

New Energy Code Compliance for Log Homes Energy Code Compliance

With adoption of the 2018 International Energy Conservation Code (IECC) and International Code Council ICC 400 Standard Design and Construction of Log Structures it is now easier for log homes to comply with the statewide energy code. In the past the only option to show compliance for a log home using small diameter logs was to perform a REScheck analysis and that usually required significant increases in the insulation levels in the ceiling, foundation and installation of more efficient windows and doors. REScheck a free code compliance online tool from US DOE and is still an option for demonstrating code compliance. <https://www.energycodes.gov/rescheck>

The ICC 400 contains many aspects of log home construction, this article only discusses energy code issues. The insulation level requirements of the ICC400 designates logs by their average diameter (5 and 7 inches) and their specific gravity, (SG) which is a measure of the ratio of a wood's density as compared to water. Note a 5-inch average diameter log would normally be considered a 6 to 7-inch log and 7 inches would be an 8 to 9 diameter log.

ICC 400 - Table 305.3.1.2 designates 5-inch logs with a SG of equal to or less the 0.50 as meeting the above grade wall insulation requirements of the code. Most species of wood used in Montana log homes such as Douglas fir, cedar, spruce, ponderosa, and lodge pole pines all meet the criteria.

Other house components requirements from ICC 400 Table 305.3.1.2 for Insulation and Fenestration are listed below.

Ceiling insulation - R-49

Windows and doors -U-30

Wood framed wall sections – R-20 or R-13 cavity with R-5 continuous

Floor -R-30

Basement wall – R-19 cavity or R-15 continuous.

Slab – R-15 for 4 feet.

Heated slab floor requires R-15 under the entire floor area.

Log homes must pass a blower door test.

Like typical framed homes, log homes must pass a blower door test of no more than 4 Air changes per hour at 50 pascal pressure (4 ACH 50). List of people performing blower door tests.

http://deq.mt.gov/Portals/112/Energy/Energy%20Code/BlowDoorTest_List.2021.pdf

The best way to reduce air-leakage and moisture infiltration is through good system design and construction details that control the air leakage at construction joints, cracks, and penetrations. Utilizing a blower door and thermal (IR) imaging during construction will help ensure a home will pass the blower door test. Some examples of air leakage sites are displayed below. Experienced home inspectors and energy raters have noted that the log homes usually have more air leakage than any other types of home construction.

Typical air leak areas are found at:

- Peak/ridge area of vaulted ceilings.

- Joint between the top log and the roof.

- Protrusion of logs through the exterior walls at both frame walls and log walls.

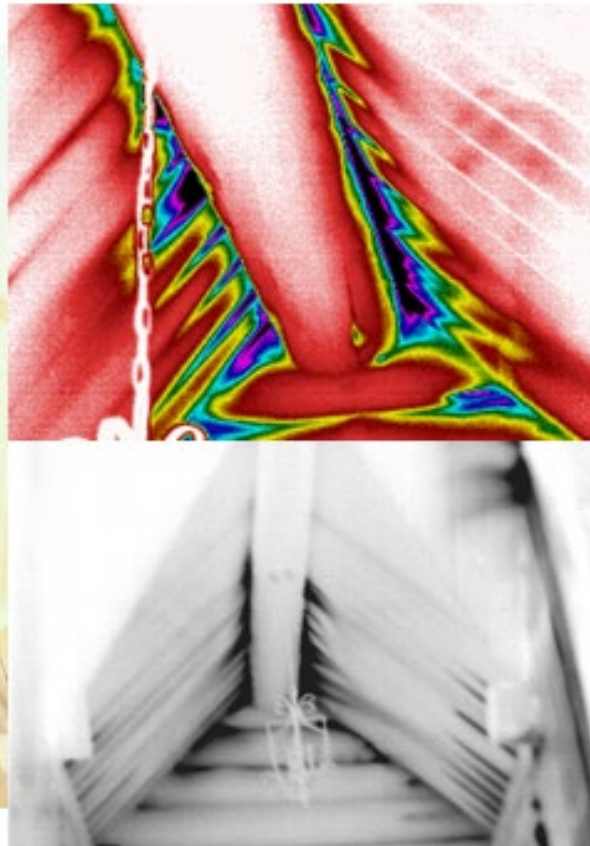
- Junction of exterior wall and floor

- Connections of the log with framed wall assemblies.

- Exterior log wall corners

These Infrared (IR) pictures of log homes were taken in winter with a blower door operating/pulling cold air into the house. When the blower fan is turned off (normal conditions) air flow would reverse, heated air would be escaping the house. In the IR pictures colder air appears darker.

