
muls, inc.
THERMAL 3Hr ALL-WEATHER SHIELD
On Roof or Ceiling
THERMAL 3Hr ALL-WEATHER SHIELD
On Walls
THERMAL 3Hr ALL-WEATHER SHIELD
Insulated Vapor Barrier
THERMAL 3Hr ALL-WEATHER SHIELD
Under Concrete Floors
THERMAL 3Hr ALL-WEATHER SHIELD
On Concrete Foundations
"All Weather Shield"

UNDERSTANDING BUILDING ENVELOPE PERFORMANCE

HEAT TRANSFER

- There are three forms of heat transfer, conduction, convection and radiation. High performance insulation will address all three.
- Conduction is the transfer of heat energy through matter and fluids. Conduction is the least predominant form of heat transfer in a building structure.
- Convection is the transfer of heat energy in a gas, vapor and/or air infiltration. Convection is the second most predominant form of heat transfer in a building structure.
- Radiation is the transfer of heat energy by infrared rays. Radiation is number one and the most predominant form of heat transfer in a building structure.

THERMAL MASS

- It is any material that has the capacity to absorb, store or transfer heat energy. Some building materials having that capacity are wood, metal, sheetrock, concrete, etc.
- Building structures vary in the types of thermal mass used. Therefore the impact of the three forms of heat transfer may be different.
- Heat passing through framing members creates "thermal bridging", especially when using only conventional cavity fill insulation.
- A continuous insulation sheathing addressing all three forms of heat transfer which provides a thermal envelope and greatly reduces thermal bridging versus cavity fill insulation only.

MOISTURE

- It's a great threat to the durability and long term performance of buildings and porous insulations. It will cause damage to building materials and leads to unhealthy indoor environments.
- Reaching a dew point, the temperature at which vapor begins to condense, in a building assembly is one of the predominant issues to prevent and lowers the effective thermal resistance of porous insulations significantly.
- A non-porous continuous insulated sheathing addressing all three forms of heat transfer installed in the roof, walls and floors helps prevent dew point formation and vapor penetration.

SUSTAINABLE GREEN BUILDING (SGB)

- SBG is the design principal of exceeding current building standards, by increasing the efficiency with which buildings use resources while reducing the impact on human health, environment and economy.
- One of the simplest, fastest and most cost effective ways to achieve a sustainable green building structure is to use a versatile high performance green insulation.
- The insulation you choose must address all three forms of heat transfer and provide a thermal break with no thermal bridging or drift. It must be environmentally friendly with sustainable, stable performance and benefits.
- Sustainable Green Builders analyze the total building structure to include framing members, insulation, mechanical equipment and green alternatives to meet their goals.

WHAT IS THERMAL 3Ht?

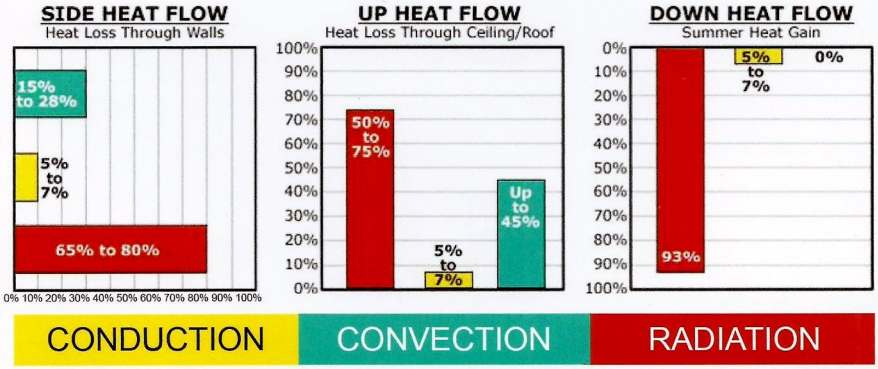
- Thermal 3Ht is a high performance, rigid insulation. The combination of a light weight, sustainable expanded polystyrene (EPS) foam core with advanced polymeric reflective facers on both sides enhances the overall performance.
- Thermal 3Ht is also manufactured with a durable double woven white facer on one side and a polymeric reflective facer on the other side, for an internal exposed finished look or below grade application.
- Thermal 3Ht comes in sheets, rolls and fanfold.
- Thermal 3Ht is very versatile. It can be used in residential, commercial, industrial, agriculture and concrete applications.
- Thermal 3Ht can be used in new or retrofit construction. It can be applied on the exterior or interior of a building structure.

WHY USE THERMAL 3Ht?

