

Validating Thermal Performance of Existing Wall Assemblies Using In-Situ Measurements

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Abstract : In deep energy retrofits, the thermal performance of existing building envelopes is often difficult to determine with a high level of accuracy. For older buildings, the records of existing assemblies are often incomplete or inaccurate. To obtain greater baseline performance accuracy for energy models, in-field measurement tools can be used to obtain data on the thermal performance of the existing assemblies. For a known assembly, these field measurements assist in validating the U-factor estimates. If the field-measured U-factor consistently varies from the calculated prediction, those measurements prompt further study. For an unknown assembly, successful field measurements can provide approximate U-factor evaluation, validate assumptions, or identify anomalies requiring further investigation. Using case studies, this presentation will focus on the non-destructive methods utilizing a set of various field tools to validate the baseline U-factors for a range of existing buildings with various wall assemblies. The lessons learned cover what can be achieved, the limitations of these approaches and tools, and ideas for improving the validity of measurements. Key factors include the weather conditions, the interior conditions, the thermal mass of the measured assemblies, and the thermal profiles of the assemblies in question.

Keywords : existing building, sensor, thermal analysis, retrofit

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