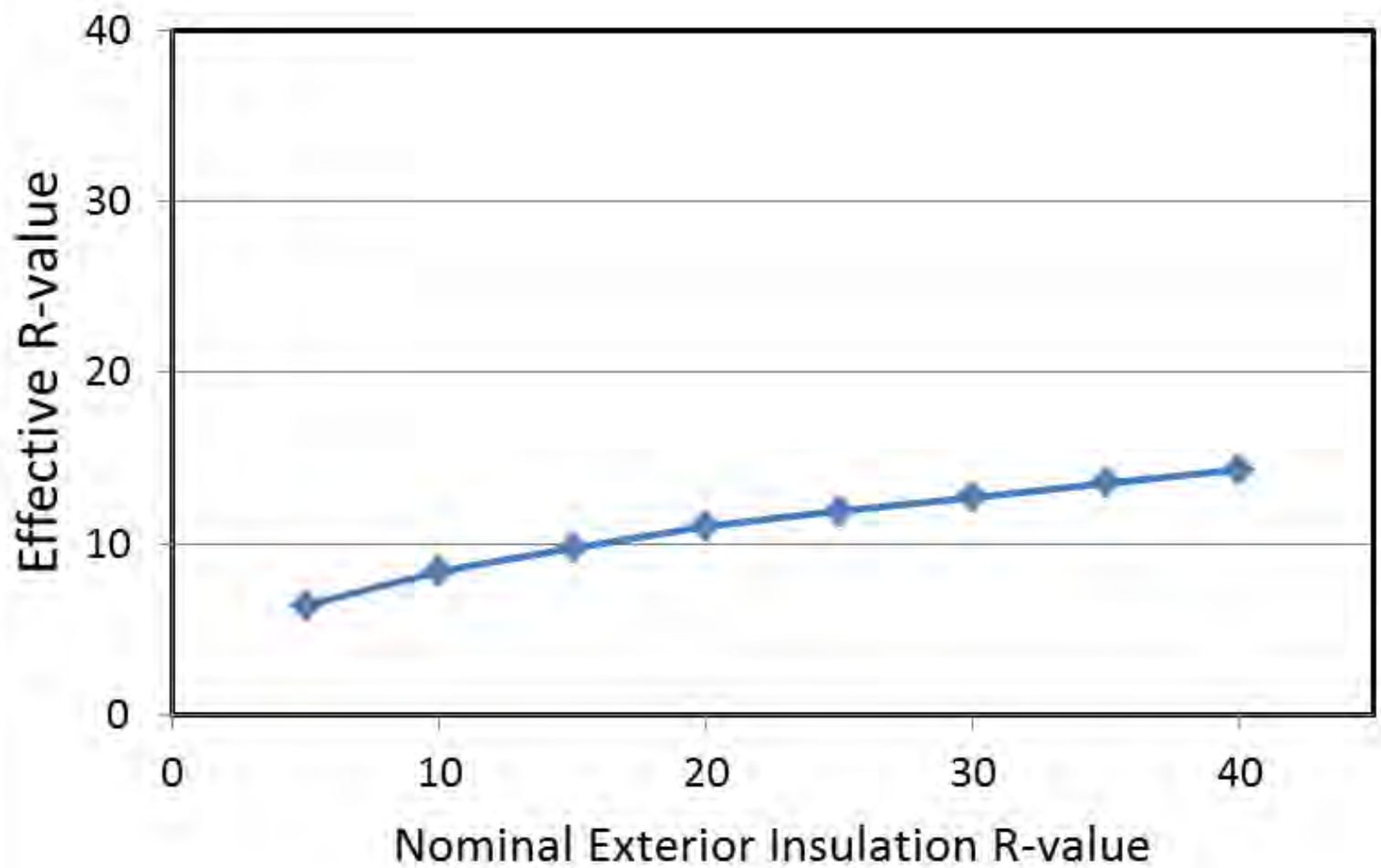
U_{SI} value = 0.477 (Effective R-value 11.9)

Fails to meet NECB requirements (even with R-40)

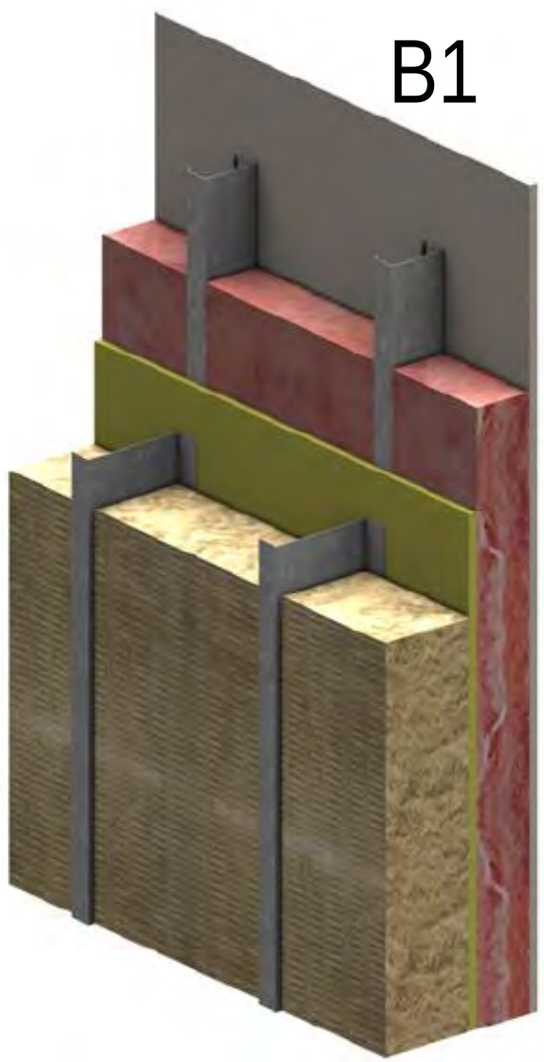
Continuous insulation must really be continuous to be effective!

IMPACT OF EXTERIOR INSULATION R-VALUE





THERMAL MODELING



Split-insulated 2 x 6 steel frame at 16" o.c.

Metal panel attached by vertical z-girts at 16" o.c.