- Thermal 3Ht addresses all three forms of heat transfer.
- Thermal 3Ht is an air and vapor barrier, radiant blocker and thermal insulation all in one insulation product.
- Thermal 3Ht is a continuous insulated sheathing or wrap, which eliminates the hot and cold spots in your building structure and creates a controlled environment.
- Thermal 3Ht provides a thermal break and prevents thermal bridging and drifts.
- Thermal 3Ht is water, mold and insect resistant.
- Thermal 3Ht is durable, flexible, recyclable and non-toxic.
- Thermal 3Ht has dimensional stability, compressive strength and stable performance.
- Thermal 3Ht saves energy, lowers utility cost and is environmentally friendly.
- Thermal 3Ht is light weight, simple to install and a versatile product.
- Thermal 3Ht can be used on its own or blended with conventional insulation.
- Thermal 3Ht is high performance insulation with “Real World Results”.

UNDERSTANDING R-VALUE

- R means resistance to heat flow. The higher the R-value, the greater the insulating value.
- How do they test and evaluate labeled R-value on all insulation products? Important information to know.
- Upon research, we concluded that Nominal R-values are the rated/labeled insulation R-values for insulation products.
- Labeled Nominal R-value is based on the ASTM C-518 hot plate test, which is predominantly conduction only and has little or no consideration for convection and radiation.
- Nominal R-values do not consider the effectiveness of the insulation when it is combined with framing members and other conventional building materials.



Different climate zones and seasons will vary percentages on the heat flow chart.

The heat flow chart above clearly reveals to properly insulate any building structure it must have an insulation product that addresses all three forms of heat transfer, such as Thermal 3Ht.

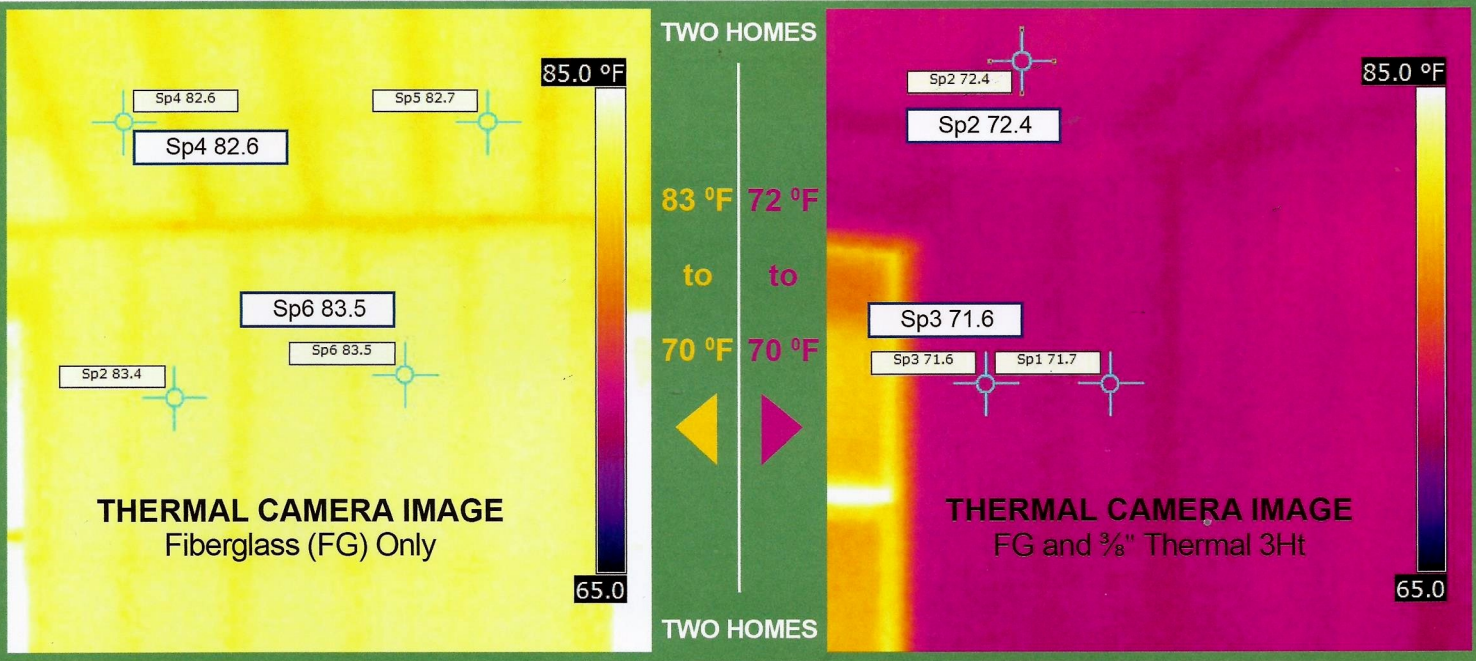
Canadian National Research Council states "Between 50% and 70% of the effective thermal resistance of porous insulation is lost if the system allows vapor transfer from one side of the cavity to the other".

