February 25, 2015

Mr. Ted Cullen
TBC Canada, Inc.
P.O. Box 577
Lasalle, Manitoba R0G1B0

RE: Calculated subgrade R-value (R_u)

Architectural Testing, Inc. (ATI) was contracted by TBC Canada to determine expected overall R-values for their Quik-Therm Subgrade Insulation when used in a horizontal application with a 3-1/2" concrete overlay. Due to the fact that horizontal specimens cannot be accurately tested in the ATI thermal test chamber, TBC Canada requested a computer simulation be conducted to determine the estimated R_u for this installation.

Results*

Quik-Therm Thickness	Concrete Thickness	Total Thickness	Overall R-value (R_u) ($hr*ft^2*F/Btu$)
11/16"	3-1/2"	4-3/16"	5.2
1-1/4"	3-1/2"	4-3/4"	7.6
1-7/8"	3-1/2"	5-3/8"	10.2
2-5/16"	3-1/2"	5-3/4"	12.1
2-7/16"	3-1/2"	5-15/16"	12.7
2-9/16"	3-1/2"	6-1/16"	13.2
3-0"	3-1/2"	6-1/2"	15.1

*Note: these are estimated overall R-values and may vary from actual system performance.

Simulation Procedure

Architectural Testing conducted two ASTM C1363 thermal tests to determine the overall R-value (R_u) for the 1/2" system and 1" system when combined with 3-1/2" of concrete. This test data was then imported to the Window5 computer program where the interior and exterior heat transfer coefficients and orientation were modified to reflect a subgrade application. The resulting overall R-values were then used to determine a linear equation that could be used to extrapolate the expected R_u for the listed thicknesses. These values were determined using computer simulation and should not be considered ASTM C1363 R-values.

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Software

Architectural Testing, Inc is an ISO 17025 and NFRC accredited test laboratory. To complete these simulations, ATI used the following approved software.

WINDOW 6.3 Program:
This software was developed by the Lawrence Berkeley National Laboratory. The program calculates U-factor and temperatures for the center-of-glazing by using two-dimensional heat flow analysis.

Sincerely,

Digitally Signed by: Andrew Walczak

Andrew C. Walczak
Architectural Testing, Inc.

ACW:acw