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

"Green" Steel Construction in the 21st Century

Pre-engineered steel buildings have seen substantial growth in popularity over the past several years. Steel is 100% recyclable and is the most recycled material in the world. Thus, each ton of recycled steel saves 2,500 pounds of iron ore and approximately 1,000 pounds of coal. Most steel utilized in the construction of steel buildings consists of 70% recycled content - in fact, the Green Building Resource Guide gives steel framing its highest 5 icon rating making it a true "green" product.

Steel Buildings and Energy Conservation

Steel building enclosure issues are perhaps the most common and least understood construction problem. One major issue with steel construction; steel conducts approximately 300 times more heat/cold than wood. Unfortunately, this results in short circuit thermal bridging through steel framing members. Properly insulated steel buildings can save natural resources, energy and money. Currently, however, conventional methods of insulating steel buildings will not meet proposed new prescriptive energy codes.

Steel buildings that are properly insulated save natural resources, energy and money! Studies show consumers are willing and prepared to invest in steel 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-19 Fiberglass in a 6" Steel Wall Assembly as Commonly Installed				
Product	Type of Assembly	Labeled R-Value	Effective R-Value	Reduction
R-19 Fiberglass	2X6 Steel Frame	19	7.2	**- 62%**

Reference: ASHRAE (American Society of Heating, Refrigeration 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, interior steel liner panels, framing members or exterior metal sheathing, e.g. R-19 fiberglass insulation as commonly installed in a 2 X 6 steel buildings has an effective or in-service R-value of approximately R-7.2 i.e.: 62% lower than the labeled R-value of the insulation.

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

The ASTM testing method considers simulated "real world" 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, interior steel liner panel, and steel framing members, insulation and exterior steel 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: THERMAL 3Ht, (EMPTY CAVITY) STEEL WALL ASSEMBLIES

Product	Type of Assembly	Labeled R-Value	Effective R-Value of Assembly	Increase
1/2" Thermal 3Ht	6" Steel Frame	1.93	5.22	**+ 170%**
1" Thermal 3Ht	6" Steel Frame	3.85	6.85	**+ 78%**

Note* Wall Assemblies include interior steel liner panel, 2 X 6 steel stud frame, empty cavity, horizontal 2 X 4 Steel Studs (simulates steel girts),Thermal 3Ht, exterior steel sheathing

TEST RESULTS: ½" THERMAL 3Ht & R-19 FIBERGLASS STEEL WALL ASSEMBLY

Conventional 6" Steel Frame R-19 Fiberglass Insulated Wall Assembly Combined with ½" Thermal 3Ht	Effective R-Value of Conventional R-19 Fiberglass Assembly	Effective R-Value of Assembly with ½" Thermal 3HT	Improvement Over Conventional Wall Assembly
Interior Steel Liner, 2 X 6 Steel Stud Frame, ½" Thermal 3Ht, R-19 Fiberglass Batt, Horizontal 2 X 4 Steel Studs (Simulates Steel Girts) Exterior Steel Sheathing	7.2	14.77	**+107%**

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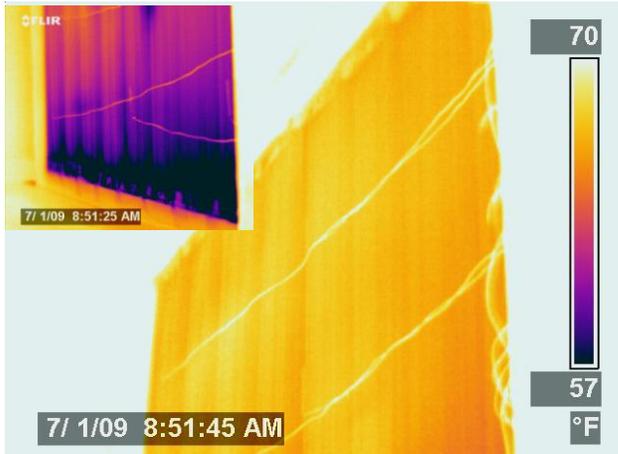
It is the overall R-value of an insulated steel wall assembly tested in simulated "real world" conditions!

INFRARED IMAGES STEEL WALL ASSEMBLY ASTM 1363-05

Actual infrared images (I.R.) of two actual ASTM 1363-05 wall assemblies

Wall 1	**Wall 2**
6" Steel Wall - R-19 Fiberglass	6" Steel Wall - R-19 Fiberglass & ½" Thermal 3Ht

Observations:

- Inset pictures on the top left corner of both infrared images are actual I.R. images of the bottom left hand corner of each wall assembly
- Color of infrared imaging is relative to the overall temperature range of the object.
- Wall 1 - 13 degrees difference in temperature from its coldest point to its warmest point
- Wall 2 - there is only 7 degrees difference from its coldest point to its warmest point
- Wall 2 - at its coldest point Wall 2 is 11 degrees warmer than Wall 1
- Wall 2 - at its warmest point, Wall 2 is 5 degrees warmer than Wall 1 and the controlled inside temperature setting of 70 degrees. Why is this happening? Is Thermal 3Ht reflecting radiant heat back to its source warming up the surface of the interior steel liner panel? Probably!

comfort