Crawl Space Ventilation in a Warm, Humid Climate

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ABSTRACT

Houses with crawl space foundations make up more than 70% of the housing stock in South Carolina and a significant number throughout the Southeast. Recent energy model evaluations have predicted that modifications to generally used crawl space practice would reduce whole house heating and cooling loads. These modifications include significantly reducing crawl space ventilation and/or adding insulation to the perimeter walls instead of to the floors over the crawl space.

Reduction in ventilation rates of crawl spaces is a particular concern in warm, humid climates. The generally accepted rationale for this ventilation has been for the control of moisture, insect pests, radon, and other pollutants in the crawl space. Previous research of crawl spaces involves sites at Karns, Knoxville, and Murfreesboro, Tennessee; Washington, D.C.; Rhinelander, Wisconsin; Long Island, New York; Oregon; and British Columbia, Canada. It is unclear how these data address the warm, humid climatic conditions of crawl space houses in South Carolina.

In response to a lack of data from crawl space houses in warm, humid climates, this quantitative project was undertaken to (1) measure the crawl space temperature and humidity profiles in occupied houses, (2) measure the actual ventilation rates of these crawl spaces, (3) compare crawl space temperatures with perimeter insulation versus floor insulation, and (4) use this information to help determine the optimum balance between crawl space ventilation and insulation for energy conservation and for moisture and pollutant control in warm, humid climates. Some specific questions to be addressed are: How does crawl space ventilation in a warm, humid climate influence energy use? Is crawl space ventilation necessary for humidity control? How does ventilation or lack of ventilation with humid outdoor air influence moisture levels of materials in the crawl space? Is perimeter insulation more efficient than floor insulation?

Three houses in northwestern South Carolina were instrumented to collect temperature, humidity, wood moisture content, and pressure profile data in and around the crawl space. Each house was equipped with a computerized data acquisition system, reading each input channel every 15 seconds, averaging the readings over 15-minute periods, and storing the data for later analysis. Phase 1 of the study involves instrumenting the houses "as-is" (open crawl space vents, floor insulation, and no soil vapor barrier) for a one-year period starting in February 1992. Phase two will consist of covering the soil with a vapor barrier, then alternating open and closed vents on a two-week cycle for one year. Phase three will consist of replacing floor insulation with foundation wall insulation and closing foundation vents.

This project was initiated only recently. As such, this is essentially a report of work in progress, not of work completed.

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