

Critical Components of “ci” Wall Assemblies Summary Sheet

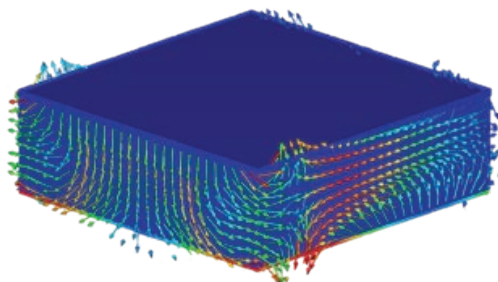
Stimulation of Convective Heat Loss through Mineral Wool in a Rainscreen Facade

Hygrothermal Analysis of Polyisocyanurate Wall Assemblies: Xci CG and Xci Ply

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What the study analyzes:

The building science of ventilated rainscreen design using continuous insulation to help understand the critical elements of air, moisture and thermal management, creating modern energy-efficient walls, integrating greater simplicity, improved climate adaptability and increased moisture resilience.



Claim:

Mineral wool manufacturers (MW) claim their product is the best choice for continuous insulation in a ventilated rainscreen exterior wall due to its ability to get wet and dry out while maintaining R-value.

Facts:

- Air movement helps MW dry quickly, but also has detrimental consequences. Trapping air between fibers is how MW gets its R-value. If air is moving, the R-value is significantly reduced.
- Computational Fluid Dynamics (CFD), the use of applied mathematics, physics and computational software is used to visualize how air flows and moves, in this study we are able to see how wind affects air movement on the exterior walls of a building.
- Mineral wool is a very porous material, air and moisture can move through it easily.
- Air moves freely through MW laterally by forced convection: the transfer of heat from one place to another by the movement of fluids. We know from the CFD study that this is how wind moves air on the face of all sides of a building. Air also moves in the very small gaps between the gypsum sheathing and the MW board.

(continued)

Example:

With a 15 mph wind velocity the thermal resistance of MW is reduced by a minimum of 30%. R-value is 4.3 per inch is now 3 per inch. At higher wind speeds it is actually even lower.

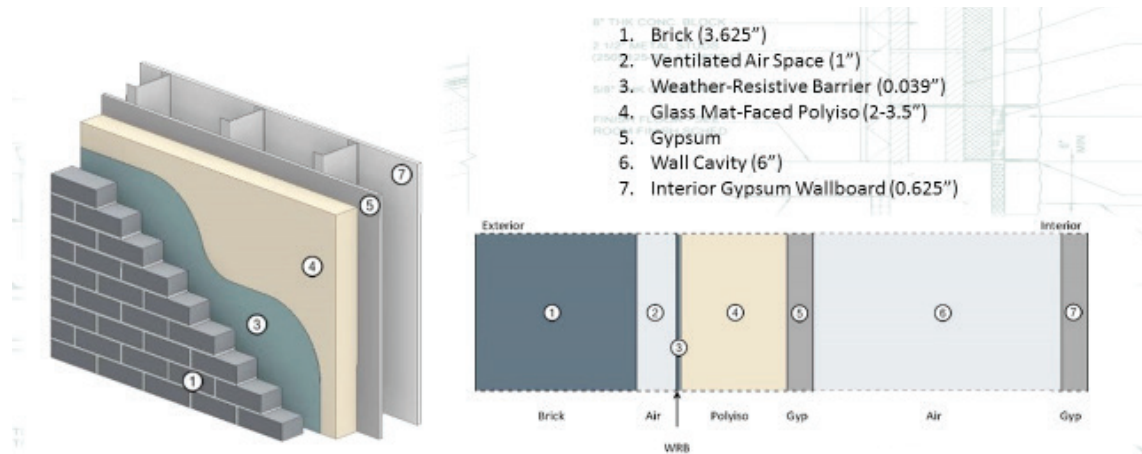
Solution:

Use Xci CG or Xci Ply with a vapor permeable barrier on the outside of the insulation and an empty stud cavity.

From a hygrothermal view walls built this way (see drawings) deliver four critical attributes for a superior performing wall.

1. Ease of installation
2. Economical
3. Forgiving when dealing with moisture, what little gets through can dry to the inside or the outside.
4. Meets Prescriptive U value as designated by IECC 2015 Code:
 - 2" polyiso in Zone 1 and 2
 - 2.5" in Zones 3–7
 - 3.5" for Zone 8

Simplified Wall Assembly with Xci CG and Gypsum



Simplified Wall Assembly with Xci Ply

