

## **Building Systems - Underslab Insulation**

**\*\*[NEW Advisory](#)\*\***

Part I, Research and Science versus Manufacturers Claims

[Part II, Solutions & Facts, Types, Performance Characteristics, Specifications](#)

For over 25 years years I've seen building products come and go and none has been as entertaining as the ebb and flow of insulating products particularly the reappearance of what I call reflective [bubble 'faux' insulation](#) or snake oil foil for under slab radiant applications. The more we dig into this the more we are realizing this is a case of marketing masquerading as science and solutions looking for problems where none exist.

According to the government run [Consumer Sentinel](#) protection services, Shop at Home/Catalogue Sales is one of the highest ranked frauds in North America so if you are considering purchasing reflective bubble "faux" insulation online or at a distribution outlet - read these excerpts and links from around the world...

[NRC-IRC, Institute for Research in Construction](#) , 1991

"...multiple reflective materials do not address conduction and convection losses in building envelope cavities well enough to warrant their use in colder climates...The reduction in heat loss suggested by the product literature, however, was not achieved...In terms of cost, reflective materials are subject to the same principles of diminishing returns as conventional insulation. If it is not cost-effective to add more conventional insulation, it is probably not cost-effective to add a radiant barrier."

[The North American Insulation Manufacturers Association](#), 1999

"In determining the R-value of reflective insulation, NAIMA believes evidence supports that the detrimental impact of dusting and corrosion frame the evaluation of thermal performance. The Department of Energy's ("DOE") "Radiant Barrier Attic Fact Sheet," issued in June 1991, reported laboratory measurements verifying that dust on the surface of aluminum foil increases the emissivity and decreases the reflectivity. Based on this finding, the DOE concluded that "dust or other particles on the exposed surface of a radiant barrier will reduce its effectiveness." Thus, observed the DOE, reflective insulation installed in locations that collect "dust or other surface contaminant will have a decreasing benefit to the homeowner

over time." For instance, when DOE monitored reflective insulation installed in a dusty attic, researchers observed that 50 percent of the insulation's effectiveness dissipated after the first year of installation"

[Canadian Construction Materials Centre Evaluates Thermal Resistance of Low Emissivity Sheet Material](#), 1999

"When the low emissivity sheet material is installed in the wall system...the effective R-value of this material in combination with the air spaces and the strapping material (furring) used to create the air spaces will account for about 26% of the thermal resistance of the wall, whereas the low emissivity material itself will account for only about 5%. (The RSI value of the material is in the order of 0.18.)

[Louisiana Department of Natural Resources, Insulation Comparison Demonstration, Funded By U.S. Department of Energy](#), 1999

"Our comparison tracked the amount of energy required to maintain the interior temperature of the three buildings at a constant 72 degrees F. In this demonstration mass insulation, using fiberglass, required less energy to maintain the set point temperature, for all four seasons, than did either the radiant barrier building...The radiant barrier building required more energy than the fiberglass building...to maintain the set point temperature for all four seasons. In this specific comparison, the fiberglass insulated building performed the best out of the three buildings."

[ASHRAE Fundamentals Handbook](#), 2001

"Values for foil insulation products supplied by manufacturers must also be used with caution because they apply only to systems that are identical to the configuration in which the product was tested. In addition, surface oxidation, dust accumulation, condensation, and other factors that change the condition of the low-emittance surface can reduce the thermal effectiveness of these insulation systems (Hooper and Moroz 1952). Deterioration results from contact with several types of solutions, either acidic or basic (e.g., wet cement mortar or the preservatives found in decay-resistant lumber)."

[The North American Insulation Manufacturers Association](#), 2001

"...one can only conclude that the reflective bubble pack products do not meet the

International Mechanical Code (IMC). Since all other model codes incorporate similar if not more stringent requirements, it is unlikely that the reflective bubble pack insulations meet any of the model mechanical codes."

[Energy Design Update](#), November 2003

A Note on the 2003 Energy Design Update article: You will need a subscription to obtain the complete text wherein several bubble foil firms made these apologies, "...apologies to anyone confused by the statement", "This was an oversight on our part", "we realized it was erroneous", "apologize for the misconstrued quote". (To RIMAs credit they are doing their best to curb this behavior but many other unscrupulous firms continue to sell the snake oil foil story for under slab applications to unsuspecting consumers).