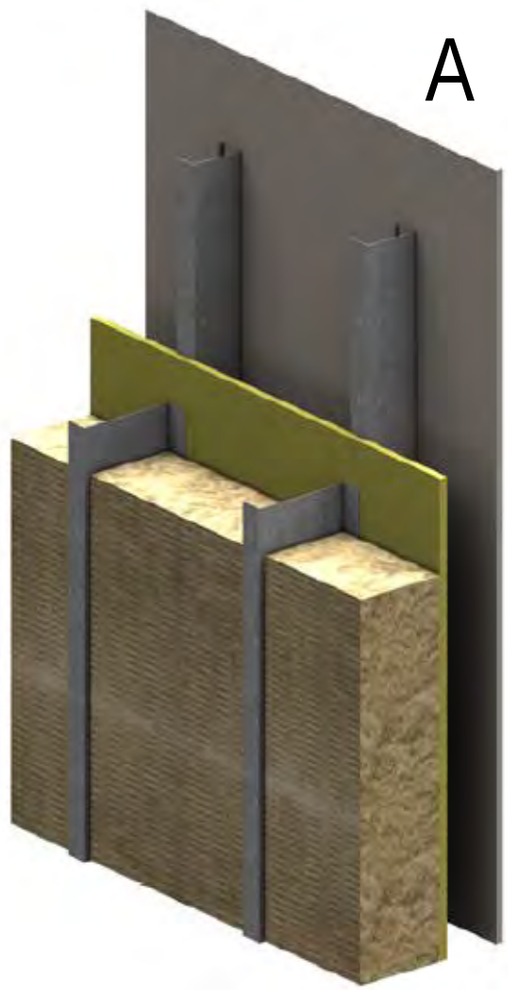
R-20 batt cavity insulation

Generic exterior continuous insulation (R-25)

U_{SI} value = 0.306 (Effective R-value 18.6)

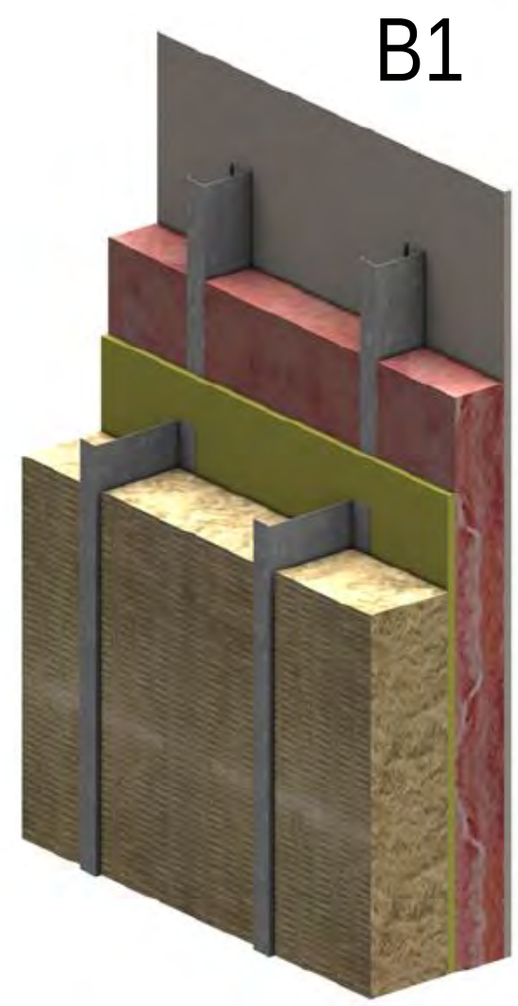
Meets NECB requirements for zone 4

IMPACT OF THERMAL BRIDGING



11.9

(47.6%)

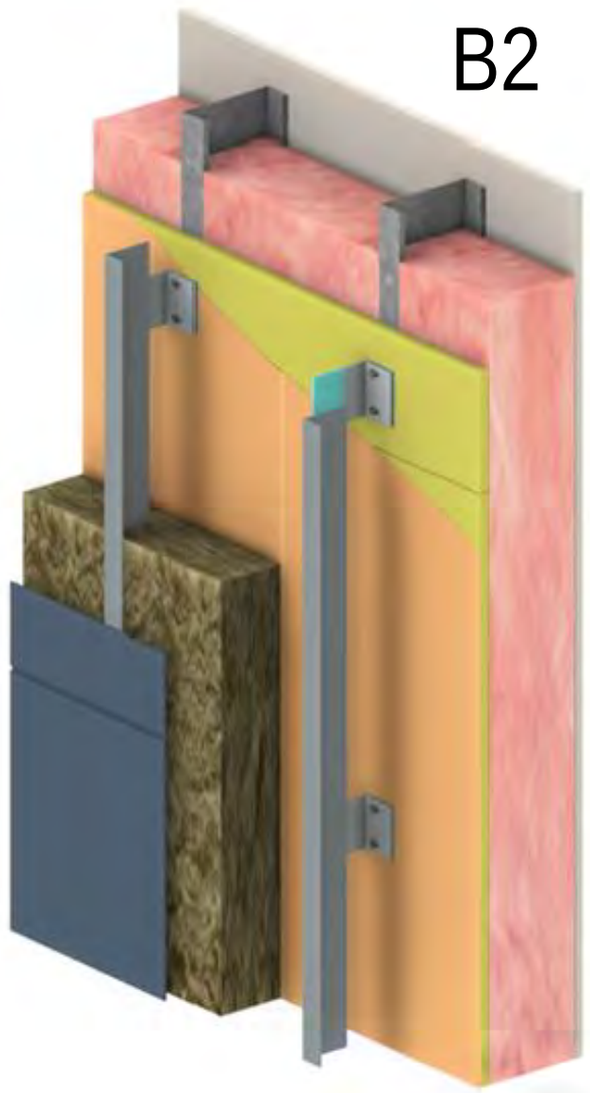


18.6

(41.3%)

R-20 batt addition provides an effective R-7

THERMAL MODELING



Split-insulated 2 x 6 steel frame at 16" o.c.

