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Officials Calling for Minimum Width Logs

by Rob Pickett

Here's how to deal with this misperception among some code officials.

Many log home builders say they are finding that some building officials are under the impression that only that only 8" wide logs and greater will meet the energy code. Naturally this is alarming for those offering a smaller diameter log package to consumers. What's more, it's incorrect.

I'd like to shed some light on this misperception. As a prescriptive approach, it might be true for some climate zones. But the log home industry hasn't lived under prescriptive codes. Prescriptive codes set the minimum allowable specification for design and construction without requiring further analysis. This works well for construction methods included in the code. Log walls are not currently in the code but are viewed as an alternate material or method of construction.

Except for fire-rated walls (see the exception for a one-hour rating for solid wood walls with a least dimension of 6" in the Urban-Wildland Interface Code), only the International Energy Conservation Code (IECC) recognizes log walls. In the component performance chapter (Ch. 5), the IECC allows log walls with a heat capacity of at least 6 Btu/ft².oF to receive credit for integral insulation (insulation and mass mixed).

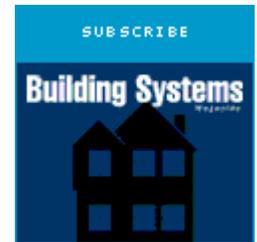
Over the past two years, I have completed over 100 heat loss calculations in compliance with the IECC or the version of it that has been adopted by various state code authorities. I have spoken to two state officials who have responsibility for energy code compliance. Both have assured me that my approach is correct. While my time to perform the analysis is not free, the program I used and the assurance I received are, so, as the movie said, I'll "Pay It Forward." How to complete energy code compliance for homes with log walls

Step One: Download REScheck (www.energycodes.gov). No, this isn't a promotional article for the program. But the truth is that REScheck is readily accepted by building officials in many states, calculates performance as stated in the IECC or specific state versions, is designed for building professionals of varying technical prowess, and includes log walls. While you are looking to download the program, check http://www.energycodes.gov/implement/state_codes/index.stm to see if your state accepts REScheck for energy code compliance. You may notice that your state has its own code, but fear not as REScheck has a drop-down menu that allows you to select specific codes for compliance (AR, GA, MA, MN, NH, NJ,

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NY, VT, WI, and even Pima, AZ).

There are other good programs that simulate energy usage of buildings. One that I now own is ENERGY10, available through the Sustainable Buildings Industries Council (SBIC, www.SBICouncil.org). This program models solar gain for passive solar design and has other strong features, but requires more training to run accurately. Another program is available at <http://www.archenergy.com/products/rem/>, the Architectural Energy Corporation's site. The REM Software Series home energy analysis software is designed to help homebuilders, home designers, energy consultants, home improvement contractors, utilities, and home energy rating organizations with critical energy analysis for residential structures. AEC features two powerful evaluation tools in the series: REM/Rate™ and REM/Design™. These programs are used by home energy raters (HERS, Home Energy Rating System) to show compliance with DOE's EnergyStar program.

The problems with the programs are that they weren't written for log walls, so you have to improvise. However, with the support of the Log Homes Council, I am fortunate to work with the staff of the U.S Department of Energy's Building Energy Codes Program who developed REScheck. The program is currently considering integration of new options for log walls in the REScheck software. REScheck users may have already noticed one minor change for log walls in the software. When I learned that a building official had incorrectly equated a 10" diameter log the thickness of a 6" rectangular log, the buzzers and whistles went off. This was caused by a poor interpretation in the software, which has now been corrected by the Building Energy Codes staff. Now REScheck refers to a nominal width of log wall, which is how the program uses that information.

Load the program and check quarterly for updates or register on-line to receive notice of the annual update. When I checked last week, we were on version 3.5 Release 1e. This is very important because improvements to the program are on going. More importantly, the codes continue to change at the ICC, state and even municipal levels. By keeping the REScheck version current, you have the latest of all referenced energy codes. The revised climate zones and other impacts of the 2003 IECC are being integrated into the REScheck as you read this.

Step 2: Do the building take-off. After opening REScheck, enter the pertinent code, location, project, and company data in the project menu. Then in the Tools menu, select "AreaCalc." This is a separate program that comes with REScheck. Enter your take-off in AreaCalc, not REScheck. When done, select "Transfer to REScheck" from the AreaCalc Option menus.

Step 3: Back in REScheck, fine-tune the building design in the Performance menu. First, move the skylights, windows and doors into their respective roof and wall assemblies. This is necessary because AreaCalc transfers them into the last roof or wall assembly, which is seldom where they belong.