[Federal Trade Commission Requirements](#), 2003

"The R-value Rule specifies substantiation and disclosure requirements for thermal insulation products used in the residential market, and prohibits certain claims unless they are true.

[CMHC Comparison of Under Floor Insulation Systems](#), 2004

"The bubble-pack insulation had a low insulating value compared to the polyurethane panels and the XPS board. It's cost benefit was the poorest of all insulating materials tested."

[Plumbing & HVAC Product News](#), 2004

"The floor we tested with bubble foil underneath did not look like it had any insulation underneath," reported senior researcher in the CMHC policy and research division.

[Federal Trade Commission Advisory Letter](#), 2004

"The FTC staff is aware of claims that are being made in the marketplace for foil-faced bubble pack products (or similar reflective or radiant barrier products) installed under concrete slabs. In the staff's view, it may be misleading for industry members to suggest that such foil products will reflect radiant heat when installed under concrete."

[U.S. Department of Energy](#), 2004

In heating dominated climates, they (radiant barriers) aren't very economical nor recommended in most cases. Unlike other insulation, there currently isn't a standard method for equating how well a radiant barrier works. Many manufacturers use the term "equivalent

R-value." This really has no scientific meaning, and it often reflects optimum conditions and not necessarily climate conditions.

[Bad Science, By John Siegenthaler, P.E., 2005](#)

"Imagine a new insulation material with a claimed R-value almost six times greater than standard extruded polystyrene. So high, in fact, that no other established insulation product even comes close to offering the same R-value/thickness combination. When installed below a heated slab, this material makes downward heat losses almost nonexistent. How is such spectacular thermal performance achieved? What have all those scientists at Dow, CertainTeed, Owens Corning and the other insulation giants been missing all these years?"

[Heating, Refrigeration, Air Conditioning Institute of Canada Advisory Letter](#)

In direct reference to bubble foil insulation, "Selecting materials that do not meet the minimum code requirements can significantly affect comfort for the consumer through excessive wasted heat into the ground and could be a very expensive proposition to rectify the condition."

[FTC Stops Allegedly False Claims About Insulation Performance](#), 2006

"The FTC complaint alleged that advertising claims for "The Barrier" exaggerated its R-value by over 600 percent compared to test results and misrepresented other thermal performance characteristics of the insulation. The FTC also charged that labeling for "The Barrier" and Microfoil insulation did not mention the products' R-values or explain the meaning of R-value, as required by law. The complaint also alleged other violations of the R-value Rule, including the publication of ads comparing "The Barrier" to competing products without disclosing the R-value for both products."

[Use of Multi-foil insulation products Compliance with Reg.7 and Req. L1](#), 2006

"In other words, multi-foil manufacturers who have used the comparative testing route are claiming the insulating properties of their product to be approximately three times better than can be verified using existing National or European test standards."

[SUSTAINABLE SOLUTIONS for BUILDINGS](#), 2006

"Testing undertaken by the National Physical Laboratory (NPL) appears to show that a multi-foil insulation product, when tested in a hot box against the internationally accepted standard

for thermal insulation, does not meet claimed insulation values...when tested in accordance with BS EN ISO 8990:1996."

[NHBC Guidance on Multi Foil Insulation](#), 2006

"The NHBC has recently published guidance regarding multi-foil insulation performance in its Standards Extra, to the effect that multi-foils will not be accepted under its warranty arrangements until a consensus on the performance and testing of these materials is achieved."

[TIMSA welcomes clarification of insulation regulations](#), 2006

"This guidance resolves a growing problem whereby claims for thermal resistance of multi-foil materials based on arbitrary testing indicated much higher values than have been obtained when these materials are subjected to proven, relevant standard test procedures – sometimes by a factor of five...over recent years many buildings have been completed with foil materials not certified by accredited bodies which may not even satisfy the standards required by Part L: 2002, putting seriously at risk the Government's stated intention to raise buildings' energy performance standards..."

[Energy Design Update](#) , September 2006

"...the statement is kind of deceptive, because it gives the impression that if you use this product, you will cut the heat flow through the wall by two-thirds, and that clearly isn't true."

[Energy Design Update](#) , September 2006

"...the marketers of P2000\* have made claims about R-value performance that are much higher than those in C-578 and are rightly being challenged to prove it."

[Radiant Panel Association Newsletter](#), 2007

"Reflective foil under a slab, with no airspace, is totally ineffective as an insulator. Reflective foil with a bubble or foam core is only slightly more effective than the bubble or foam by itself."