Metal panel attached by aluminum clip and vertical rail

Spacing at 16" o.c. horizontal and 24" o.c. vertical

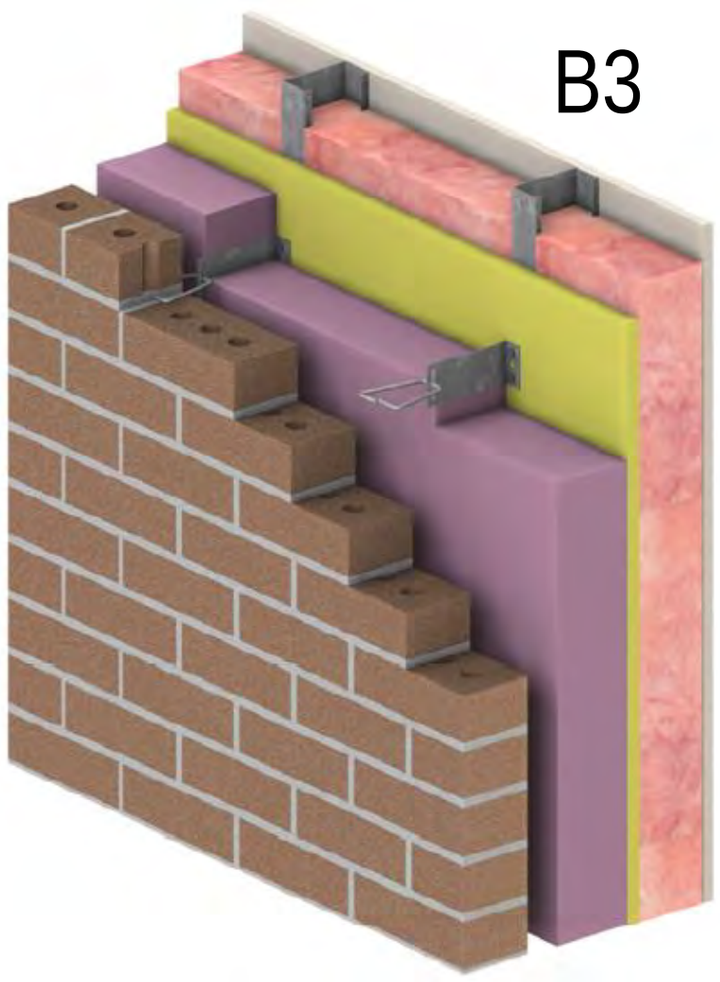
R-20 batt cavity insulation

Generic exterior continuous insulation (R-25)

U_{SI} value = 0.213 (Effective R-value 26.6)

Meets NECB requirements for zones 4-5-6

THERMAL MODELING



Split-insulated 2 x 6 steel frame at 16" o.c.

Brick veneer - ties at 16" o.c. (horizontal and vertical)

R-20 batt cavity insulation

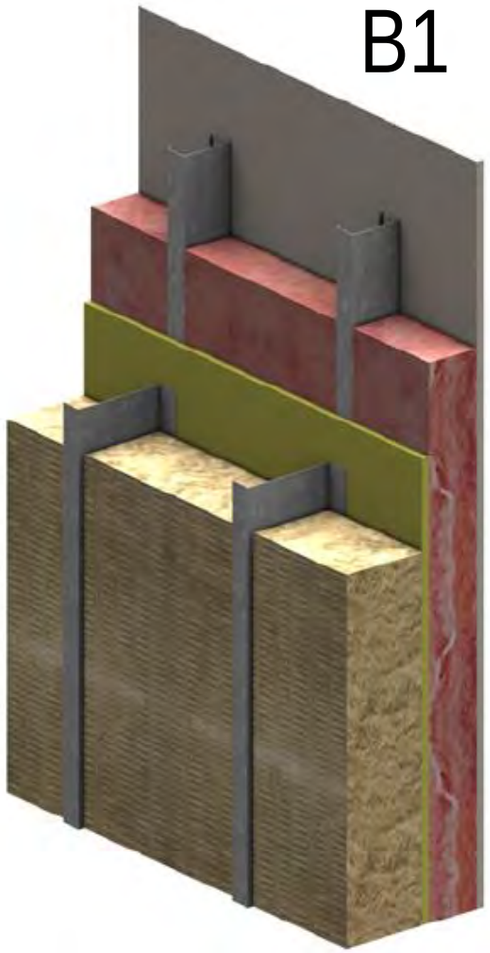
Generic exterior continuous insulation (R-25)

U_{SI} value = 0.194 (Effective R-value 29.3)

Meets NECB requirements for zones 4 to 7

IMPACT OF THERMAL BRIDGING

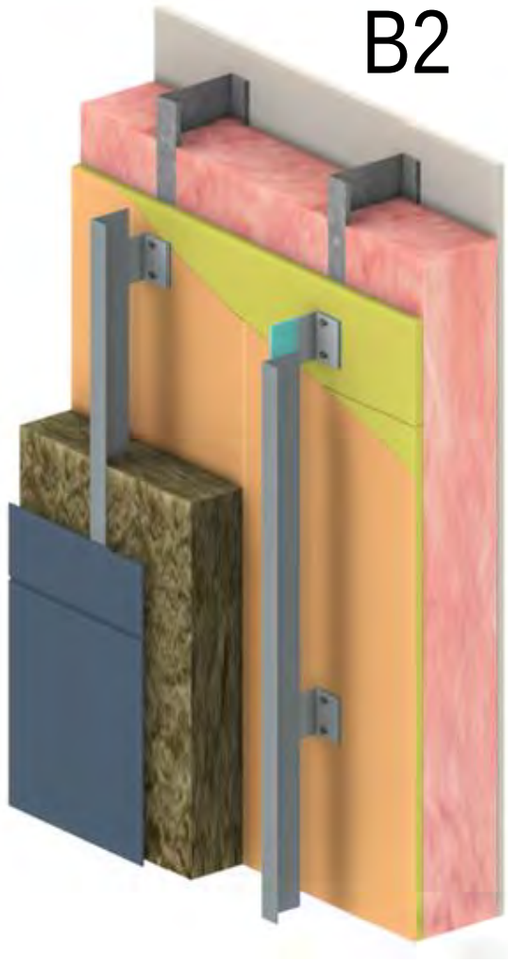
B1



18.6

(41.3%)

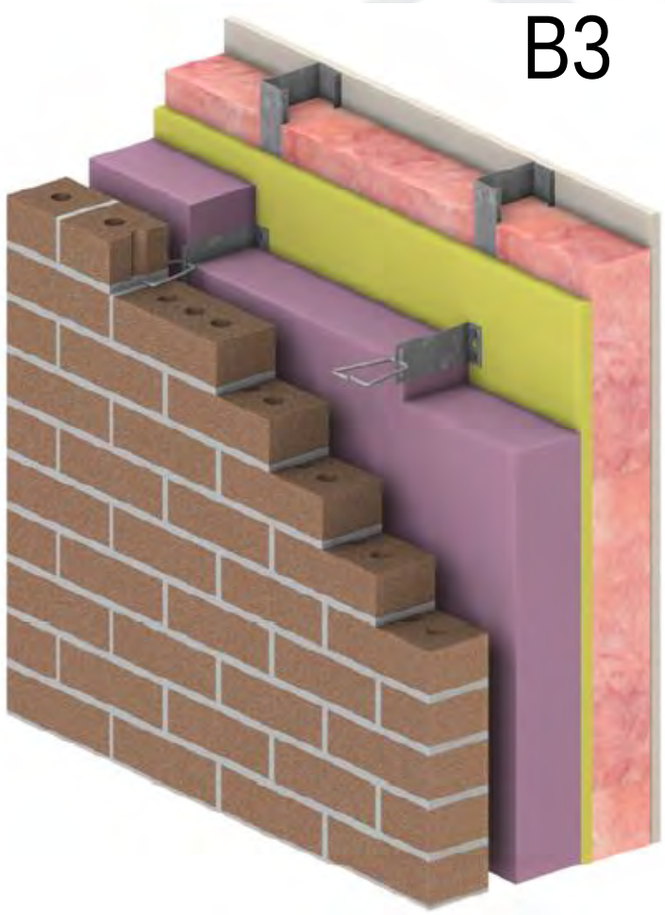
B2



26.6

(59.1%)

