

MECHANICAL CODE DISCUSSION

The Building Thermal Envelope



BRENT URSEBACH

BRENT URSEBACH

SALT LAKE COUNTY PLANNING
AND DEVELOPMENT

bursenbach@slco.org

385-468-6694

THE MAJORITY OF MY DAILY responsibilities are focused on building mechanical systems and compliance to the adopted energy code. Both areas are directly related, as the size and design of a mechanical system and compliance with the code, are based on the design and construction of the building thermal envelope. The most frequent problem I find while reviewing load calculations and energy compliance documents, is the incorrect or incomplete representation of the components in the building thermal envelope.

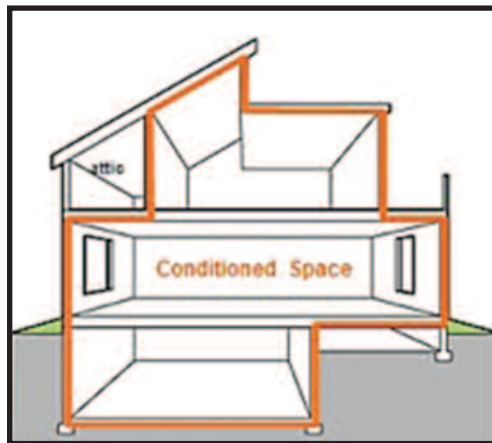
ACCA/ANSI Manual J provides this definition:

Thermal Envelope: The glass and opaque surfaces that form the interface between the conditioned space and outdoors, or a conditioned space and an unconditioned space.

The International Energy Conservation Code (IECC) provides a similar definition:

Building Thermal Envelope: The

basement walls, exterior walls, floor, roof, and any other building elements that enclose conditioned space, or provides a boundary between condition space and exempt or unconditioned space.



Referring to the diagram, (below) the thermal envelope is identified by the continuous boundary, isolating the conditioned space from outside, or the earth on the side of a foundation wall or below the basement floor.

Please consider:

- Heat is lost or gained through every square inch of the thermal envelope. Failure to include each component of the envelope in a load calculation results in an incorrect load and improperly sized equipment. Components often missed include: rim joists, skylights, skylight walls and cantilevers.

- Misrepresenting the R-values and U-factors on a load calculation also produces incorrect loads. The U-factors and Solar Heat Gain Coefficients (SHGC's) for windows are often off by a factor of 50%.
- Completing a REScheck or COMcheck Energy Compliance Certificate with incomplete or incorrect data may give a false indication that the structure is energy efficient and in compliance with the energy code.
- Submitting incorrect load and energy compliance documents for plan review, during the building permit process, delays the issuance of the permits.

A final caution for anyone performing HVAC design and energy compliance calculations; be absolutely certain that the information provided by design professionals and builders is accurate. The vast majority of the Manual J residential load calculations submitted to my office list R-values for insulation and U-factors for windows, that are inconsistent with those listed on the plans. Your equipment will not be sized correctly when the load is based on incorrect information. ■

Please remember your questions, comments and suggestions are always welcome.—Brent

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