

# MECHANICAL CODE DISCUSSION

## Windows, Skylights and Doors— Impact on Heat Loss



### BRENT URSENBACH

SALT LAKE COUNTY PLANNING AND DEVELOPMENT

bursenbach@slco.org

385-468-6694

BRENT URSENBACH

The ICC Codes include this definition:

**FENESTRATION.** Products classified as either vertical fenestration or skylights.

**Skylight.** Glass or other transparent or translucent glazing material installed at a slope of less than 60 degrees (1.05 rad) from horizontal.

#### Vertical fenestration.

Windows (fixed or moveable), opaque doors, glazed doors, glazed block and combination opaque/glazed doors composed of glass or other transparent or translucent glazing materials and installed at a slope of at least 60 degrees (1.05 rad) from horizontal.



A couple of issues ago, the discussion focused on thermal factors — R-values, U-factors, and solar heat gain coefficient (SHGCs). The National Fenestration Rating Council (NFRC) label was noted in that discussion. The NFRC label includes the U-factor, SHGC, Visible Transmittance and Air Leakage ratings for the fenestration assembly. U-factor, the thermal transmittance for the assembly, is expressed as: BTUh, per degree Fahrenheit, per square foot — [(BTUh) / (°F' SqFt)]. When multiplied by the design temperature difference, the product is the Heat Transfer Multiplier or HTM.

HTM = U-factor X Temperature Difference

Temperature Difference (TD) is the difference between inside and outside temperature

This may appear confusing; however, applying this calculation to the windows of a typical home will help clarify. Calculating the heat loss through windows for this typical

home, with a total window area of 300 square feet, with new energy code compliant windows, a 70°F inside temperature and 10° outside temperature.

2015 Code requirement for windows:  
0.32 U-factor

Temperature Difference = 70° – 10° = 60°F

HTM = U-factor X TD = 0.32 X 60° = 19.2 BTUh/sq.ft.

For every square foot of window, there will be 19.2 BTUh heat loss each hour.

300 sq.ft. total window area:

19.2 X 300 = 5,760 BTUh = Total Heat Loss through windows

Calculating for the same window area;

however, with old single pane aluminum framed glass.

Single pane clear glass, metal frame — 1.27 U-factor

HTM = 1.27 X 60° = 76.2 BTUh/sq.ft.

76.2 X 300 = 22,860 BTUh = Total Heat Loss through windows

New Code compliant windows in this typical home when compared with 40-year-old windows, reduced the heat loss through the windows by 17,100 BTUh, a 75% reduction in window heat loss. Considering the improvements in made in the insulation and air sealing throughout the entire construction of the home, it's obvious why a load calculation must be performed on every home, when HVAC systems are installed, both new construction and replacement. Other components of the building thermal envelope will be considered in the next issue.

*Please let me know if you have questions or comments.*

*Thanks, Brent* ■