



Quik-Therm Insulation Solutions Inc.

936 Connect Composite Wall Weatherization System

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(204) 736-3012

Code Compliance

National Building Code Canada

July 2021

Canadian Provinces typically adopt the National Building Code of Canada (NBCC) as their Provincial codes; however, some Provinces and Municipalities may add additional information reflecting modifications, to their Provincial code, to meet local needs and concerns. Compliance with the code is achieved by complying with the acceptable solutions of Division B of the code. Division B lays out the steps that must be followed, beginning with the geographic location where the build is taking place.

1a. Can a Part 9 building be constructed in Canada with rigid foam plastic insulation sheathing in lieu of plywood, OSB or exterior gypsum?

Yes! Article 9.23.17.1. Required Sheathing Table 9.23.17.2.-A, Wall Sheathing and Thickness and Specifications lists permitted materials for use as sheathing in a Part 9 building. Polystyrene, expanded polystyrene (EPS) Types 1 and 2, meeting the CAN/ULC - S701.1 Material Standard are permitted in lieu of plywood, OSB and gypsum sheathing in a Part 9 building.

1b. Does Quik-Therm 936 Connect meet the requirements of NBCC Articles 9.23.13.1. Requirements for Low and Moderate Wind and Seismic Forces?

Yes! 936 meets the requirements of NBCC Article 9.23.13.1.(1) by complying with the design data in Table C-2, applicable geographic zones. 936 also meets the requirements of sentence 9.23.13.1(2). by complying with Sub-clause 9.23.13.1.(2)(a)(iii).

1c. Can foam sheathing be used on the exterior of a Part 9 building?

Yes! Yes. Foam plastics can be used on the exterior and interior of a Part 9 building as long as it is protected from adjacent space in the building by a thermal barrier as outlined in NBCC Article 9.10.17.10. Protection of Foamed Plastics. 936 Connect meets this requirement by complying with Clause 9.10.17.10.(1)(a).

Quik-Therm Testing: *ASTM E330/E330M* Structural Performance of Windows, Doors, Skylights and Curtain Walls.
TAS 1 24-95 Adhesion Testing for Laminated Polymer Films.

2. Does the NBCC require 2x6 studs when constructing a Part 9 building?

No! Article 9.23.10.1. Stud Size and Spacing Article 9.23.10.1. Stud size and Spacing in the NBCC, defines stud size and spacing allowed in Part 9 construction. Table 9.23.10.1. lists supported loads, minimum stud size, maximum stud spacing and the maximum unsupported height (of the stud), for use in interior and exterior walls. For exterior walls supporting a "Roof with or without attic storage plus one floor", 2x4 studs, spaced 16" O.C., to a maximum unsupported height (length of the wall stud) of 3.0 meters, are permitted for use in a Part 9 building.

Quik-Therm Testing: *ASTM E330/E330M* Structural Performance of Windows, Doors, Skylights and Curtain Walls.

3a. Is polyethylene required for use as a vapour barrier in Part 9 construction?

No! Article 9.25.4.2. Vapour Barrier Materials Thermally insulated, heated buildings must have a vapour control layer incorporated into the building envelope (exterior walls) of a building, to prevent water vapour diffusion from the interior of the building, entering into the wall spaces. Article 9.25.4.2. of the NBCC describes a vapour barrier as a material having a vapour permeance, not greater than 60 ng/(Pa.s.m2) and requires it to be installed on the interior (warm side) of insulated walls, floors and roof spaces. Sentence four [9.25.4.2.(4)] permits the use of coatings to the drywall, such as vapour barrier paints with a vapour permeance ranging from between 45-60 ng/(Pa.s.m2) to act as the vapour control layer of the building envelope, in lieu of six mill poly.

Quik-Therm Testing: *ASTM E96* Water Vapour Permeance.
ASTM E331 Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls.
Hygrothermal Analysis of Quik-Therm 936 Connect Wall.

3b. Does a vapour barrier need to be continuous?

No! Article 9.25.1.1. (2) Difference Between a Vapour Barrier and an Air Barrier. It is important to understand the difference between the functions of a vapour barrier and an air barrier. Some materials perform both functions, while others are only intended to perform one of the two. Vapour barrier materials are intended to restrict the movement of water vapour due to vapour pressure differentials, which are created by differences in temperature and moisture content, while air barrier materials are intended to restrict the movement of air due to air pressure differentials. A vapour barrier does not have to be continuous or sealed to perform its function of reducing the amount of water vapour that moves across an assembly, but an air barrier must be continuous and fully sealed to prevent the movement of air across the assembly.

4. Is an Air Barrier required in Part 9 Construction?

Yes! Article 9.25.3.1. Required Barrier to Air Leakage and 5.4.1.2. Air Barrier System Properties. An air barrier is required in wall, ceiling, and floor assemblies separating a heated space from an unconditioned space. Air barrier systems must create an effective barrier to air infiltration and exfiltration when exposed to a differential air pressure, from, stack effect, mechanical system's or wind. Materials used as an air barrier must have an air leakage of not greater than 0.02 L/(s.m2) measured at a pressure difference of 75 pascals (Pa), when tested in accordance to ASTM E 2178. Note: Quik-Therm performed two ASTM 2178 air permeance tests - one with laminates not breached and the other with laminates breached. The results from both tests met the requirements of an air barrier, as outlined in Section 5.4.1.2. in Division B, of the NBCC.