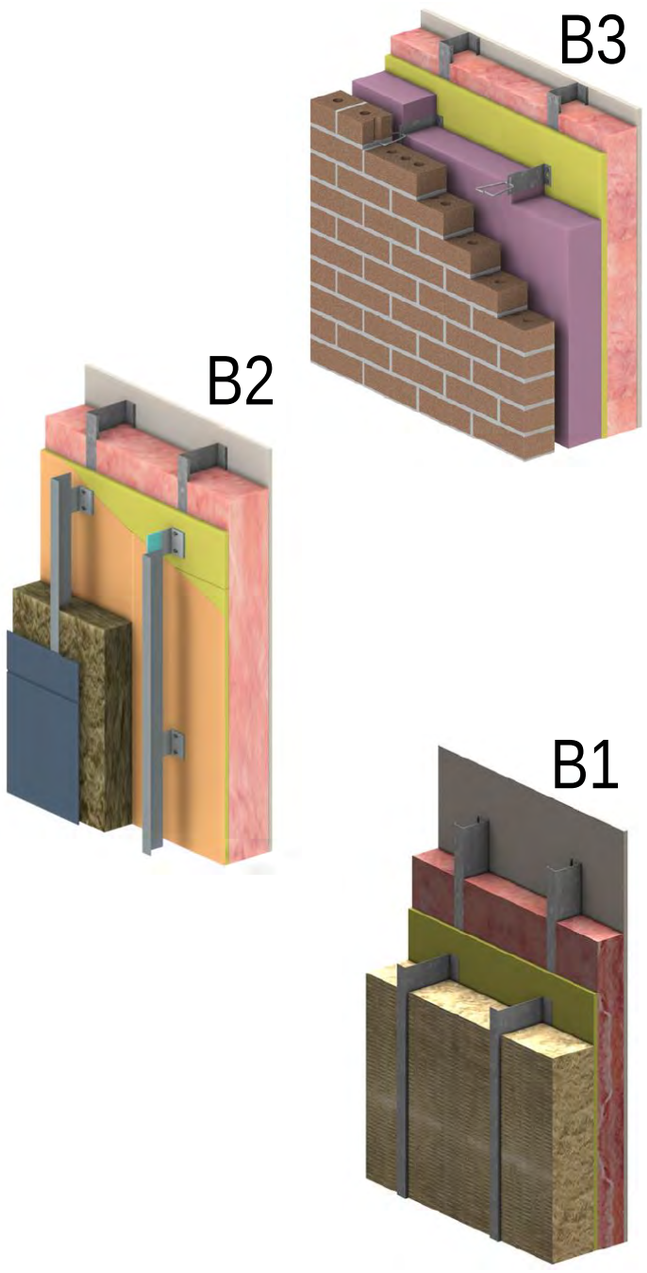
B3

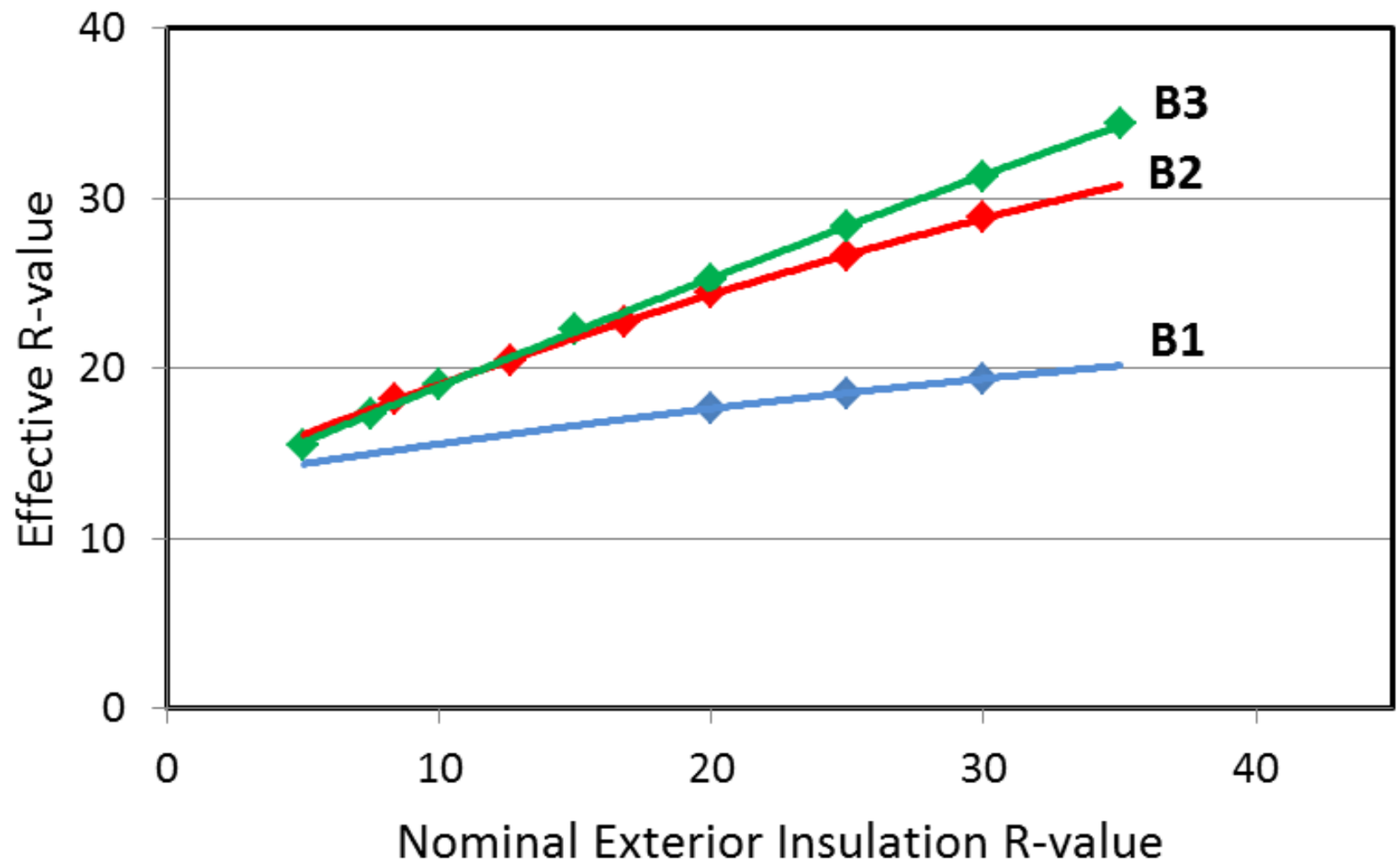


28.3

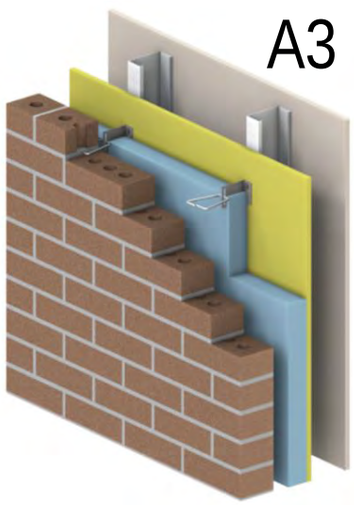
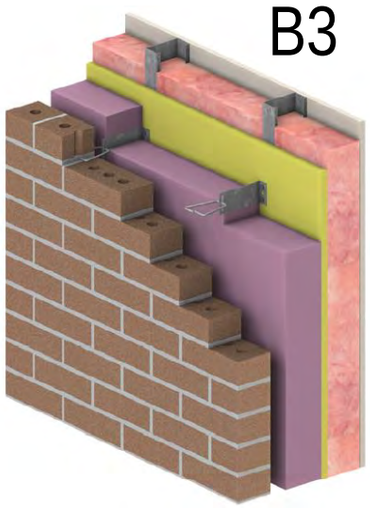
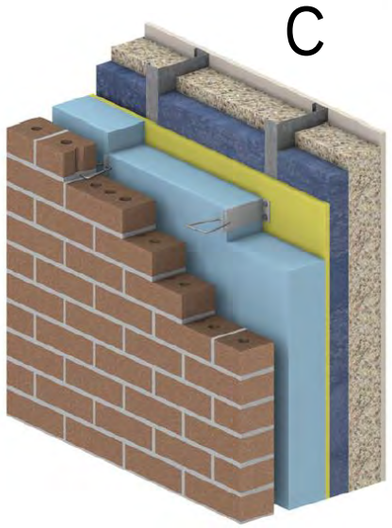
(62.9%)

IMPACT OF EXTERIOR INSULATION R-VALUE

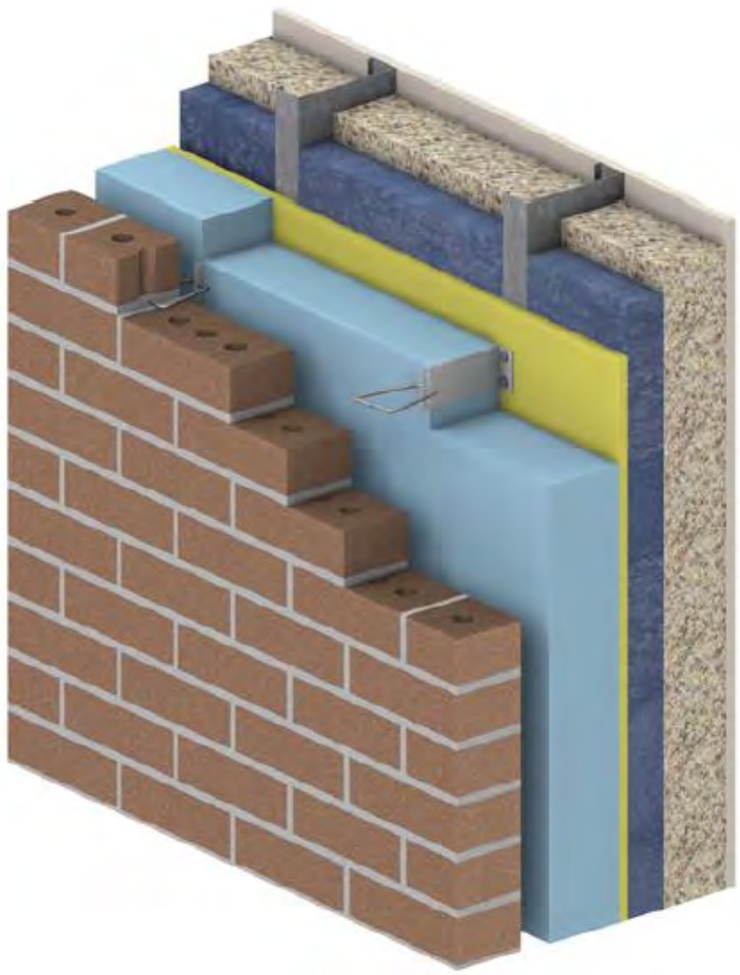




IMPACT OF CAVITY INSULATION R-VALUE

