

# BUILDER'S GUIDE TO ENERGY EFFICIENT HOMES IN LOUISIANA: INSULATION IDEAS

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The *Builder's Guide to Energy Efficient Homes in Louisiana (Builder's Guide)* is being updated to reflect new code requirements. This is the sixth in a series of articles that will summarize the information in the guide and highlight updates.

**Foundation Wall Insulation:** Foundation walls and other masonry walls are usually made of concrete masonry units (c.m.u.) or poured in place concrete. Concrete masonry unit (c.m.u.) walls are usually more difficult to insulate than frame walls because there is no convenient cavity to house insulation batts.

**Concrete Masonry Unit (c.m.u.) walls:** Builders can insulate c.m.u. wall cores using one or a combination of the following:

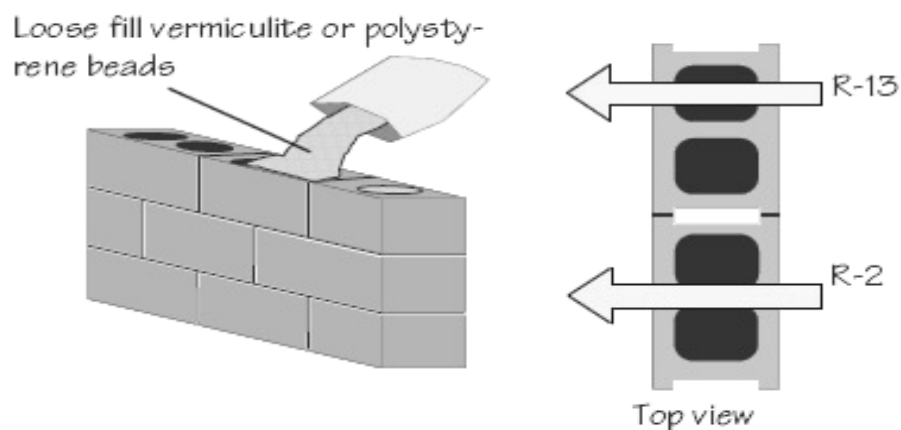
Vermiculite - R-2.1 per inch

Polystyrene inserts or beads – R-3.6 to 4.4 per inch

Polyurethane Foam – R 5.5 to 6.5 per inch

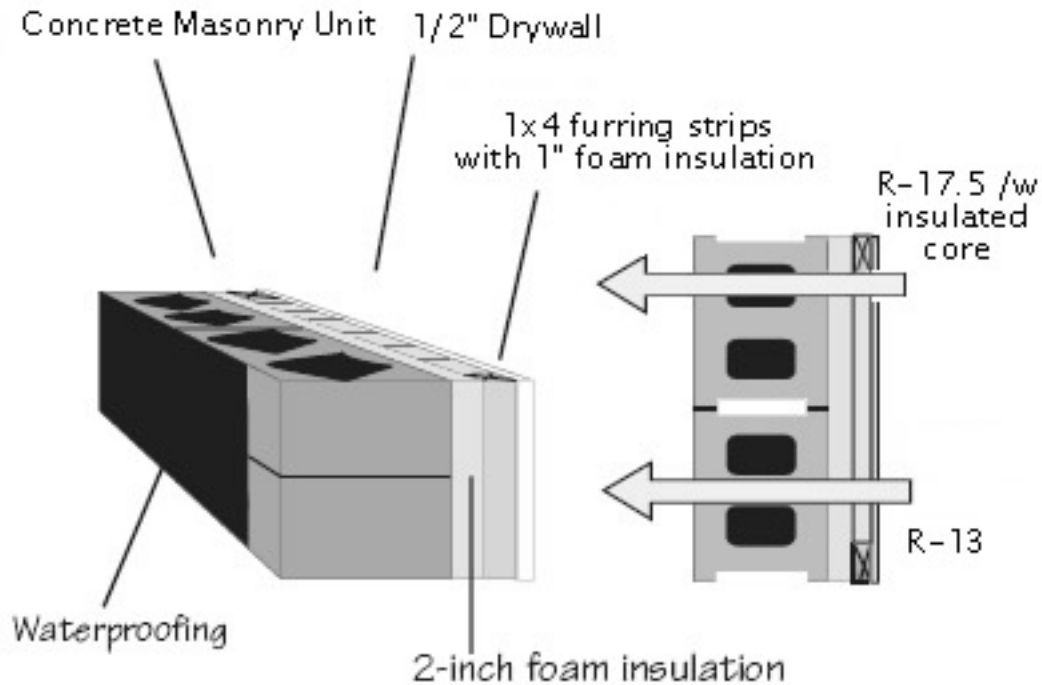
Unfortunately the substantial thermal bridging through the concrete connections between cores largely depreciates the potential R-value derived from placing insulation in the cores. Please see figure 1 following.