Oak Ridge National Laboratory states: "The market focus on clear-wall cavity R-value is misleading and is inhibiting the market penetration of high performance wall systems into the residential construction industry."

Currently the R-value standard is based on the ASTM C-518 test method which is a conduction test only.

Why? (Please refer to the heat flow chart.)

Thermal camera images below proves Thermal 3Ht insulation WORKS!



Outside Surface Temperature	Roof	118 °F	Outside Wall	109 °F	Outside Surface Temperature	Roof	118 °F	Outside Wall	109 °F
Inside Surface Temperature	Ceiling	83 °F	Inside Wall	83 °F	Inside Surface Temperature	Ceiling	72 °F	Inside Wall	72 °F
Energy Waste and Cost	HIGHER - Summer / Winter				Energy Waste and Cost	LOWER - Summer / Winter			

BUILD IT TIGHT
VENTILATE IT RIGHT

Average Energy Savings

- Sidewalls only – 20% – 35% average energy savings
- Sidewalls & ceiling or roof – 35% – 60% average energy savings
- Sidewalls, ceiling or roof & floor – percentage may be even higher
- Percentages may vary due to size, location and type of structure.

Our goal is to create a total insulation envelope that addresses all three forms of heat transfer around the building. It is important to consult with your HVAC contractor about the need for air exchange and the possible downsizing of the mechanical system. Different climate zones and seasons must be taken into consideration.

Thermal 3Ht's unique combination of components create a high performance insulation. It can be used with all types of construction: agricultural, commercial, residential, basement walls and under concrete. To properly insulate any building you must find an insulation that controls all three forms of heat transfer and can perform in any climate zone.

Does your current insulation prevent, resist or have the following when properly installed?

	THERMAL 3Ht	YOUR CURRENT INSULATION
	Y N	Y N
Radiant Heat	☑ ☐	☐ ☐
Convection	☑ ☐	☐ ☐
Conduction	☑ ☐	☐ ☐
Thermal Bridging	☑ ☐	☐ ☐
Water Resistant	☑ ☐	☐ ☐
Insect & Mold Resistant	☑ ☐	☐ ☐
Stable Performance	☑ ☐	☐ ☐
Non-toxic	☑ ☐	☐ ☐
Recyclable	☑ ☐	☐ ☐
Durable	☑ ☐	☐ ☐
Saves Energy	☑ ☐	☐ ☐
Lowers Utilities	☑ ☐	☐ ☐
Versatile	☑ ☐	☐ ☐
Real World Results	☑ ☐	☐ ☐



Large custom home with ⅜" Reflective-Reflective EPS (RRE) Thermal 3Ht insulation over OSB.



½" RRE Thermal 3Ht insulation placed under concrete slab. Optional to use WRE Thermal 3Ht.



Two story apartment complex with ½" RRE Thermal 3Ht over OSB (Wall) ⅜" RRE between the sheetrock and the ceiling joist.

THERMAL 3Ht . . . ALL WEATHER SHIELD

CONTINUED UNDERSTANDING R-VALUE

- Effective or In-Service R-values are the total heat flow resistance provided by all components or materials in a building structure, such as wood or steel framing members, wood sheathing, metal panels, concrete, sheetrock and insulation, etc.
- Effective or In-Service R-values are based on the ASTM-1363 hot box test which is predominantly conduction and convection. This is one step closer to a real world environment.
- The overall predominant form of heat transfer, solar heat (sun) in the form of radiant heat is not included in either Nominal or Effective In-Service R-values.
- For now, the only way to evaluate how well an insulation performs in the real world is by monitoring energy bills, blower door tests and by thermal imaging cameras. (Example on Page 4)

Note: Architectural Testing Inc. (ATI), an independent testing laboratory accredited in both the USA and Canada, conducted the following tests according to the ASTM 1363-05 standard.

Product	Type of Assembly	Labeled R-Value of Product	Effective R-Value of Assembly	Increase/Decrease
1″ Thermal 3Ht	2x4 wood frame	3.85	8.3	**+ 115%**
1″ Thermal 3Ht	2x4 wood frame with a ¾″ air space	3.85	10.6	**+ 175%**
½″ Thermal 3Ht	2x6 steel frame	1.93	5.22	**+ 170%**
1″ Thermal 3Ht	2x6 steel frame	3.85	6.85	**+ 78%**
6″ Fiberglass	2x6 steel frame	19	7.81	**- 59%**



ROLLS
4' x 72'
⅜" – ½"