Increasing insulation

ASHRAE 90.1 now calls for more insulation in roof assemblies

by Mark S. Graham

THE AMERICAN SOCIETY of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Inc. has updated its standard 90.1, "Energy Standard for Buildings Except Low-Rise Residential Buildings." The 2007 edition (ASHRAE 90.1-07) includes significant increases in the amount of thermal insulation required for roof assemblies.

Because roof system designers often use ASHRAE 90.1 to determine the amount of thermal insulation in roof assemblies, you should be aware of these changes.

ASHRAE 90.1

ASHRAE 90.1 is a recognized consensus standard that serves as the technical basis for or is a reference standard in most energy-efficiency codes for buildings. The standard provides minimum energy-efficiency requirements for the design and construction of building envelopes (roof and wall assemblies); HVAC systems; water heating; power; lighting; and other equipment.

ASHRAE 90.1 applies to new buildings, new additions to existing buildings, and new systems and equipment in existing buildings. Specifically excluded from ASHRAE 90.1 are single-family houses; multifamily structures of three stories or less; manufactured houses; buildings that do not use electricity or fossil fuels; and equipment and portions of building systems that use energy primarily for industrial, manufacturing or commercial processes.

ASHRAE 90.1 originally was published in 1975, and revised editions were published in 1980, 1989, 1999, 2001 and 2004.

Current edition

In developing the standard's 2007 edition, ASHRAE undertook a strategic objective it intends to meet by 2010 to increase buildings' energy efficiency by more than 30 percent than was recommended in previous standard editions. Overall, ASHRAE 90.1-07 includes 31 changes from the 2004 edition that were processed by the ASHRAE 90.1 committee and approved by ASHRAE's board of directors.

As it applies to roof assemblies, ASHRAE 90.1-07 includes several changes. Most significantly, if you use its prescriptive building option, you'll note minimum insulation requirements for insulation entirely above a roof deck for residential and nonresidential buildings have been raised from an R-value of 15 to an R-value of 20 for buildings in climate zones 2 through 8. For buildings in climate zone 1, the minimum R-value insulation requirement remains 15.

Also, ASHRAE 90.1-07's provisions for reducing the amount of thermal insulation required when using high-albedo (highly reflective) roof systems have been revised.

The 2004 edition provided an exception and Roof U-factor Multiplier table that effectively reduced the amount of thermal insulation required for buildings in climate zones 1 through 3. In ASHRAE 90.1-07, a minimum R-value of 12 for buildings in climate zones 1 through 3 is specifically prescribed for high-albedo roof systems. No reduction in R-value is permitted for buildings in climates zones 4 through 8.

ASHRAE 90.1-07 specifically defines a high-albedo roof system as one with either a minimum solar reflectance of 0.70 and minimum thermal emittance of 0.75 or a minimum solar reflectance index (SRI) of 82. ASHRAE 90.1's previous editions did not include an SRI provision.

Adoption

ASHRAE 90.1-07 includes significant increases in the amount of insulation required for roof assemblies. This is the first time in more than 18 years ASHRAE has increased its insulation requirements for roof assemblies.

At press time, largely because of the standard's recent publication, I am not aware of any code jurisdiction that has adopted ASHRAE 90.1-07 and put it into effect. However, I expect such implementation to begin in the coming months.

For additional information about ASHRAE 90.1-07, including its climate zones map, tables of its R-value requirements for specific climate zones and a link to purchase ASHRAE 90.1-07, access www.professionalroofing.net.

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