Cavity Insulation	None	R-20	R-24
R-25 Exterior Insulation			
R_{eff}	21.0	28.3	?

IMPACT OF CAVITY INSULATION R-VALUE



Split-insulated 2 x 6 steel frame at 16" o.c.

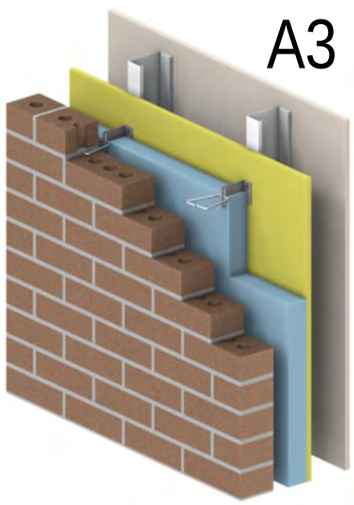
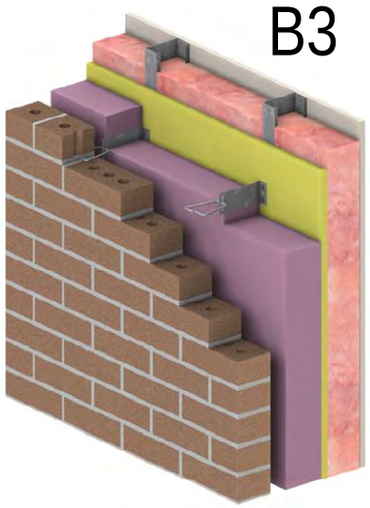
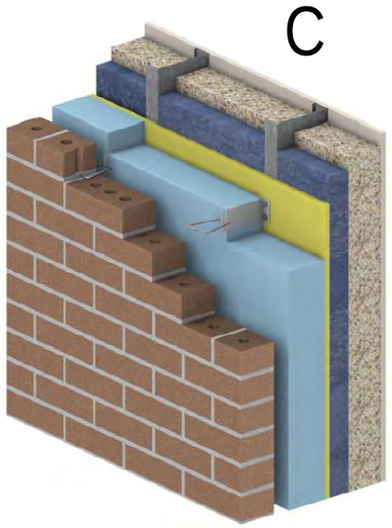
Brick veneer - ties at 16" o.c. (horizontal and vertical)

