Issues regarding polyiso insulation

by **Mark S. Graham**

Polyisocyanurate insulation enjoys widespread acceptance in the U.S. roofing industry. According to the Polyisocyanurate Insulation Manufacturers Association (PIMA), its members sold more than 2.5 billion board feet (5900000 m^3) of polyisocyanurate insulation during 1997 and more during 1998. NRCA's 1998-1999 Annual Market Survey reveals polyisocyanurate insulation was used in about 44 percent of all low-slope roof systems installed during 1998.



However, there still are a number of issues regarding polyisocyanurate insulation that concern roofing professionals.

R-value

In 1987, NRCA and the Midwest Roofing Contractors Association issued a joint technical bulletin addressing the loss of thermal resistance value (R-value) of polyisocyanurate and polyurethane roof insulation boards throughout a roof system's anticipated service life. This bulletin concluded that an R-value of 5.6 per inch (1 Km^2/W per 25 mm) thickness is a reasonable value to be used when calculating the R-value of polyisocyanurate insulation throughout a roof system's anticipated service life.

Since the bulletin was issued, there has been considerable research regarding the long-term R-value of polyisocyanurate insulation. In early 1996, the American Society for Testing and Materials (ASTM) published ASTM C 1303, "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." This standard provides a consensus-based procedure for determining the long-term change in R-value of plastic foam insulations such as polyisocyanurate.

At NRCA's 110th Annual Convention and Exhibit in 1997, PIMA representatives presented an educational program introducing ASTM C 1303 to roofing professionals. During the program, PIMA committed to providing R-value data for polyisocyanurate roof insulation based on the ASTM C 1303 method within a year. To date, the data have not been made available.

Blowing agents

In 1992, most polyisocyanurate insulation manufacturers changed their products' blowing-agent components from a chlorofluorocarbon (CFC-11) to a hydrochlorofluorocarbon (HCFC-141b). This change was in response to government regulations mandating a reduction in the use of certain chemicals, such as CFC-11, that are considered to be harmful to the Earth's ozone layer.

Polyisocyanurate insulation manufacturers again will need to change their products' blowing-agent components. Citing continued environmental concerns, the U.S. Environmental Protection Agency significantly will restrict the production of certain chemicals, including HCFC-141b, as of Dec. 31, 2002. As a result, polyisocyanurate insulation manufacturers need to find a suitable blowing-agent replacement for HCFC-141b.

To date, only one manufacturer of polyisocyanurate insulation publicly has acknowledged the implementation of a blowing-agent replacement for HCFC-141b; the manufacturer reportedly is using a proprietary hydrocarbon blowing agent.

It remains to be seen what specific blowing agent(s) other polyisocyanurate insulation manufacturers will use; whether all manufacturers will choose to use the same blowing agent; and when products using new blowing agent(s) will enter the marketplace. Also, the physical properties and field performance of polyisocyanurate insulation using this next generation of blowing agents(s) are largely unknown at this time.

Product standards

In 1995, ASTM published a new product standard for polyisocyanurate insulation—ASTM C 1289, "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board." The values incorporated in this ASTM standard were based on two ASTM standards, ASTM C 984 and ASTM 1013, that have since been discontinued.

NRCA recognizes there are considerable shortcomings in ASTM C 1289. For example, the standard does not address the need for polyisocyanurate insulation manufacturers to adequately cure products before shipment. Also, NRCA believes the standard's values for compression strength, dimensional stability and facer-sheet adhesion of finished polyisocyanurate insulation products are not adequate to consistently ensure roof system performance.

The next meeting for the ASTM task group responsible for ASTM C 1289 will be held Oct. 4 in San Antonio, Texas. Discussion of NRCA's concerns and considerations of possible revisions to the standard will be the meeting's primary focuses.

Closing thoughts

Given the number of unresolved technical issues, further development and refinement of polyisocyanurate insulation and the standards associated with it are necessary. This is particularly important because of polyisocyanurate insulation's significant market share in the U.S. roofing industry.

It is hoped polyisocyanurate insulation manufacturers and PIMA will work constructively within the roofing industry to bring about the necessary changes. PR

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