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Presentation:

## Long-term Thermal Resistance (LTTR) of Cellular Plastic Insulation and the Variation of Insulation R-value with Temperature

Thursday, Feb 26th at 5:30pm

Perkins+Will  
5310 South Alston Ave, Suite 300  
Durham 27713

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**COST:** Attendance is free! Online registration is required. [www.bec-rt.org/cal](http://www.bec-rt.org/cal)

**LEARNING UNITS:** AIA: 1 LU/HSW/SD  
SC Building Codes Council: 1.5 hrs  
Certificate by request

**PRESENTER:** David W. Yarbrough, PhD, PE

**PRESENTATION SUMMARY:** The presentation will describe the basis for changes in thermal resistance of cellular plastic insulations manufactured with a gas other than air and the variation of R-values with temperature. A large fraction of the volume of building insulations is occupied by air or a gas with low thermal conductivity. The thermal properties of the gas phase has a major impact on the overall thermal performance of the insulation. Cellular plastic produced with a gas component (blowing agent) other than air experience inward diffusion of air and outward diffusion of the blowing agent for a long period of time after the insulation is produced. This is especially true of unfaced products. The overall thermal resistance changes over a period of years as the gas-phase composition changes. Techniques for determining long-term performance have been developed and standardized. These methods and their basis will be discussed. Since the thermal conductivity of materials including air and blowing agents changes with temperature, the thermal resistance of insulations changes with temperature. The composition of the gas phase can also change as a result of condensation in the case of blowing agents. As a result, cellular plastic insulation performance varies with time and temperature. In general, the thermal performance of insulations changes with temperature.

- LEARNING OBJECTIVES:**
- to understand the basis for the decrease in thermal performance with time of cellular plastics containing a gas other than air.
  - to understand the methods for determining long-term thermal performance (LTTR).
  - to review typical data for unfaced cellular plastic insulation.
  - to understand the dependence of R-value on temperature.
  - to review typical data for the variation of R-value with temperature.

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