Quik-Therm Testing: *ASTM E2178* Product Air Barrier Testing.
ASTM E2357 Air Leakage Rate of Air Barrier Assemblies.
ASTM E1186 Air Leakage Detection in Building Envelopes and Air Barrier Systems.
ASTM E331 Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls.
Hygrothermal Analysis of Quik-Therm 936 Connect Wall.



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Testing & Analytical Studies

5. Does NBCC accept the results from ASTM C1363 Effective R-value testing?

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Yes! Article 9.36.2.2. Division B. Determination of Thermal Characteristics of Materials, Components and Assemblies. (4) The effective thermal resistance of opaque building assemblies shall be determined from calculations conforming to Article 9.36.2.4., or laboratory tests performed in accordance with ASTM C1363, "Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus," using an indoor air temperature of $21 \pm 1^\circ\text{C}$ and an outdoor air temperature of $-18 \pm 1^\circ\text{C}$.

6. Is Quik-Therm 936 Connect exempt from Table 9.25.5.2 (Ratio of Outboard to Inboard Thermal Resistance) in climate zones less than 6000 HDD?

Yes! Article 9.25.5.1.(4). Where a material has a water vapour permeance not less than $30 \text{ ng}/(\text{Pa} \cdot \text{s} \cdot \text{m}^2)$ and a thermal resistance not less than $0.7 \text{ (m}^2\text{K)}/\text{W}$ and the heating degree-days of the building location are less than 6000, the assembly need not comply with Sentence (1).

Inspired by Building Science

Over the past 12 years Quik-Therm Insulation Solution Inc. has collaborated with many of North America's finest Building Science engineering and testing organizations. We have conducted 70+ ASTM standard test procedures - including 30+ C1363 effective R-value tests, numerous hygrothermal analysis's - physical wall drainage and drying assembly tests. Several Quik-Therm insulation technologies have been utilized in Canada's largest and second largest Passive House Buildings and the Home of Tomorrow

Air Barrier & Air Leakage Testing

ASTM E2178 Product Air Barrier Testing. QAI Laboratories. Semi-permeable (breached/perforated polymer films) meets the requirements of an air barrier as outlined in Section 5.4.1.2 (Division B) of the National Building Code of Canada.

ASTM E2357 Air Leakage Rate of Air Barrier Assemblies. Red River College (BETAC).

ASTM E1186 Air Leakage Detection in Building Envelopes and Air Barrier Systems. Red River College (BETAC).

Hygrothermal Analysis

Hygrothermal Analysis of Quik-Therm 936 Connect Wall. Patrick Roppel, P.Eng., Sophie Mercier, P.Eng. Building Science Specialists, Evoke Buildings Engineering Inc.

The Quik-Therm 936 Connect wall meets the prescriptive requirements in the 2015 NBC for thermal insulation (9.25.2), air barrier system (9.25.3), vapour barriers (9.25.4), and position of materials in the building envelope (9.25.5).

Tape Peel Adhesion Testing

Tested to ASTM D 3330, Method A. 3M considers the bond of 3M 3015, Air and Vapour Barrier tape to Quik-Therm insulation to be adequate and the products to be compatible.

Water and Vapour Barrier Testing

ASTM E96 Water Vapour Permeance. QAI Laboratories. Average water vapour permeance of $87.30 \text{ ng}/(\text{Pa} \cdot \text{s} \cdot \text{m}^2)$ (1.53 US perms). Perforated 936 Connect is deemed vapour semi-permeable.

ASTM E331 Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls. Red River College (BETAC). Detects water leakage utilizing high pressure water. Simulates driving rain.

Structural Testing

ASTM E330/E330M Structural Performance of Windows, Doors, Skylights and Curtain Walls, Red River College (BETAC). Withstood 1500 pascals. Equivalent to 178 km/h sustained wind speed. Minimal deflection. No drywall, exterior sheathing or cladding. Just 2" thick 936 Connect nailed over 2x4 framing @16" OC. No Bracing.

TAS 1 24-95 Adhesion Testing for Laminated Polymer Films. QCA Building Envelope Ltd. Three test samples. Averaged pull resistance 257 psi / 1,029 psf.

Effective Thermal Resistance

In addition to nominal R-Value testing as per ASTM C518, standard prescriptive calculation methods and independent evaluations, Quik-Therm Insulation Solutions Inc. has undertaken a program of full-scale thermal performance testing to ASTM C1363-05 "Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus."

Method	Test Company	Test Assembly	R-Value
ASTM C-518	ATI/Intertek	1" Type 2 Quik-Therm Connect	4.18
ASTM C-1363	ATI/Intertek	3/8" drywall, 6 mil poly vapour barrier, R-13 batt (2x4 cavity), 7/16" OSB, 2" Connect, 1/4" cement board siding	23.1
Prescriptive Effective R-Value Calculation	Minimum R-value Calculations	Interior Air Film (R-0.17) + 1/2" drywall (R-0.45) + R-12 fiberglass (R-9.8) + 2" Type 2 Connect (R-8.36) + typical cladding materials (R-0.4) + Exterior Air film (R-.68)	19.9