Cavity insulation combo (SPF & Cellulose) R-24

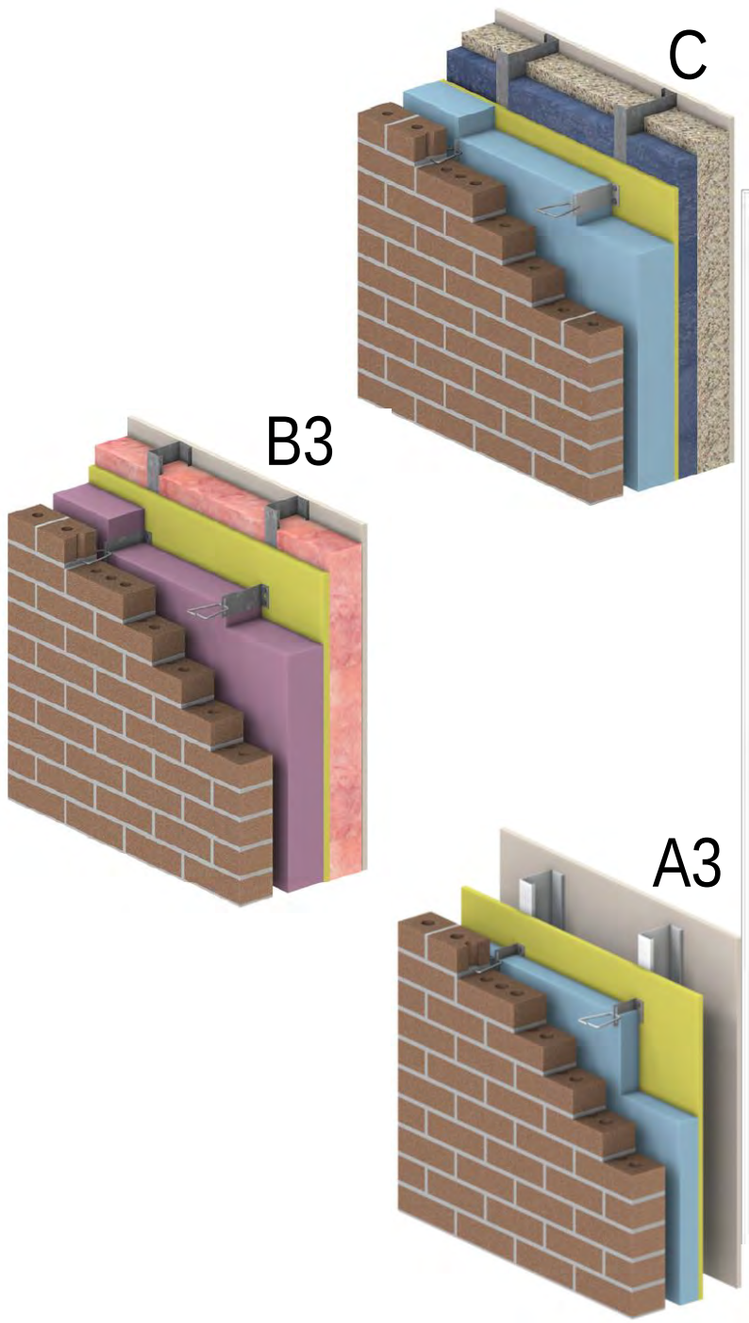
Generic exterior continuous insulation (R-25)

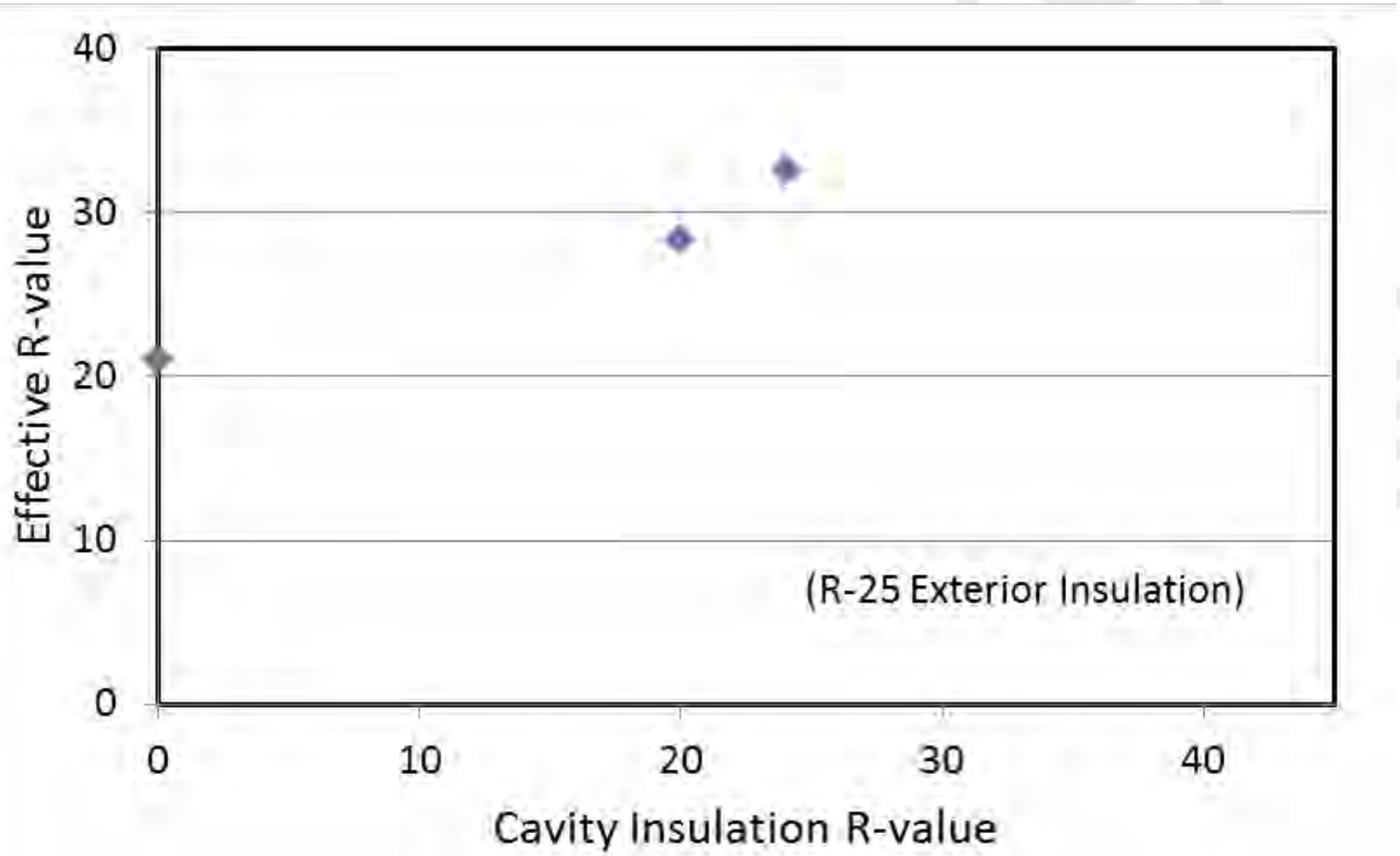
U_{SI} value = 0.174 (Effective R-value 32.6)

