Dynamic R-Value Equivalent & Dynamic Benefit for 9", 11", 13" and 15" Reward iForm® Insulating Concrete Form (ICF) Walls[1]

Including the Effect of Whole-Building Energy Use and Infiltration [2]

IECC climate zone	Representative city	Reward Steady-state R-value[3] h·ft²·°F/Btu				Dynamic R-value Equivalent[3,4] h·ft²·°F/Btu				Dynamic Benefit for Massive Systems[5] (DBMS)			
		9-inch iForm	11-inch iForm	13-inch iForm	15-inch iForm	9-inch iForm	11-inch iForm	13-inch iForm	15-inch iForm	9-inch iForm	11-inch iForm	13-inch iForm	15-inch iForm
1A	Miami, FL	24.2	24.3	24.4	24.5	> 1000[6]	> 1000	> 1000	> 1000	> 40	> 40	> 40	> 40
2A	Houston, TX	24.2	24.3	24.4	24.5	> 1000	> 1000	> 1000	> 1000	> 40	> 40	> 40	> 40
2B	Phoenix, AZ	24.2	24.3	24.4	24.5	> 1000	> 1000	> 1000	> 1000	> 40	> 40	> 40	> 40
3A	Memphis, TN	24.2	24.3	24.4	24.5	> 1000	> 1000	> 1000	> 1000	> 40	> 40	> 40	> 40
3B	El Paso, TX	24.2	24.3	24.4	24.5	> 1000	> 1000	> 1000	> 1000	> 40	> 40	> 40	> 40
3C	San Francisco, CA	24.2	24.3	24.4	24.5	> 1000	> 1000	> 1000	> 1000	> 40	> 40	> 40	> 40
4A	Baltimore, MD	24.2	24.3	24.4	24.5	200	200	200	200	8	8	8	8
4B	Albuquerque, NM	24.2	24.3	24.4	24.5	200	200	200	200	8	8	8	8
4C	Salem, OR	24.2	24.3	24.4	24.5	250	250	250	250	10	10	10	10
5A	Chicago, IL	24.2	24.3	24.4	24.5	125	150	150	150	5	6	6	6
5B	Boise, ID	24.2	24.3	24.4	24.5	125	125	125	125	5	5	5	5
6A	Burlington, VT	24.2	24.3	24.4	24.5	150	175	175	175	6	7	7	7
6B	Helena, MT	24.2	24.3	24.4	24.5	125	125	125	125	5	5	5	5
7	Duluth, MN	24.2	24.3	24.4	24.5	125	125	125	150	5	5	5	6

Notes

1. This table, including all six notes, can only be reproduced in its entirety. This table should be used only as an answer to the question: “What wall R-value should a house with wood frame walls have to obtain the same space heating and cooling energy consumption as a similar house with Reward iForm walls?”
2. Infiltration and fresh air intake is 0.15 air changes per hour (ACH) for the Reward iForm house and 0.35 for the wood frame house.
3. R-values include thermal resistances of exterior air film, exterior sheathing, interior sheathing, and interior air film, which total approximately 2 h·ft^2·°F/Btu. The concrete thicknesses for the 9-, 11-, 13-, and 15-in. Reward iForm walls are 4, 6, 8, and 10 in., respectively. Steady-state R-values are based on measurements by others.
4. Dynamic R-value Equivalent is the wall R-value of a house with wood frame walls that has the same space heating and cooling energy consumption as a similar house with Reward iForm walls, assuming different infiltration values for the houses (see note 2).
5. Dynamic Benefit for Massive Systems (DBMS) is a dimensionless multiplier of steady-state R-value to enable simple comparisons of dynamic energy performance of wall systems. The product of DBMS and steady-state R-value is called “Dynamic R-value Equivalent for Massive Systems.” [Kosny, J. and others, Building Technology Center, Oak Ridge National Laboratory, 1998.] In this table the DBMS also includes reduced air infiltration for Reward iForm walls.
6. The Dynamic R-value Equivalent is greater than 1000 in some cases because additional insulation in a wood frame wall cannot make up for the energy savings in a Reward iForm wall due to its thermal mass and reduced air infiltration. For example, in this case (Miami), the total annual heating and cooling load for the wood frame wall with R-13 insulation is 59 million Btu, with R-1000 insulation it is 50 million Btu, and for the Reward iForm wall it is 48 million Btu.

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