[The UK Mineral Wool Association](#), 2007

"In recent months the government has moved to give guidance on the use of multifoil insulation...It has written to all local building control departments and to bodies such as the

NHBC...(advising) they could no longer accept the thermal values claimed for (brand x) and similar products"

[Sustainability Magazine](#), 2007

"The architects who specify such products and the building engineers who sign off houses insulated with them may be leaving themselves open to litigation from clients who will understandably be very angry that their new home is not insulated to the required standard."

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This is an excerpt from an advisory from Natural Resources Canada, Released May 2007:

"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 this paper dealing with the effective thermal resistance (RSI/R value) of these and other reflective types of products for the purpose of energy modeling under its energy efficiency housing initiatives."

To read the full text and discuss its content [visit the forum](#).

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This is an excerpt from [Thermal Insulation Manufacturers and Suppliers Association](#), Statement on Multi-foils, Released May 2007:

"...some multi-foil producers have been claiming thermal resistances or U-values based upon unproven, and therefore non-approved, comparative field test methods. These non-approved methods give apparent thermal values significantly better than those obtained using the Hot Box method. TIMSA does not accept thermal resistance values or U-values based on such methods and advises that such values should not be accepted for any project under current Building Regulations: Part L- 2006."

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Other Sources

[De-rating Recommendations for Reflective Aluminium Foil Insulations As a Result of Dust Accumulation](#) by Dr. Richard M Aynsley

[HPAC Engineering, Moisture, Materials, and Buildings](#), by Dr. J.F. Straube

[Radiant Panel Association Technical Bulletin 101](#) (for members)

[Radiant Panel Association Technical Bulletin 220](#) (for members)

[Department of Energy, DOE/CE-0180/with Addendum 1, Insulation Facts CSA B214-01, Installation Code for Hydronic Heating Systems](#)

[ANSI/ASHRAE Standard 90.2-2004, Energy-Efficient Design of Low-Rise Residential Buildings](#)

[Part 1, Answers to questions on snow-melt insulation](#) by [Mark Eatherton](#)

[Part 2, More answers on snow-melt insulation](#) by [Mark Eatherton](#)

[Part 3, Even more answers on snow-melt insulation](#) by [Mark Eatherton](#)

[Field Results of Insulations in a Snow Melt System](#), by [Mark Eatherton](#)

[Underslab Insulation for Radiant Heating](#), [Dr. J. Straube](#), [C. Schumacher](#), B.Tech, B.A.Sc. for [Beaver Plastics](#), 2000

[Claims on the Web](#), Misleading Information Posted on the WWW.

[Claim of the month...](#)

\* P2000 is an EPS insulation manufactured by Polar Industries.

[Building Systems - Part II, Solutions & Facts](#)

## **How Do Manufacturers and Distributors Come Clean?**

- Do not mislead consumers to believe that having certifications or product listings means that the listing is for the 'claimed' performance.
- Do not mislead consumers to believe that buying and having memberships in several industry organization makes the performance claims legitimate.
- Do not mislead consumers to believe that participating on industry committees validates the performance claims.
- Do not mislead consumers to believe that energy savings or reduced heat transfer from a reflective foil product is a benefit when the benefit is substantially below energy and/or building codes.
- Do report how tests are performed and in what context and noting that the reflective component may not be recognized by building officials having authority.
- Do inform consumers that aging of reflective foils potentially includes corrosion, fouling, oxidation and/or accumulation of dust/dirt which reduces performance.
- Do communicate that reflective foils under concrete slabs have zero radiant benefits and that "wet cement mortar or the preservatives found in decay-resistant lumber" may deteriorate some foils.

### **Message to Consumers:**

You have to do your homework. When companies can't follow the governing laws and/or make exaggerated claims and/or make claims without providing context, and/or lead you to believe that having a product certification and/or listing or belong to and/or sit on association committees validates their performance claims, you are not getting the facts. Be wary of sellers using words like "equivalent R-value" or "nominal", or "approximately". If you buy products in a jurisdiction which does not recognize the manufactures claims and find yourself in a position of selling your property - knowing what you now know...do you want to have to defend your choice of insulation?

**If you have been misled or have concerns, call the Federal Trade Commissions toll-free # 1-877-(382-4357)**

Learn more about insulation and [radiant cooling and heating](#) here. Note: Allow up to 60 seconds to load.