IMPACT OF CAVITY INSULATION R-VALUE

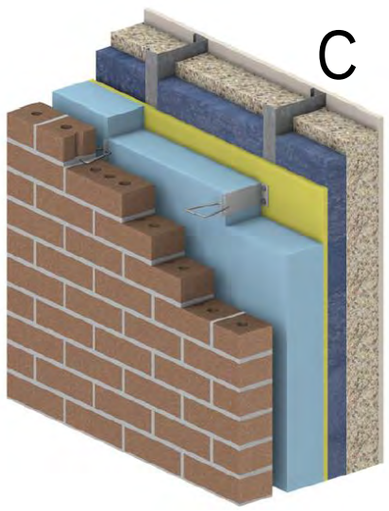
Cavity Insulation	None	R-20	R-24
R-25 Exterior Insulation			
R_{eff}	21.0	28.3	32.6

IMPACT OF CAVITY INSULATION R-VALUE





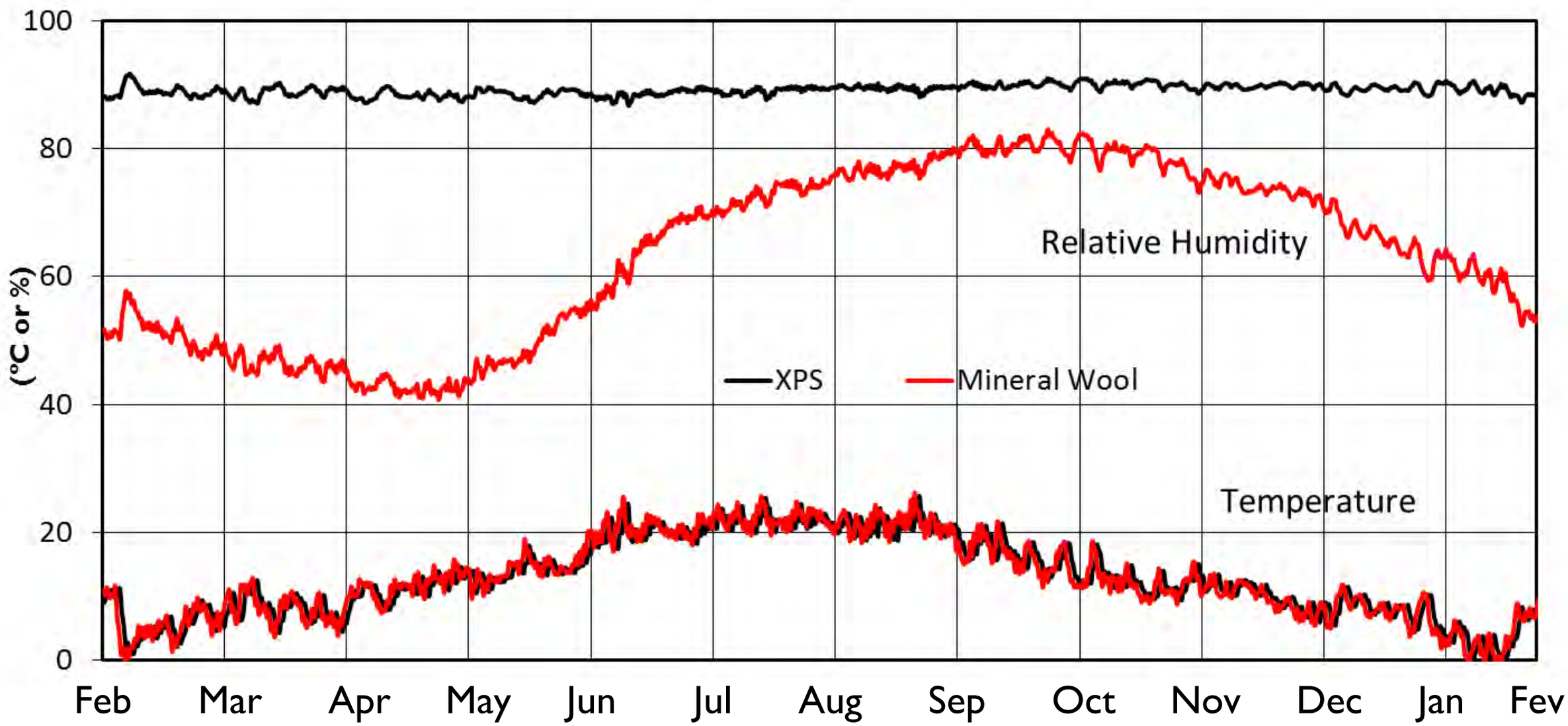
MOISTURE MANAGEMENT



- Simulations done using WUFI Pro software
- 4 climate zones covered
- Impermeable (XPS) and permeable (mineral wool) insulation scenarios

