OWENS CORNING®

INNOVATIONS FOR LIVING®

Fiber Glass Loosefill Attic Insulation
Performance in Cold Climate Conditions

Technical Bulletin

Background

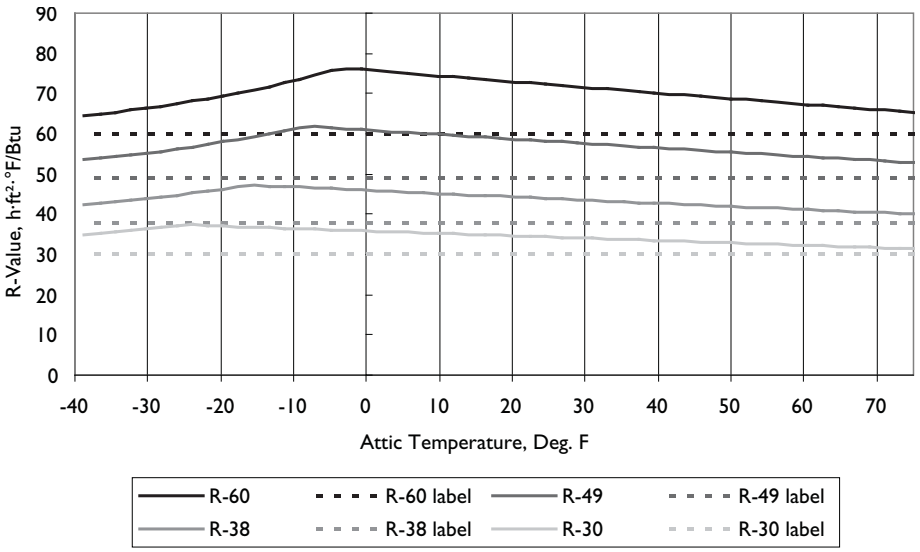
Claims regularly appear on some product manufacturer's websites and in "newsletters" regarding the performance of light-density loosefill (blown-in) fiber glass attic insulation in cold climates. Specifically, that the thermal performance (R-value) is reduced as the outside temperature drops and the difference in temperature (Delta T) between the inside of the house and the attic space increases. These claims are based on research done at Oak Ridge National Laboratory (ORNL) in the early 1990's[1]. Testing in a large-scale climate simulator (LSCS) demonstrated the occurrence of natural convection, leading to a reduction in R-value as Delta T's increased, with the outside temperature going to zero degrees Fahrenheit and below. This occurred only in light-density loosefill fiber glass and "no significant convection was found either with fiber glass batts or cellulose loosefill".

Subsequent to the ORNL work, Owens Corning confirmed the convection occurrence, using a similar test apparatus at its Science and Technology Center. As a result, the Owens Corning loosefill products intended for use in cold climates were adjusted to overcome this by increasing the density.

Current Status

Owens Corning loosefill products have undergone a number of changes since the time of the ORNL study. At the time of the study, Owens Corning's premium loosefill was cubed – cut from blankets of bonded fiber glass. In contrast, the current primary loosefill products, **PRO**PINK® L77 unbonded loosefill insulation and AttiCat® loosefill insulation, are manufactured with no binder. The bonded cubes did not nest well, leaving voids of relatively large air spaces and allowing R-value depleting convection to occur. However, when installed via blowing machines, the current "unbonded" products naturally lay down in closer proximity to each other, having smaller air spaces between them than the cubes or clumps of the bonded products. The newly developed Owens Corning technology, specific for unbonded loosefill, has significantly altered the fiber characteristics, forming a structure that inhibits the convection cycle, thus maintaining the desired R-value in cold climates at highly productive light densities.

Table 1



The ORNL work developed a mathematical model to predict thermal performance in cold climate conditions. One of the primary characteristics is airflow resistance, determined via ASTM C 522. With the airflow resistance and standard thermal performance (ASTM C 518, "Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus") data, the model calculates installed R-value at a range of outside (attic) temperatures.

Owens Corning utilized the model to optimize its "next generation" of loosefill insulation products – **PRO**PINK® L77 unbonded loosefill insulation and AttiCat® loosefill insulation. The information in Table 1 (generated from the model) shows calculated thermal performance when installed per the manufacturers' instructions – proper thickness and bag count for the desired

R-value. Note that labeled R-value is exceeded even at outside temperatures below zero, and is maintained until a point well below the lowest winter design temperature for the continental U.S. (as listed in the ASHRAE Handbook of Fundamentals).

Conclusions

Based on the referenced ORNL research work:

- Owens Corning adjusted the installation coverage charts on older fiber glass loosefill insulation products for application in cold climate areas, to account for the natural convection phenomenon.
- Owens Corning current fiber glass loosefill insulation products are designed to deliver their labeled R-value in cold climates, when installed according to the manufacturer's instructions.

Notes

1. Thermal Performance of Fiber Glass and Cellulose Attic Insulations; Wilkes, K.E. & Childs, P.W.; presentation at the "Thermal Performance of the Exterior Envelopes of Buildings V"; Clearwater Beach, FL, December 7 – 10, 1992

INNOVATIONS FOR LIVING®

OWENS CORNING INSULATING SYSTEMS, LLC
ONE OWENS CORNING PARKWAY
TOLEDO, OHIO 43659
1-800-GET-PINK®
www.owenscorning.com

Pub. No. 10012955. Printed in U.S.A. July 2010.