



## THERMAL 3Ht....Saving Energy, One Building at a Time.

"GREEN" Wood Frame Construction in the 21<sup>st</sup> Century

Most houses in Canada and the USA are wood-frame construction. There are many wood houses still in existence today that were built more than 200 years ago. The modern conventional wood-frame house, with wood or wood product covering materials, is economical, long lasting, and can be constructed almost anywhere.

### Our Homes and Energy Conservation

Building envelope issues are perhaps the most common and least understood construction problem. An energy efficient home is well sealed, well insulated and properly ventilated creating comfort and a healthy living environment. Today's insulation systems are designed to slow the movement of heat, air and moisture within roof and wall cavities. Currently, however, conventional methods of insulating wood frame homes and buildings will not meet proposed new prescriptive energy codes.

Homes that are properly insulated save natural resources, energy and money. Studies show consumers are willing and prepared to invest in homes and buildings that are comfortable and energy efficient.

### Labeled R-value vs. Effective or In-service R-value

The chart below shows the labeled R-value of fiberglass insulation is much lower than its effective or in-service R-value.

Effective R-value of R-11 & R-19 Fiberglass in Wood Wall Assemblies as Commonly Installed				
Product	Type of Assembly	Labeled R-Value	Effective R-Value	Reduction
4" Fiberglass	2X4 Wood Frame	11	9.6	- 13%
6" Fiberglass	2X6 Wood Frame	19	13.7	- 28%

Reference: US Department of Energy and ASHRAE (American Society of Heating, Refrigerating and Air-conditioning Engineers)

Conventional R-value testing takes place in laboratory environments that are not indicative of "real world" conditions.

The conventional R-value test method has little or no consideration for sub zero outside temperatures, wind, radiant heat loss or gain, moisture, air infiltration, sheetrock, framing members or exterior sheathing, *e.g.*, R-19 fiberglass insulation as commonly installed in a 2X6 wood frame wall assembly has an effective or in-service R-value of approximately R-13.7, *i.e.*: 28% lower than the labeled R-value of the insulation.

**Effective or in-service R-value is the R-value of a wall assembly containing sheetrock, vapor retarder (if applicable), framing members, insulation and exterior wood sheathing.**

The ASTM 1363-05 testing method considers Thermal 3Ht in simulated "real world" like environment, *i.e.*: Temperature Range: 70°F / 21°C inside and 0°F / -18°C outside.

#### Thermal 3Ht Testing

- Thermal 3Ht has been tested to the ASTM 1363-05 standard by (ATI) Architectural Testing Inc.
- ATI is an independent and accredited laboratory in Canada and the USA.
- The ASTM 1363-05 test considers "real world" like temperatures, wind, moisture, insulation, vapor retarder if applicable, sheetrock, wood framing members, insulation and exterior sheathing.
- Test results provide an overall R-value of the complete wall assembly.

### ASTM 1363-05 TESTING

Temperature Range: 70°F / 21°C inside and 0°F / -18°C outside.

#### TEST RESULTS 1" THERMAL 3HT, (EMPTY CAVITY) WOOD WALL ASSEMBLIES

Product	Type of Assembly	Labeled R-Value	Effective R-Value of Assembly	Increase
1" Thermal 3Ht	2X4 Wood Frame	3.85	8.3	<b>+ 115%</b>
1" Thermal 3Ht	2X4 Wood Frame with ¾" Air Space	3.85	10.6	<b>+ 175%</b>

