TECHNICAL BULLETIN NO.10

Thermal Building Concepts
1366 Elon Drive
Waukon, Iowa, USA 52172
Phone 877-703-2323
Fax 563-535-7101

DATE: **June 5, 2009**

SUBJECT: ASTM 1363-05 Thermal Performance Testing – Thermal 3Ht

Description

Thermal 3Ht is a high-performance superior closed cell Type 1 Expanded Polystyrene (EPS) rigid insulation with factory laminated metallic-reflective facers, white facers or a combination of the two. Thermal 3Ht offers a long-term stable R-value, is Energy Star qualified insulation and qualifies for LEED points.

Testing

Architectural Testing Inc., an accredited independent testing laboratory, has performed the ASTM 1363-05 R-Value test on a series of wood framed wall assemblies. Each assembly contained different thicknesses of Thermal 3Ht which were installed in a variety of locations throughout the wall assemblies.

Temperature Range: 70 F / 21 C inside and 0 F / -18 C outside.
Attached to the R-11 fiberglass insulation was a paper laminated vapor retarder.

Note* in a wood framed wall assembly, fiberglass insulation does not perform to its labeled R-value. In a typical 2X6 wood wall, R-19 fiberglass performs between R-13 and R-17 and R-11 fiberglass insulation performs between R-8 and R-10.

For additional information: www.ornl.gov/roofs+walls/wholewall/wallsys.html

TEST RESULTS

Wall Construction Details	R-Value
Typical R-19 Wall: ½" Sheetrock, 2 X 6 Studs, Vapor Retarder, R-19 Batts, 7/16" OSB	13-17
½" Sheetrock, 2 X 4 Studs with R-11 Batts, 7/16" OSB, ½" Thermal 3Ht	15.1
½" Sheetrock, 2 X 4 Studs with R-11 Batts, 7/16" OSB, 1" Thermal 3Ht	18.0
½" Sheetrock, 3/4" Thermal 3Ht, 2 X 4 Studs with R-11 Batts, 7/16" OSB	17.0
½" Sheetrock, ¾" Strapping, ¾" Thermal 3Ht, 2 X 4 Studs with R-11 Batts, 7/16" OSB	19.5
½" Sheetrock, 2 X 4 Studs with Empty Cavity, 7/16" OSB, 1" Thermal 3Ht	8.3
½" Sheetrock, 2 X 4 Studs, Empty Cavity, 7/16" OSB, ¾" Strapping, 1" Thermal 3Ht	10.6
½" Sheetrock, 2 X 6 Studs, R-19 Batts, 7/16" OSB, ¾" 3Ht Strapping, 1" Thermal 3Ht	26.3

Infrared Imaging of Tested Wall Assemblies

Infrared imaging shows thermal bridging through the framing members of the 6", R-19 conventional wall. The Thermal 3Ht wall shows minimal thermal bridging and the surface temperature is warmer than the R-19 conventional wall.

Conventional Wall
6" Studs / 16" O.C.
½" Sheetrock
Vapor Retarder
R-19 Fiberglass
7/16" OSB
R-Value 13-17

4" Studs / 16" O.C.
½" Sheetrock
¾" Strapping / Furring
¾" Thermal 3Ht
R-11 Fiberglass
7/16" OSB
R-Value 19.5

Additional Information & Observations:

- The ASTM 1363-05 is an R-value test (heat transfer via conduction). The test is conducted in total darkness; consequently this testing method does not fully utilize the effectiveness of Thermal 3Ht's metallic-reflective facers.
- When installed in a conventional wood framed wall, the in-service R-Value of R-19, 6" fiberglass insulation diminishes by as much as 30%. Conversely, when the components of a wood framed wall assembly with R-11 fiberglass insulation are combined with ¾" Thermal 3Ht the in-service R-Value of the wall assembly is enhanced by as much as 60%.
- The R-Value for 1" Thermal 3Ht is approximately R-4. However in an empty 2 X 4 stud wall cavity with a ¾" air space and 1" Thermal the in-service R-Value is 10.6. Without the air space the in-service R-Value is 8.3.
- The R-Value of any of the tested wall assemblies would be improved by utilizing 2 X 6 studs and R-19 fiberglass insulation combined with Thermal 3Ht.
- The performance of any wall assembly is enhanced by incorporating an air space between Thermal 3Ht and OSB / sheetrock.
- Thermal 3Ht is a highly effective interior insulated vapor retarder.
- Additional LEEDS points may be achieved by utilizing 2 X 4 walls rather than typical 2 X 6 walls.