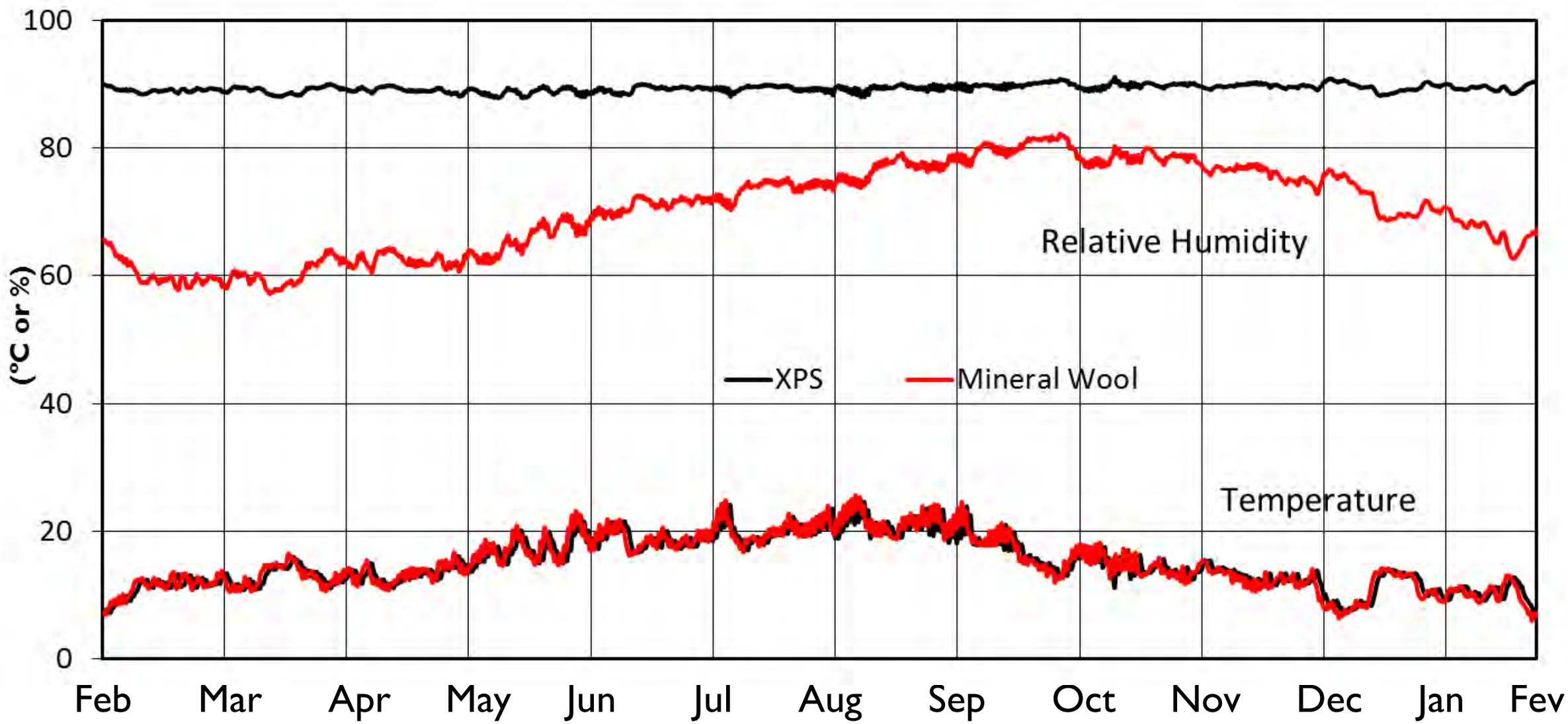
MOISTURE MANAGEMENT

Québec City (Climate Zone 6)



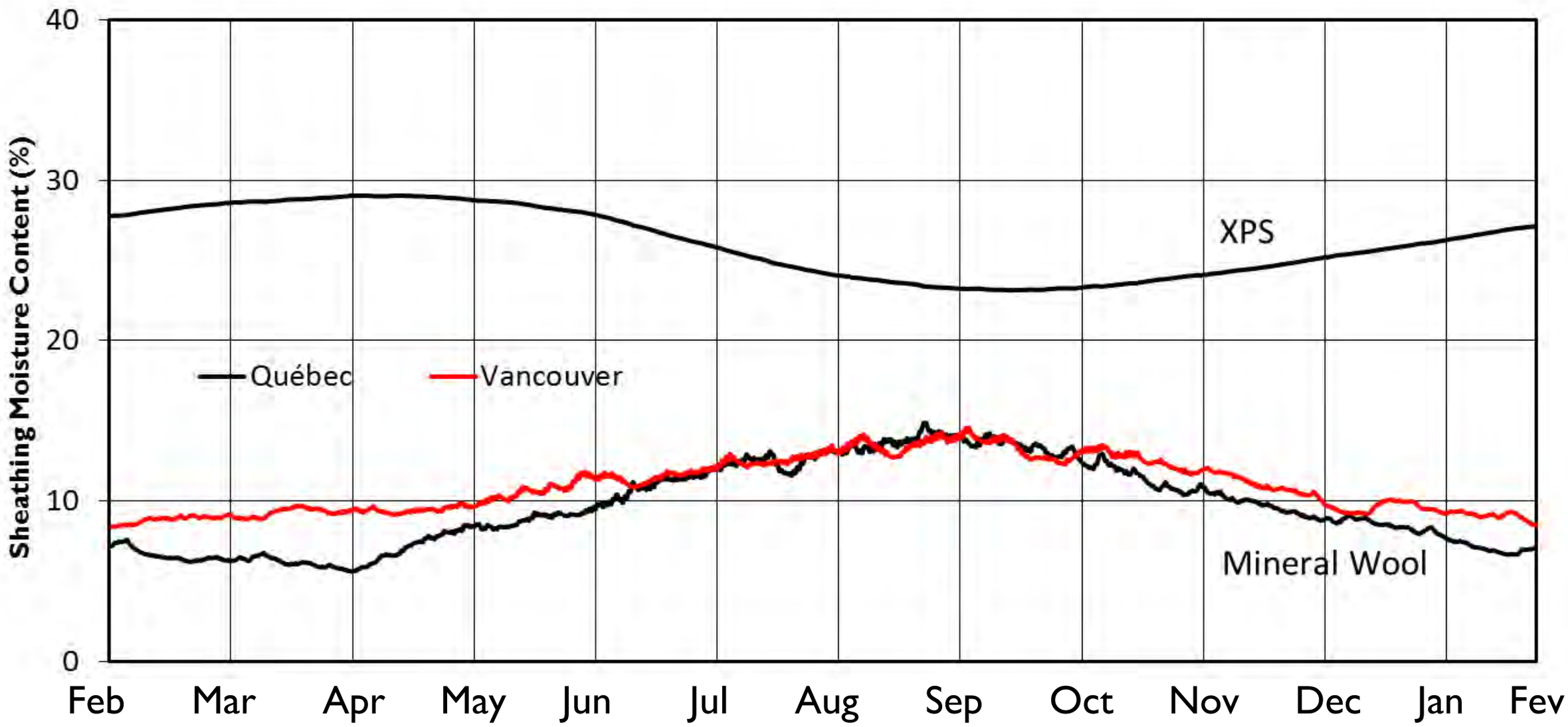
MOISTURE MANAGEMENT

Vancouver (Climate Zone 4C)



MOISTURE MANAGEMENT

Sheathing Moisture Content Evolution



THANK YOU