Technical Report

Calculated Thermal Performance for a Hybrid Insulation with AA2 Reflective Insulation

Prepared For:

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Background

A hybrid thermal insulation assembly intended for use on masonry block wall construction has been evaluated using published material R-values. The assembly consists of five layers as follows.

1. A ½-inch thick layer of 100 lb_m/ft^3 stucco
2. Eight-inch masonry block wall with and without core insulation
3. A ½-inch thick continuous layer of polystyrene cellular plastic insulation ("Flex-Foam")
4. A region with nominal 1 by 2 inch furring strips that are 16 or 24 inches on-center with Fi-Foil AA2 reflective insulation in the air space between the furring strips
5. A layer of ½-inch thick drywall

Exterior surface-to-interior surface R-values were calculated for a path through the insulated region and for the total wall. U-values were based on the total wall R-value plus interior and exterior air-film resistances.

Results

Thermal data shown with source "ASHRAE" were taken from Chapter 26 of the 2017 ASHRAE Handbook-Fundamentals. The R-values used in the calculations are listed in Table 1.

Table 1. Thermal Data

Item	R-value ($ft^2 \cdot h \cdot °F/Btu$)	Source
Exterior air film-winter	0.17	ASHRAE
Exterior air film-summer	0.25	ASHRAE
Stucco layer (Layer 1)	0.075	ASHRAE
Masonry Block wall – no core insulation (Layer 2)	1.04	ASHRAE
Masonry Block Wall – Foam- core insulation (Layer 2)	3.1	Series-Parallel Model
Flex Foam (Layer 3)	1.64	R&D Services Report RD20370
Enclosed airspace with AA2 (Layer 4)	4.10	C1363
Furring strips	0.91	ASHRAE
Drywall (Layer 5)	0.455	ASHRAE
Interior air film (high emittance)	0.68	ASHRAE

Table 2 contains R-values ($ft^2 \cdot h \cdot °F/Btu$) and U-values ($Btu/ft^2 \cdot h \cdot °F$) results for summer and winter conditions. Surface-to-surface R-values are shown for the heat-flow path through the insulated region and for the whole wall. The U-values include the exterior and interior air-film thermal resistances. The wall types include masonry block structure with no insulation in the cores and masonry block structure with foam insulation having R-value per inch of thickness of 4.91 in the core.

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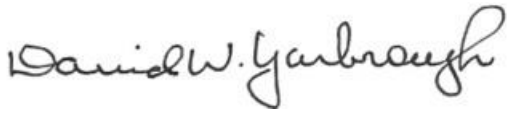
Table 2. Calculated R-values and U-values

Wall Type	Season	R-cavity path	R whole wall	U-value
No core insulation – 16 in. OC framing	Summer	7.31	6.71	0.131
	Winter	7.31	6.71	0.132
No core insulation – 24 in. OC framing	Summer	7.31	6.89	0.128
	Winter	7.31	6.89	0.129
Insulated core – 16 in. OC framing	Summer	9.37	8.77	0.103
	Winter	9.37	8.77	0.104
Insulated core – 24 in. OC framing	Summer	9.37	8.95	0.101
	Winter	9.37	8.95	0.102



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