Step 4: Enter the values for the insulation that will be used. Note that there are two options – cavity and continuous. If you read through the REScheck supporting documentation, you will find that there are already factors applied for sheathing credit, etc. While everyone is tempted to add R1.25 for 2x T&G decking on a timber rafter roof, it is not appropriate in this program. Stick to the value of the rigid or batt insulation only.

Step 5: Look at the comparison of the “code” house versus the specifications that you have entered. If you do not meet or exceed this code house, review the insulation levels again, adjusting where practical. If you are meeting the code, print out a compliance report for your code official. If needed, go to Step 6 to gain compliance, but it is best to skip it.

Step 6: Your project likely has a significant percentage of glazed wall area, or has a large log wall area relative to the roof area. Or, it may be that the log wall specification is the culprit, in which case you have two options, the least desirable of which is to add furring and insulation to the inside of the log wall where it will be hidden from view. What? You say this is counter-productive? You are correct! Tests have proven that it is best to locate insulation to the outside of the mass to maximize the thermal mass benefit within the space. In light of this, let's look at the other option.

If your design is not meeting code by as much as 15% and the insulation levels are maxed out, move to REScheck's Mechanical menu. Select the known heating source or use an educated guess (forced air is common, but boilers are often used in New England). REScheck will enter the minimum code compliant equipment. Now you have the opportunity to increase the efficiency of the equipment. Don't get too tricky though, because it is difficult to find equipment with an efficiency rating over 95%, and then it is getting expensive too.

I have never had to resort to anything more than what I have discussed above to get a design to meet or exceed the code house. This is why that I become so irritated when someone says, “I was told I need an 8” thick wall to build a log home here.”

So, why 8”-thick walls?

Let's look at that. This was meant to be a short article, but some of the questions warrant further discussion.

Quabbin Timber is celebrating it's 20th years as an independent family owned and run lumber distribution company involved in selling to log home manufactures in Maine, Vermont, Massachusetts, New York, Pennsylvania, North Carolina and Tennessee. Bob Chase, Jr., who works in sales and purchasing for the company, has also heard the talk of 8x8 that has been a buzz in the industry over the last 6 to 8 months.

He is receiving calls asking, “What are your hearing?” in regards to the question of whether 8x8 timbers are going to take the

place of 6x8's because of code requirements. Chase explains "Over the past 20 years we have prided ourselves in listening to the concerns of both the mills and the customer. In my conversation with both, I have not found a sound argument for switching to 8x8, although a few local building inspectors may disagree."

On the mill side, the sawing for 8x8 limits the log size that can be used. There are times when a log will yield a 6x8, but not an 8x8, putting the mill in the situation of having to sawing that log into boards instead of getting the better yield sawing the 6x8. While an 8x8 brings only slightly more weight to the handling of material, the cost per lineal foot is greater for the 8x8, and their potential lead-time may be longer. In some instances, there is a 15-20% up charge for 8x8. Chase also notes, "As we are all concerned with the rising cost of housing in the northeastern states, we do not need another reason to raise the already high costs. As a 40-year veteran log home builder in central Pennsylvania puts it, 'the home owner is simply not getting enough bang for the buck.'"

If the codes are truly the issue, it should be recognized that REScheck is not a performance/full simulation tool (like the others mentioned earlier), and it accounts generically for minor details (e.g., variance in siding or interior finishes) that do not substantially affect the results. Along those lines, the current REScheck assumes that all log walls are of uniform nominal thickness, and does not provide a mass wall credit for log walls less than 7" nominal thickness. This is based on the IECC requirement 6 Btu/ft²·h·°F to receive a mass wall credit. While this may make compliance with the energy code more difficult for smaller diameter logs, it is still possible to comply using the software tradeoffs.

The Log Homes Council has been working to change the way calculations are performed for R-values of log walls in REScheck. In the future, REScheck and similar tools may calculate the performance of the log walls more precisely (based on a wider range of specific gravity), which should better represent log walls relative to energy code compliance.

There are two more thoughts that I will mention but are well beyond this discussion. These concepts may explain why log walls have such good thermal performance: 1.) The blower door tests that I have seen demonstrate that air leakage is present, but not through the wall; and 2.) The standard analysis of a wall assembly is to add a vertical inside and outside air film, but there are few log profiles that have smooth, flat surfaces and uniform nominal thickness—the more rounded the log profile the greater the effect on both the average wall thickness and the dynamics of air flow across the rounded surface.

Ok, I'll stop there. Some log-wall-friendly changes are in the works for REScheck and the ICC that will benefit the log home industry. REScheck is the best tool available for energy code compliance right now, so when the building official says, "Log home? Does it have 8" walls?"

Respond with "I'll get a REScheck analysis for you."

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