Figure 1. Insulating Concrete Block Cores  
(R-4 to R-6 overall)



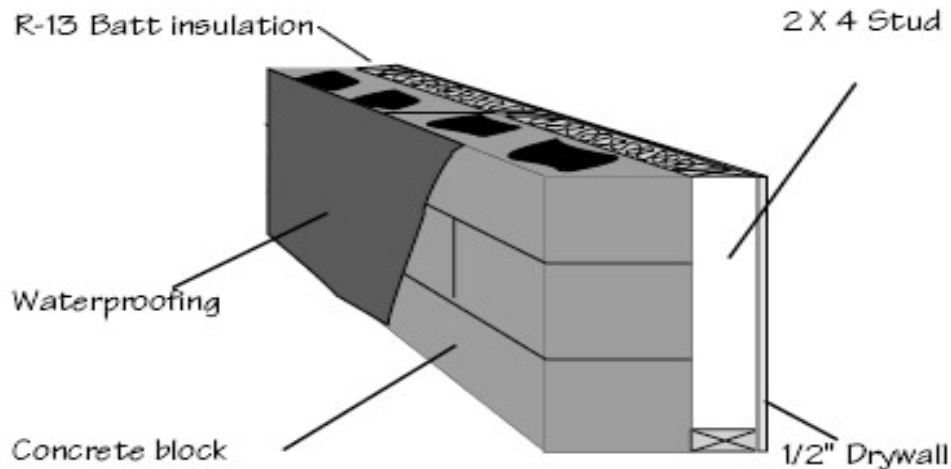
**Interior foam wall insulation:** Foam insulation may be added to the interior of masonry walls, however, it may have to be covered to resist damage and to meet local fire codes. In many cases ½" drywall is sufficient for both of the above, but builders, architects, and home designers are cautioned to consult local permit offices to avoid costly change orders in the field. Please see figure 2 following.

Figure 2. Interior Foam Wall Insulation  
(R-10 to R-14 overall)



**Interior framed wall:** In certain instances, architects or designers may detail and specify an interior framed wall inside the masonry (c.m.u.) wall. Standard frame wall insulation and air sealing techniques can then be applied. Please see figure 3 following.

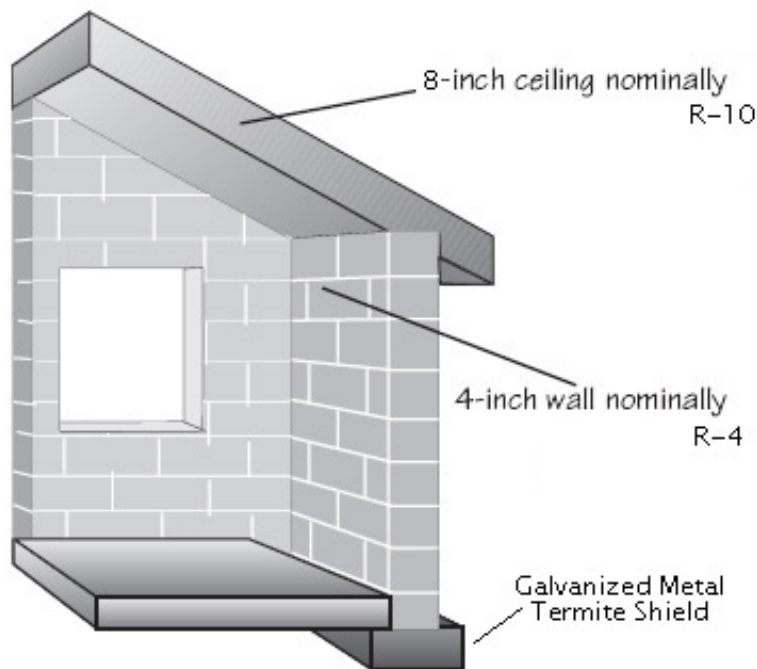
Figure 3. Interior Framed Wall  
(R-11 to R-15 overall)



