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INSULATION: ALREADY A GREEN TECHNOLOGY

Don't overlook mechanical insulation when designing a green building.

By Alec J. Rexroat

Can a green building really be green without consideration of proper mechanical insulation types and thicknesses? Whenever you read an article about Leadership in Energy and Environmental Design® (LEED)-certified or green buildings, you find fascinating information about environmentally friendly construction. Mechanical insulation is seldom mentioned as a potential energy- and pollutant-reduction solution.

Green buildings use 36-percent less energy than conventional buildings use on average, according to a recent study by Washington, D.C.-based energy consultancy Capital E.

In Chicago, One S. Dearborn Street Tower is certified by the U.S. Green Building Council (USGBC). It is expected to use 30-percent less energy than comparably sized buildings. Instead of forcing air down from the 30-foot ceiling in the lobby, heat rises from the floor. The building also uses variable-speed fans on the air-conditioning systems, according to an article in *Crain's Chicago Business*.

Some green buildings will have a space between the interior and exterior walls. The lighting in many buildings is being adjusted to reduce energy consumption. Locally friendly plant materials that use less water have been instituted in the landscaping. In many buildings, a portion of the roof is covered with small plants and trees. In Chicago, more than 60 green roofs were installed or planned in 2005 through city initiatives. And, of course, recycling of construction materials helps these buildings comply with the scope of green buildings.

In most articles pertaining to green buildings, mechanical insulation is not even mentioned. In a recent energy symposium in Chicago, a panel of experts on energy audits was asked if they look at mechanical insulation for energy payback and reduction. Not one member of the panel ever considered insulation as a source of energy reduction.

Insulation professionals know that the first thing in many buildings to be omitted or reduced is the mechanical insulation. Perhaps this is because everyone assumes that insulation is already included in the building specifications. The proper thickness of insulation on all mechanical services will reduce energy consumption and allow for a more-efficient building. It doesn't cost—it pays. When engineers, architects, general contractors, or mechanical contractors ask for “value engineering” from insulation contractors, they are asking for the elimination or reduction of insulation on services. We should be very clear here: **Mechanical insulation is the only item in the building that begins to pay for itself as soon as it is installed.**

As an example of the possible savings in energy and greenhouse gas emissions, use a 2-inch, hot-water heating pipe supplying 180-degree hot water to the coil system in a normal commercial building. Calculate the data using 2-inch-thick fiber glass with all service jacket (ASJ) as the insulation of choice. The time of operation is 6 months or 4,160 hours. If the data is

prepared using the North American Insulation Manufacturers Association (NAIMA) 3E Plus® program, the bare, uninsulated, pipe operating at 180°F for 6 months loses about 610,700 British thermal units (Btus) per year. The same pipe with 2 inches of fiber glass insulation will lose about 53,850 Btus per year for a 91-percent efficiency rating. This reduction in energy use also extrapolates into savings of greenhouse gas emissions. The same 2-inch pipe operating at 180°F for 6 months will go from 94.9 pounds of carbon dioxide (CO₂) per foot per year to 8.4 pounds per foot per year. The same reductions take place for nitrogen oxide (NO_x), which goes from .19 pounds per foot per year to .017, and cerium (Ce), which goes from 25.86 pounds per foot per year to 2.28.

If a building is going to wear the green label, mechanical insulation must be a primary consideration in its design and construction. ☺

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