



Masonry Advisory Council

MASONRY ADVISORY COUNCIL

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Steel stud wall systems face several design challenges; from meeting structural requirements to effective insulation values. Current typical conventional steel stud construction is as follows: interior gypsum, optional vapor barrier, 4”-6” steel studs filled with R-11 to R-19 fiberglass batt insulation, exterior gypsum board, air barrier, air space, and a brick exterior. Two issues are apparent in this system; R-value effectiveness and moisture in the system.

ASHRAE 90.1 (below) addresses the correction factor for R-values when constructing the conventional design outlined above. 90.1 lists the effectiveness of batt insulation between steel studs, to be anywhere from 35-60% effective depending on stud spacing and insulation R-values. The correction factors account for thermal inefficiencies every 16” or 24,” based on steel studs with an R-value of roughly 0.1 per inch. These thermal bridges not only result in a significant reduction in R-values for your wall system, but they also pose an issue of condensation at the steel studs. Interior and exterior dust shadowing/staining may also occur at the location of the studs where colder air is present.

Nominal Framing Depth and Spacing	“Labeled” batt insulation R-Value (between steel studs)	“Effective” R-Value with batt insulation and steel studs	Wall thermal efficiency ⁽¹⁾
4” @ 16” on center	R-11	5.5	50%
	R-13	6.0	46%
	R-15	6.4	43%
4” @ 24” on center	R-11	6.6	60%
	R-13	7.2	55%
	R-15	7.8	52%
6” @ 16” on center	R-19	7.1	37%
	R-21	7.4	35%
6” @ 24” on center	R-19	8.6	45%
	R-21	9.0	43%

⁽¹⁾- Data Source: ASHRAE/EIS Standard 90.1 – 1999, Appendix A.

Below is a website with a research study done by Canada Mortgage and Housing Corporation entitled “Performance of a Brick Veneer/Steel Stud Wall System” dated May 13, 2002.

http://www.cmhc.ca/en/imquaf/himu/himu_004.cfm

The study was done over a 7-year period with the conventional construction described above and closely monitored by thermocouples, relative humidity sensors, moisture sensors, and pressure taps. The wall was opened after 4 years and the results are startling. Building paper and exterior gypsum board were very wet with significant amounts of mildew, minor corrosion of the building frame, and the fiberglass batt insulation was wet.