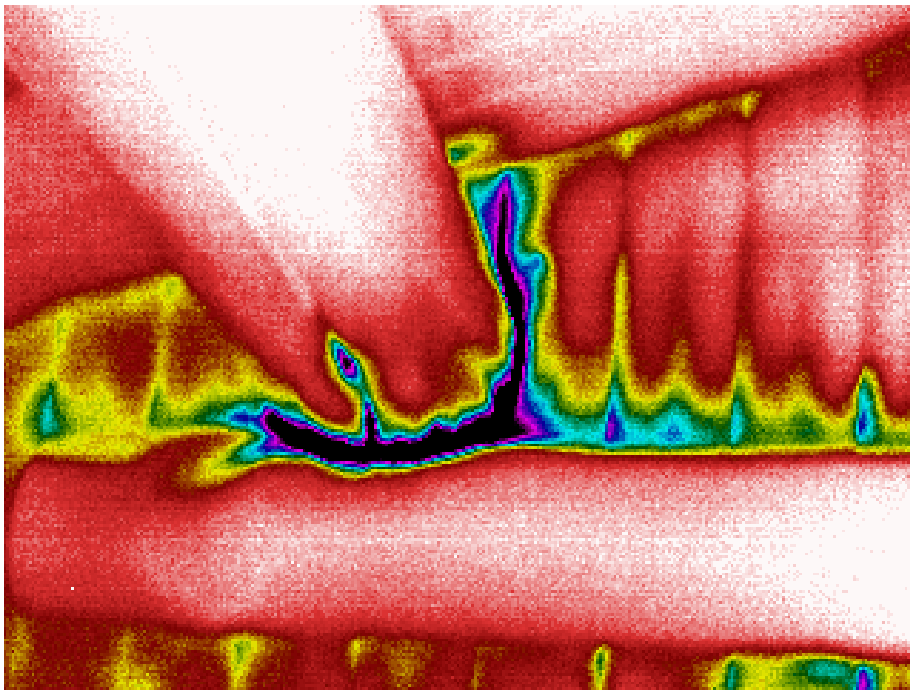
Peak of vaulted ceiling.



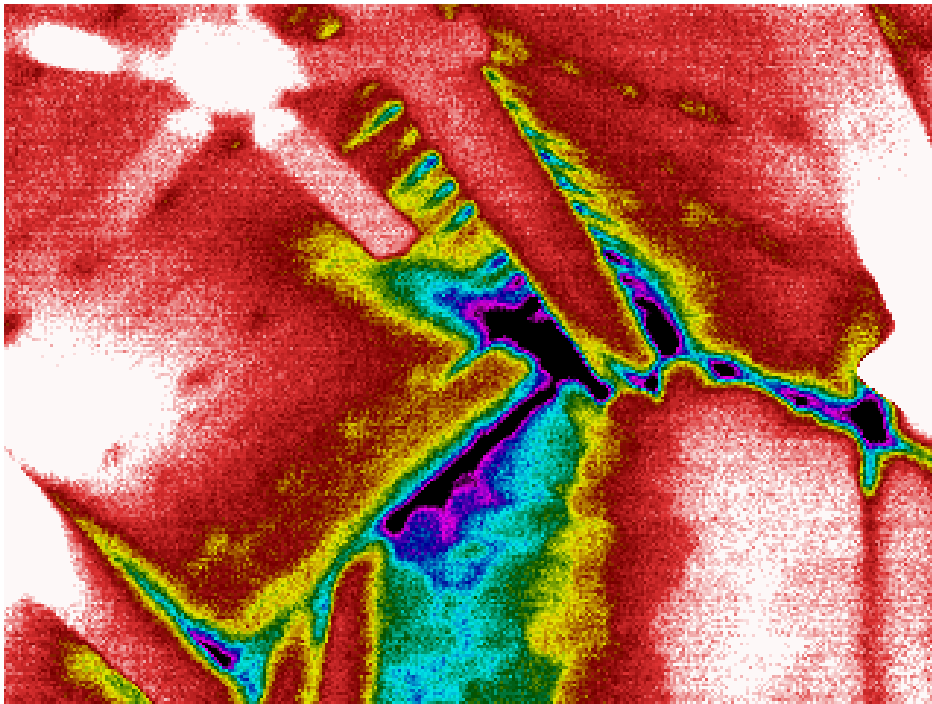
Joint between wall and ceiling



Log protrusion through exterior wall.



Junction of log wall at rock fireplace



Link to additional information on log home air sealing. - The Energy Performance of Log Homes

<https://www.logcabinhomes.com/wp-content/uploads/2019/04/TheEnergyPerformanceofLogHomes.pdf>