"R" Value vs. "Our" Value - http://www.rvaluehomes.com/rvalue.htm

Referring to "R Value" as the only measure of energy efficiency today, is the equivalent of believing the best method of communication is the telegraph.

We know so much more today about energy savings - why do we still insist on referring to only R Value?

Because it takes little effort to explain, and conventional construction proponents are quite satisfied with this narrow definition of energy measurement.

"R" stands for Resistance - the ability of a material to resist heat flow - the greater the number, the better insulating value of the material. Different materials have different R Values. In order to determine the R Value of a wall section, the R factors of all the components making up that section must be considered together to obtain the total resistance.

So…commonly used 3½" thick fiberglass insulation (used in 2 x 4 walls) is rated at R 13. It is then logically deduced that a wall containing this material also has a vale of R 13. This is false for three reasons.

1. Wood 2 x 4s placed on 16" center create a thermal "short circuit" because of their limited insulation value. According to ASHRAE, the total R-value for that wall is reduced by approximately 18% to R10.7. There is also a 3¼" thick batt insulation rated at R11 which similarly develops only R 9.0 when placed in a 2 x 4 wall.
2. This method of calculations does not take into consideration the energy loss due to air infiltration - typical with this type of construction - further reducing the wall's insulation efficiency.
3. Compression of fiberglass insulation material can occur both during construction and over time with condensation contributing to a matting of the material, drastically reducing the dead air spaces and lessening its effectiveness.

Now considering a concrete block wall. The insulated wall mentioned above reflects the R-value created by the millions of "dead air space" in fiberglass insulations. A concrete block actually has very limited insulation value with an R-value of 2. While it has some mass, and the core could be considered dead air space, it is also porous and loses its insulation value through air infiltration. In order to realize an approximate insulation value of R 19, the cores in the block should be filled with concrete for the additional mass effect, and a supplementary insulation material such as 4 inches of foam board added. This is obviously an expensive and time consuming procedure.

In order to further understand the attributes of an ICF wall as compared to a stud wall or concrete block wall, an explanation of energy efficiency as it pertains to the three types of energy transfer is necessary. These are *conduction, convection,* and *radiation.*

Conduction is energy transferred through thermal mass. Traditional 2 x 4 construction with use of fiberglass batt insulation is actually a contradiction of ideas. Whereas, the insulation does a decent job in not conducting energy from outside to inside, the wood 2x4s do an excellent job - partially cancelling out the effects of the insulation material.

Convection is measured through air infiltration. As mentioned earlier, 2 x 4 construction is prone to high levels of air infiltration. According to an energy study by the Wisconsin Public Service Corporation after performing blower door tests on various buildings, they determined that in new construction built to good energy saving standards, the interior air totally changes every 3 - 4 hours. This compares to an ICF home where the air changes every 10 hours. This translates in an ICF home being nearly 3 times as energy efficient in the "convention" area alone.

Radiation is probably the least understood of all energy transfer types. Radiation is very difficult to stop…but it can be slowed down. Traditional 2 x 4 construction does little to even slow down radiation effects. However, the dense, concrete mass contained in ICF construction helps a great deal to slow down radiation and the subsequent heat gain or heat loss of the interior. The changes that do occur are very slow and gentle.

Also, consider this very important fact. The concrete mass in an above grade ICF wall emanates from below grade where the ground temperature is 53 - 55 degrees Fahrenheit. This mass carries (wicks) that same temperature up the wall core (being heavily insulated with several inches of expanded polystyrene) so not only are radiation effects minimized, but the transfer of outside temperatures to indoors are literally non-existent.

These findings have little bearing on the traditional definition of R Value. They however have a majority impact on total energy efficiency. We refer to this "total package" of energy savings as "Our Value".

A study at the University of Ottawa conducted on a typical ICF, determined that the R-value was 32. This was achieved through the use of infrared cameras measuring thermo graphic equivalents. They also determined it would take fiberglass insulation measuring R 50 to match the energy savings of ICF construction.

RDS BUILDERS - Certified (ICF) Installer - MHBR USGBC NHBA

Randy Knoblauch - Cell 410-570-6958