An end to a debate?

by **Mark S. Graham**

Since the early 1980s, there has been an ongoing debate in the U.S. roofing industry regarding the long-term thermal performances of rigid board polyisocyanurate insulation used in low-slope roof assemblies.

If you are involved in the design or installation of low-slope roof assemblies using polyisocyanurate insulation, you should be familiar with recent and upcoming developments regarding this issue.

Background

In November 1987, NRCA and the Midwest Roofing Contractors Association issued a joint technical bulletin regarding the in-service R-value for polyisocyanurate and polyurethane roof insulation boards.

The bulletin recommends using an in-service R-value of 5.6 per inch (25 mm) of foam thickness. In-service R-value is intended to represent the thermal resistance of polyisocyanurate and polyurethane insulation during a roof assembly's design life.

Some roofing professionals, including some polyisocyanurate insulation manufacturers, have criticized this recommendation.

Many manufacturers have disregarded the recommendation and simply provided R-value information for their products according to the Roof Insulation Committee/Thermal Insulation Manufacturers Association's conditioning procedure (RIC/TIMA 281-1) or, more recently, the Polyisocyanurate Insulation Manufacturers Association's (PIMA's) conditioning procedure (PIMA 101).

Recent developments

In the early 1990s, Oak Ridge National Laboratory (ORNL), Oak Ridge, Tenn., in cooperation with NRCA, PIMA and The Society of the Plastics Industry, conducted research that led to the development of a new methodology for assessing in-service R-values for plastic foam insulation.

The research resulted in the development and publication of ASTM International's ASTM C1303, "Standard Test Method for Estimating the Long-Term Change in the Thermal Resistance of Unfaced Rigid Closed-Cell Plastic Foams by Slicing and Scaling Under Controlled Laboratory Conditions."

In 1998, the Standards Council of Canada and Underwriters Laboratories of Canada published CAN/ULC-S770, "Standard Test Method for Determination of Long Term Thermal Resistance of Closed-Cell Thermal Insulation Foams." CAN/ULC-S770 is based on ORNL's research and ASTM C1303 and provides R-value data based on a 15-year time-weighted average. This type of long-term R-value determination has become known as LTTR.

In July, ASTM published an updated edition of its material standard for polyisocyanurate insulation, ASTM C1289-02, "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board." ASTM C1289-02 includes requirements that LTTR for polyisocyanurate insulation be tested and reported.

The future

Beginning Jan. 1, 2003, in the United States, PIMA members have agreed to use LTTR as the exclusive method for describing the thermal performances of their permeable-faced, rigid board polyisocyanurate insulation products used in low-slope roofing applications.

In Canada, a similar implementation already has taken place; it was effective July 1.

Firestone Building Products Co., Carmel, Ind., has provided NRCA with the values applicable to its permeable-faced, rigid board polyisocyanurate insulation products (see the figure).

Additional information regarding LTTR values for specific manufacturers' polyisocyanurate insulation products is available by contacting the manufacturers.

LTTR values of Firestone Building Products' polyisocyanurate insulation

Insulation thickness	LTTR
1.0 inch (25 mm)	6.0
1.5 inches (38 mm)	9.0
1.7 inches (43 mm)	10.3
1.8 inches (46 mm)	10.9
2.0 inches (51 mm)	12.1
2.5 inches (64 mm)	15.3
2.7 inches (69 mm)	16.6
3.0 inches (76 mm)	18.5
3.3 inches (84 mm)	20.4
3.5 inches (89 mm)	21.7
4.0 inches (102 mm)	25.0

Long-term thermal resistance (LTTR) values per thickness for Firestone Building Products' polyisocyanurate insulation products.



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