



MORRISON HERSHFIELD

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Ray Snitynsky
V.P. Marketing
Quik-Therm Insulation Solutions Inc.
621-100 Paget St.
Winnipeg, Manitoba
R3P 1C6

Re: Quik-Therm Solar-Dry System in Above Grade Exterior Wall Applications

The intent of this report is to support the use of Quik-Therm's Solar-Dry System as exterior insulation in framed construction.

By way of qualification and bias, I note that I:

- am a Professional Engineer (licensed to practice in the Province of Ontario, British Columbia, Alberta, and the Yukon Territory);
- specialize in the building envelope;
- am employed by Morrison Hershfield Limited, which has a history of product evaluations for Quik-Therm Insulation Solutions.

Background

The Solar-Dry product consists of metalized polymer faced Type 1 expanded polystyrene (EPS) boards with or without 3/4" x 2-1/2" OSB nailing strips embedded at 16" o.c. Vertical contours (flutes) are provided on the interior side of the panel to provide venting and drainage between the interior wall assembly and exterior insulation. The flutes are 14" wide and 3/16" deep at the centre point between the furring. Joints between boards, board edges and the tops of the panels are sealed to prevent convective air movement.

The metalized polymer face combined with the expanded polystyrene also makes Solar-Dry an air-tight, water-tight and low vapour permeance product which must be installed in accordance with article 9.25.5.2 *Position of Low Permeance Materials*.

Tested Thermal Performance

Quik-Therm Insulation Solutions Inc. has undertaken a program of full scale thermal performance testing according to ASTM C1363-05 *Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus*. Testing was performed by Architectural Testing Inc. This testing included direct comparison of assemblies with Solar-Dry and with a Quik-Therm Connect product that is similar but without the "flutes". The tests confirmed that the introduction of the 3/16" flutes and 2"x3/4" wood furring had no appreciable effect on the thermal performance of the wall assembly, provided that the flutes are sealed at the top of each wall panel to eliminate any convection air currents.

Vapour Control

As previously mentioned, the Quik-Therm Solar-Dry is an air-tight and low vapour permeance product with a vapour permeance of $5.89 \text{ ng}/(\text{Pa}\cdot\text{s}\cdot\text{m}^2)$ as per the ASTM E96 test report provided by Architectural Testing, Inc. Therefore, the installation of the Solar-Dry system in a wall assembly must meet the requirements of article 9.25.5.2 *Position of Low Permeance Materials*. Article 9.25.5.2 requires that low permeance materials such as Solar-Dry, be installed out board of a drained and vented cavity or that the ratio of outboard to inboard thermal resistance meet a minimum level dependent on climate. The 3/16" deep flutes in Solar-Dry are too small to meet the definition of a drained and vented air space in article 9.27.2.2. As a result, application of Solar-Dry must comply with clause 9.25.5.2.1.(b) where the overall wall assembly must be designed to meet the minimum ratio of outboard to inboard thermal resistance listed in Table 9.25.5.2 of the Code. This is similar to other closed cell foam insulation products.

The calculation, detailed in Appendix A-9.25.5.2., is based on nominal R-values for all materials and air films

Table 2 Compliance with 9.25.5.2	Ratio of Outboard to Inboard Thermal Resistance⁽⁵⁾	Limit for number of Heating Degree Days as per Table 9.25.5.2
2x4 wall with batt and 2" Solar-Dry	0.65	11,999 HDD
2x6 wall with batt and 2" Solar-Dry	0.40	7,999 HDD

Notes

- (1) These ratios were calculated as per the method outlined in Appendix A-9.25.5.2.
- (2) The ratios provided in Table 9.25.5.2 assume that there is a vapour barrier on the warm side of the assembly.

Note that in an assembly using conventional foam exterior insulation panels, there will be a double vapour barrier, which limits the drying capacity of the assembly. The cavity provided by Quik-Therm Solar-Dry (installed as per manufacturer's recommendations) provides a technical advantage. The vertical cavities, open at the base, provide a drying path to the outside.

Air Control

When installed on the exterior substructure of the building envelope, Quik-Therm Solar-Dry does not act as the air barrier required by section 9.25.3 *Air Barrier Systems*. As such, an air barrier system in the wall assembly is required to meet code requirements.

Moisture Control

Quik-Therm Solar-Dry with joints taped can act as the second plane of moisture protection described in Article 9.27.2.3. That being said we would still recommend the use of a vapour permeable sheathing membrane between the exterior sheathing and the Solar-Dry.

Yours truly,
Morrison Hershfield Limited



Mark Lawton, FEC, P.Eng.
Senior Building Science Specialist

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