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### **Don't Become A Victim of Bubble Foil or Reflective Foil Insulation Scams:**

From the Federal Trade Commissions website:

*What should I do if I don't get information about the R-value from the manufacturer, retailer, installer or new home seller?*

Report it to the Federal Trade Commission.

Use the [online complaint](#) form.

Call toll-free:  
1-877-FTC-HELP  
(382-4357) or,

Write: Federal Trade Commission, Consumer Response Center, 600 Pennsylvania Avenue, NW, Washington, DC 20580.

The FTC works for the consumer to prevent fraudulent, deceptive and unfair business practices in the marketplace and to provide information to help consumers spot, stop, and avoid them.

The FTC enters Internet, telemarketing, identity theft, and other fraud-related complaints into Consumer Sentinel, a secure, online database available to hundreds of civil and criminal law enforcement agencies in the U.S. and abroad.

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True Story...

Section 460.13 of the R-Value Rule requires, "If you are a manufacturer, you must give retailers and installers fact sheets for the insulation products you sell to them." When asked for a fact sheet one manufacturer replied it didn't have a fact sheet for the product.

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### **Misleading Stuff**

This excerpt comes from a industry technical bulletin, *"The system R-value of R-1.95 results in an energy savings or reduction in heat loss of 56% when compared to the same concrete floor system without insulation."*

The Facts: Energy can neither be created nor destroyed ergo it can not be saved so the only true statement is a 'reduction heat loss' but what they don't tell you is that even with the bubble insulation the R 1.95 is still 256% less than the minimum standards of CSA B214 or 500% below the R10 requirements of many building efficiency requirements such as those specified in the OBC.

It is irresponsible to make consumers think that a 56% reduction is better than no insulation when it is grossly inadequate.

### **Misleading Stuff Redux**

This text is taken from one manufacturers website, "independent laboratory tests proved that 5/8" of brand x outperforms 6" of fiberglass insulation plus vapour barrier."

What does The Safety & Buildings Division, Building Products Evaluation, State of Wisconsin note for this manufacturers product?

*"The distributor and/or manufacturer may not reference radiant R-values associated with radiant testing of this product in the State of Wisconsin since these tests, and their associated results, are not recognized by the Wisconsin Department of Commerce as a means to demonstrate commercial building code compliance."* See Notes on page 2 and 3 from [the full report](#).

But unsuspecting consumers visit websites which have no geographic boundaries and read the stuff about independent testing and certifications without having the skills to evaluate it. The manufacturer does this knowing full well that the State of Wisconsin has limited reporting to the conductive and convective result according to such tests like CAN/ULC S701-01 in accordance with ASTM C518, which states **the thermal resistance for a nominal 1" sample of brand x is a nominal R-3.7**

Ref. Intertek Testing Report

**...and again from another website."**

"In a heated slab, Radiation is responsible for 93% of the heat traveling downward."

The Facts: Two surfaces in contact exchange energy via conduction not radiation.

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Here is an excerpt from the Federal Trade Commission 16 CFR Part 460 Labeling and Advertising of Home Insulation: Trade Regulation Rule; Final Rule

The Commission issued the R-value Rule to prohibit, on an industry-wide basis, specific unfair or deceptive acts or practices. When it issued the Rule, the Commission found that the following acts or practices were prevalent in the home insulation industry and were deceptive or unfair, in violation of section 5 of the FTC Act, 15 U.S.C. 45: (1) Sellers had failed to disclose R-values, and caused substantial consumer injury by impeding the ability of consumers to make informed purchasing decisions; (2) the failure to disclose R-values, which varied significantly among competing home insulation products of the same thickness and price, misled consumers when they bought insulation on the basis of price or thickness alone; (3) sellers had exaggerated R-values, often failing to take into account factors (e.g., aging, settling) known to reduce thermal performance; (4) sellers had failed to inform consumers about the meaning and importance of R-value; (5) sellers had exaggerated fuel bill savings that consumers could expect, and often failed to disclose that savings will vary depending on the consumer's particular circumstances; and (6) sellers had falsely claimed that consumers would qualify for tax credits through the purchase of home insulation, or that products had been "certified" or "favored" by federal agencies.

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This is how the pro's do it for aircraft hangars. It's how you should do it for your home as well. Why? Because the principles of heat transfer don't change just because your home has a 3" or 4" slab.