Note\* Wall Assemblies include ½" sheetrock, empty cavity, OSB, 1" Thermal 3Ht

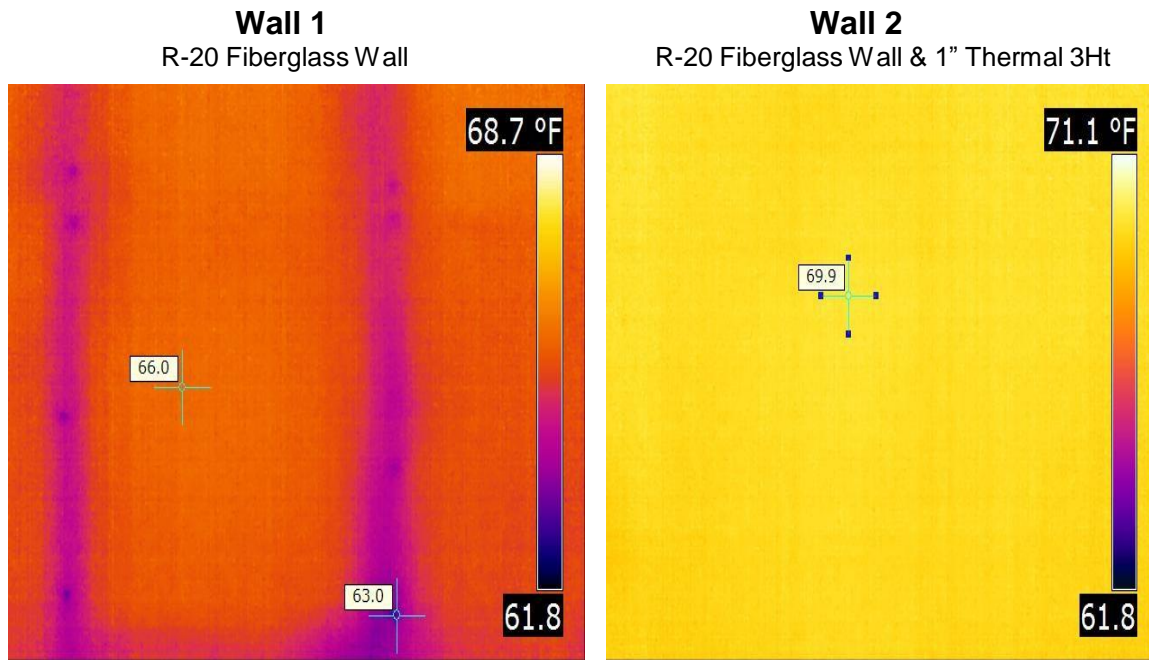
#### TEST RESULTS THERMAL 3HT & FIBERGLASS WOOD WALL ASSEMBLIES

Conventional Fiberglass Insulated Wall Assemblies Combined with Thermal 3Ht	Effective R-Value of Conventional Assembly	Effective R-Value of Assembly with Thermal 3HT	Improvement Over Conventional Wall Assembly
½" Sheetrock, ¾" Thermal 3Ht, 2X4 Studs with R-11 Fiberglass, 7/16" OSB	9.6	17	<b>+77%</b>
½" Sheetrock, 2X4 Studs with R-11 Fiberglass, 7/16" OSB, 1" Thermal 3Ht	9.6	18	<b>+87%</b>
Sheetrock, ¾" air space, ¾" Thermal 3Ht as Vapor Retarder, 2X4 Wood Frame with R-11 Fiberglass, OSB	9.6	19.5	<b>+103%</b>
Sheetrock, 6 mil Poly, 2X6 Wood Frame with R-19 Fiberglass, ¾" Air Space, 1" Thermal 3Ht, OSB	13.7	26.3	<b>+92%</b>

When considering insulation performance, what is most important? Is it the labeled R-value of an insulation product tested in non-real world conditions? Or is it the overall in-service/effective R-value of an insulated wall assembly, tested in simulated "real world" conditions?

**It is the overall R-value of an insulated wall assembly tested in simulated "real world" conditions!**

## Infrared Imaging Comparison



### Observations:

Infrared images are of an actual home, before and after 1" Thermal 3Ht.

- Outside temperature is -9°F.
- Wall 1 - R-20 fiberglass - warmest spot, 68.7°F.
- Wall 2 - R-20 fiberglass and 1" Thermal 3Ht - warmest spot, 71.1°F.
- Wall 2 - warmest spot is 2.4°F higher than warmest spot on Wall 1.
- Thermal Bridging is apparent in Wall 1. Temperature of 2 X 6 studs is 63°F or 6.9°F colder than Wall 2.
- Wall 2 - studs appear to have no negative effect on the overall surface wall temperature.
- Wall 1 - cavity temperature is 66°F.
- Wall 2 - cavity temperature is 69.9°F or 3.9°F warmer than Wall 1.