# Thermal Resistance – IECC, IRC



## OVERVIEW

The Energy Codes and Building Codes have become more conscience of the thermal resistance and or transmittance through a whole wall assembly. Certain aspects of wood framed walls with batt insulation have been recognized as having a reduce efficiency due to thermal bridging, air infiltration, faulty application of the insulation and possible degradation of the insulation materials from moisture and durability.

These items are being addressed in the latest codes with higher R-values, continuous insulation over the wood framing to reduce thermal bridging and higher standards for air infiltration, making the envelope tighter.

Home energy evaluations and blower door testing is becoming the norm, to evaluate the building envelope to an energy standard such as HERS and/or Energy Star rating.

Wood cavity walls have 23% + wood framing or thermal bridging area.
NRCC

## MASS WALLS

The International Code Council (ICC) does recognize the influence on the overall thermal resistance through a wall assembly provide by a mass wall and specifically identifies ICFs as being a mass wall for above grade thermal envelope tables.

The ICFMA has conducted third party testing that confirms the influence of the mass to moderate the thermal transmittance through the wall assembly. This effect influences the temperature variation on the interior face of the wall, meaning the temperature within the insulated mass wall does not change rapidly, minimizing temperature swings on the interior face of the wall.

Refer ICFMA – CLEB Laboratory Inc.
ICF Thermal Performance Report
icfma.org

The overall thermal efficiency of the Fox Blocks, as a mass wall, reduces the operational requirements of the HVAC systems, which in turn reduces monthly utility rates to heat and cool the building.

## IECC / IRC THERMAL RESISTANCE TABLES

Many States have not adopted the latest energy code, and some have developed their own energy standards. The evaluation of a wall assembly is now recognized as a sum of all the materials, plus air films in that assembly. The recognition of how thermal bridging influences the thermal resistance, various framing methods and/or the requirements for continuous insulation on the exterior face of wood framed walls are being used to address this issue.

In all cases, the evaluation of Fox Blocks insulated concrete forms for thermal resistance is reviewed as the whole wall assembly, encompassing all the elements that are part of that assembly. Fox Blocks provides continuous insulation on the exterior and interior face of the wall and does not have any elements that contribute to thermal bridging.

The U-Factors identified for a Fox Blocks exceed the current requirements for above and below grade walls, in all climate zones.

The following Table R402.1.4 is from IECC 2015. Using the U-Factor equivalent tables for a full wall assembly calculation.

### TABLE R402.1.4. EQUIVALENT U-FACTOR

| CLIMATE ZONE | FRAME WALL | MASS WALL ABOVE GRADE | BASEMENT WALL |
|---|---|---|---|
| 1 | 0.084 | 0.197 | 0.360 |
| 2 | 0.084 | 0.165 | 0.360 |
| 3 | 0.060 | 0.098 | 0.091 |
| 4 except Marine | 0.060 | 0.098 | 0.059 |
| 5 and Marine 4 | 0.060 | 0.082 | 0.050 |
| 6 | 0.045 | 0.060 | 0.050 |
| 7 and 8 | 0.045 | 0.057 | 0.050 |

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## FOX BLOCKS WALL ASSEMBLY – U-FACTOR

| Component | 4" | 6" | 8" | 10" | 12" |
|---|---|---|---|---|---|
| Interior Air Film | 0.68 | 0.68 | 0.68 | 0.68 | 0.68 |
| Gypsum Board | 0.46 | 0.46 | 0.46 | 0.46 | 0.46 |
| EPS Insulation 2 Layers | 21.8 | 21.8 | 21.8 | 21.8 | 21.8 |
| Concrete | 0.25 | 0.38 | 0.50 | .063 | 0.75 |
| Fiber Cement Siding | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Exterior Air Film | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 |
| **Assembly TOTAL R-Value** | **23.5** | **23.6** | **23.7** | **23.8** | **23.9** |
| **Assembly TOTAL U-Factor** | **0.0425** | **0.0423** | **0.0421** | **0.0420** | **0.0418** |
| **IECC 2016 Zone 7&8** | **Mass Wall 0.057** | | **Basement 0.050** | | |

1. *Fox Blocks size is for a full block with a two layers of EPS insulation 2⅝" on each side of the concrete core. The size as identified is the concrete core size.*
2. *The Zone 7 & 8 U - Factors are the most stringent as listed in the current energy codes.*

Refer to Technical Bulletin 1.13.05 – Comparative Analysis – Insulated Wood Framed Walls vs Fox Blocks ICF