

# Best Practices & Energy Codes

Log Cabin and Timber Frame Supplement Reducing Air-Leakage in Residential Buildings How to Pass the Blower-Door Test the First Time

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### Reducing Air-Leakage Building Code & Blower Door Testing

#### **Current Building Code Requires:**

- An independent inspector must be hired to test and confirm that your new home meets the air-tightness requirements of the building code,
- The target is 3.0 ACH50\* (or less) to pass, (\*air changes per hour at -50 pascals pressure),
- This is about **twice as tight** as homes built in from the 1980's until 2010.



A blower-door test, and infrared camera ready to confirm tightness, and help find leaks when necessary.

### Reducing Air-Leakage A Good Return on Investment!

#### Advantages of Tighter Construction:

- More comfortable and less expensive to heat and cool,
- HVAC equipment can be downsized, saving on construction costs.
- Larger homes will save more,
- Homes located at higher elevation and/or windy settings will save more,
- Propane and electric heated homes will save much more!



Don't forget to adjust those thresholds, a great return on investment!

### Reducing Air-Leakage Timber-Frame and SIPS Panels

#### Advantages:

- SIPS\* have higher R-values,
- Continuous insulation,
- Minimal thermal bridging points,
- Challenges:
- Timber-frame penetration points leak and create a 'thermal bridge',
- Sealing joints and seams between SIPS panels needs attention to detail when assembling, and hard to seal later.



\*SIPS = Structural Insulated Panels

### Timber-frame and SIPS Panels Reducing Air-Leakage:



Pay attention to sealing junctions where multiple assemblies meet and/or where timber-frame passes through walls.

### Reducing Air-Leakage Log Cabin Air-sealing Details

## Timber-frame roof to wall junction leaks:



# Roof to wall junction leaks, very common:



### Reducing Air-Leakage Log Cabins Details

Example: Initial blower door test= 12ach50,

- Roof-deck was spray-foamed, BUT eaves (roof/wall junctions) were NOT sealed,
- Rockwool batts in cathedral ceiling,
- Sandwich and interior log sealing,

#### Similar Neighboring Cabin:

Same builder/floor plan = **\$600 in propane** heating cost (*no woodstove*) **per month**, built just prior to air-sealing codes.





### Reducing Air-Leakage Log Cabin Air-sealing Details





Insulation had to be removed in order to spray-foam/seal the entire perimeter of the roof/wall junction:

### Reducing Air-Leakage Log Cabins / Cathedral Ceilings

#### Solution: Seal Critical Junctions

- Seal roof-deck (at bird-blocks) to exterior wall top-plate with spray-foam between cathedral ceiling joist.
- Caulking and/or elastomeric chinking will work as well.



Unvented cathedral ceilings are permitted in the building code with specific requirements.

### Log Cabins and Energy Efficiency R-Value and Building Codes

#### A Note Regarding Log Cabin Walls and R-value:

- The R-value for wood ranges from 1.4 per inch for softwoods, and 0.7 for hardwoods,
- A 6" softwood log wall has a R-value of R-8,
- Compared to a conventional wood stud wall  $w/5\frac{1}{2}$ " of R-20 insulation, the log wall is apparently a far inferior insulation system.
- Log walls may not meet building energy codes,
- Thermal mass benefits are not realized north of the 40<sup>th</sup> parallel\* or at mountain elevations.

\*The 40<sup>th</sup> parallel passes through Boulder, CO



https://www.energy.gov/energysaver/typeshomes/energy-efficiency-log-homes

### Reducing Air-Leakage Log Cabin Air-sealing Details

#### Interior: Install backer rod,



#### Interior:

#### Seal w/Perma-chink,



#### Exterior:

#### Same approach,



### Reducing Air-Leakage Building Code & Blower Door Testing

#### Accuracy and Documentation:

- Compliance testing with semi-automated software, paired with blower-door test, provides verified, accurate results,
- Such as Fan-testic® and TECTITE®,
- Approved inspectors are expected to submit results to the building department in a timely manner.



"Begin with the End in Mind" Stephen R. Covey

### Residential Energy Efficiency Green Building & Energy Codes

To Learn More about Energy Codes or Green Building, please contact: Community Development <u>https://www.larimer.org/building</u> Building: 970-498-7700 or Planning: 970-498-7683



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