**Lightweight c.m.u. products:** Lightweight air-entrained concrete is a viable alternative wall system. The aerated concrete can be shipped as c.m.u., or as panels. It combines reasonable R-values with

thermal mass. Lightweight concrete masonry units (c.m.u.'s) weigh an average of 26.5 pounds versus 70 pounds for conventional c.m.u.'s. This boosts productivity. Lightweight concrete products can also be cast as roofs and other horizontal structural components, which is impossible with conventional c.m.u.'s. Both lightweight c.m.u.'s and lightweight masonry components reduce construction time and overhead costs. Although lightweight c.m.u.'s don't have significantly different R-values from standard c.m.u.'s, the three factors above are increasing demand for lightweight concrete products. Please see figure 4 following.

Figure 4. Lightweight Concrete Products  
(R-4 to R-10 overall)



**Insulated Concrete Form (I.C.F.) wall systems:** Polystyrene or polyurethane can be used as formwork for poured or sprayed structural concrete. Many of these systems can be very economical where high heating/cooling expenses are prevalent. As with other exterior foams, the foam forms should not be in direct contact with the ground, whenever possible, to avoid termites. If ground contact cannot be avoided then use termiticide treated foam and place termite shield at the base of the wall.

Insulating crawlspaces in Louisiana is only advantageous **where there is no chance of flooding**, where the humidity is below a relative humidity (RH) of 70% for most of the year and where heating degree days (H.D.D.'s) considerably outnumber cooling degree days (C.D.D.'s). H.D.D.'s and C.D.D.'s can readily be obtained from your local news station or from your local newspaper. Consult the FEMA flood maps for flood information.

More information on energy savings features, and the full text of the *Builder's Guide*, can be found on the DNR Technology Assessment Division website at URL: <http://www.dnr.louisiana.gov/tad> and click on the Builder's Guide link.

Figure 5. Insulated Concrete Foam Foundation Systems

### INSULATED CONCRETE FORM (ICF) FOUNDATION SYSTEMS

Foam insulation systems that serve as formwork for concrete foundation walls or even the entire exterior wall system of the home can save on the cost of materials and reduce heat flow. Although expensive, ICF's can serve as the entire wall system for the home. Advantages include improved termite control due to lack of wood in the exterior structure, durability, hurricane resistance, continuous insulation, and noise control. Examples of these types of products include:

**Foam blocks** — Several companies manufacture foam blocks that can be installed quickly on the footings of a building. Once stacked, reinforced with rebar, and braced, they can be filled with concrete. Key considerations are:

- ❑ Bracing requirements — the cost of bracing the foam blocks before construction may outweigh any labor savings from the system. Some products require little bracing while others need substantially more.
- ❑ Stepped foundations — make sure of the recommendations for stepping foundations — some systems have 12" high blocks or foam sections, while others are 16" high.
- ❑ Reinforcing — follow the manufacturer's recommendations for placement of rebar and other reinforcing materials.
- ❑ Concrete fill — make sure that the concrete ordered to fill the foam foundation system has sufficient slump to meet the manufacturer's requirements. These systems have been subject to blowouts when the installer did not fully comply with the manufacturer's specifications. A blowout is when the foam or its support structure breaks and concrete pours out of the form. \*
- ❑ Termites — follow the guidelines in this chapter concerning termite prevention strategies with any foam product. Homes built completely with ICF's will minimize termite risks because they eliminate framing lumber. \*

**Spray-on systems** — Concrete can be sprayed onto foam panels which are covered by a metal reinforcing grid, part of which is exposed. A structural concrete mixture is sprayed onto the exposed reinforcing metal. As with foam block systems, installers must follow manufacturer's recommendations carefully for a successful system.

**Foam panel/ snap tie systems** — Some companies produce systems in which insulation panels are locked together with plastic snap ties. A space, typically eight inches, is created between the foam panels that is filled with concrete. As with foam block systems, installers must follow manufacturer's recommendations carefully for a successful system.

**Note: These systems should not be used below grade to reduce potential for termite infestation.**

\* In Louisiana use termiticide treated foam whenever possible.

