



# BLUE HOUSE ENERGY

From Green Building Listserve

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Tue Oct 30 13:48:49 EDT 2007

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Ahhhh, does the bubble-wrap never go away? Here's the word on this product directly from Natural Resources Canada, supported by other North American agencies. Please note the R-values and the specific installation/placement of the material, and see note #1 for the biggest challenge to the claims of the manufacturers: extrapolating from existing standards for materials with different capacities etc. does not a qualified test make.

As a result of countless inquiries from the general public, building contractors and building professionals concerning claims made by manufacturers of foil-faced bubble insulation (FFBI) products, Natural Resources Canada (NRCan) has prepared the following information dealing with the effective thermal resistance (RSI/R value) of FFBI and other non-bubble structure types of products for the purpose of modeling under its energy efficiency housing initiatives.

Canada Mortgage and Housing (CMHC), the National Research Center (NRC) and other various agencies across North America have performed studies on reflective films, such as foil-faced or foil embedded bubble insulation, and caution potential buyers about exaggerated claims and limitations of these products. Currently, despite advertisements and comments made by manufacturers and salespeople in the Canadian marketplace, and unless otherwise proven by a respected third-party testing agency against a recognized standard for the testing of such reflective materials, NRCan recommends the following effective thermal resistance maximum values for FFBI products when modeling them with HOT2000™ software.

RSI 0.26 (R 1.5) where the bubble layer is between two layers of foil without air spaces in front of the foil.

RSI 0.53 (R 3) where the bubble layer is between two layers of foil with only one air space in front of the interior facing foil.

RSI 0.62 (R 3.5) where the bubble layer is between two layers of foil with air spaces in front of the foils.

RSI 0.62 (R 3.5) where the foil layer is between two clear layers of bubbles acting as air spaces

Refer to #5 below for information on the thermal resistance of other foil-faced products that do not incorporate an air bubble structure.

Issues Concerning FFBI Products:

1. There is no specific ASTM standard (American Society for Testing and Materials) applicable to FFBI products by which to rely upon. Manufacturers refer to various standards and extrapolate portions of various tests to indicate how the product will perform overall in the house. Therefore, it is currently extremely difficult to obtain proven, unbiased, third-party technical data on FFBI products.

2. The United State's Federal Trade Commission (FTC) has explicitly stated that manufacturers in the U.S.A. must label their product with its basic R-value for the materials involved. This is the same method that NRCan uses for its rating of up to RSI 0.26 (R 1.5), where there is no air space. If the foil product is installed with an adjacent air space or other system, such as a layer of clear bubbles, then the FTC states that a "system R value" can be labeled to include the benefits of the material's reflective qualities together with its basic R value. In Canada, no such information has yet been found on Canadian labeled products. It is important to note that in order to benefit from the system R values, the air space must be present and reflective coatings must be clean. Even the clear plastic bubbles can reduce reflectivity and overall performance. For a report on a system R value by the Canadian Construction Materials Centre (CCMC), visit

[http://irc.nrc-cnrc.gc.ca/pubs/ci/v4no2/v4no2\\_7\\_e.html](http://irc.nrc-cnrc.gc.ca/pubs/ci/v4no2/v4no2_7_e.html).

It should be noted that due to the very complex nature of evaluating FFBI insulating products and their

reflective/insulating properties, they are best evaluated as part of an assembly (e.g., wall, floor, slab and ceiling). Unfortunately, very little third party assembly testing has been undertaken to date.

3. The majority of heat loss in the average Canadian home is from conductive heat loss and air leakage (not including windows). However, for houses with in-floor hydronic or electrical radiant heating, no substantial figures for radiant heat loss versus conductive heat loss are readily available (especially from basement floors). Nonetheless, leading manufacturers and researchers of in-floor hydronic heating systems do NOT recommend anything but foam based sub-slab insulation. You will not find reflective type sub-slab bubble insulation products or foil faced foam products in their manuals at this time. This includes bubble insulation where the reflective foil is between two clear layers of bubbles. An interesting report by CMHC on the Comparison of Under-Floor Insulation Systems can be found at: <http://www.cmhc.ca/od/?pid=63728>. The bubble insulation foil used in this report is the type where the reflective foil is between two clear layers of bubbles.

4. According to the Reflective Insulation Manufacturers Association (RIMA), "Reflective vapour/air barrier products and reflective sheathing can, if properly installed, provide additional thermal resistance to wall and ceiling assemblies. To do so the surfaces must be faced with intervening airspaces and the surface characteristics of the reflective material must remain unchanged. The NRC has indicated that the thermal resistance of a 20-mm airspace with two reflective surfaces would be RSI 0.61 (R 3.46) for wall applications. However, the absence of an airspace on either side of the insulation prevents any additional reflective thermal resistance. In such applications these products are expected to provide a maximum of RSI 0.26 (R 1.5), assuming the bubbles remain intact and unperforated."

5. If modeling a reflective foil film with or without a laminated layer of foam or fibre-based insulation board and there is a dead air space of 12 - 22 mm ( $\frac{1}{2}$  inch to 1 inch), NRCan will accept an RSI value of 0.26 (R 1.5) for the foil and dead air space. If a layer of insulation is laminated to the foil with its adjacent air space, then also add the insulation's RSI/R value. For the RSI/R value of the laminated insulation itself, use the values in Appendix 1 of the Energy Advisor Workshop Manual or other reliable sourced value). As noted, if there is no air space, then just calculate the value of the insulation (single-layer foil membranes without an airspace have an RSI/R value of 0). If there is the possibility of air movement within the air space, the air currents (mass flow or convective air current) may negate the value of the reflective foil.

NRCan does not discredit other valuable characteristics of foil-faced bubble insulation, such as its flexibility, its air/vapour barrier characteristics or its use to reflect solar radiation in cooling climates. The intent of this paper is only to provide information on the effective insulation value accepted by NRCan for this type of product, for the purpose of modeling houses under its energy efficiency housing initiatives.