



Evaluation Report

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Ispro Green System/Ispro Green System Plus

1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Ispro Green System” and “Ispro Green System Plus” EIFS, when used as cladding systems that are designed to provide additional thermal insulation and a weather barrier for new and retrofit construction in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code of Canada (NBC) 2005:

- Clause 1.2.1.1.(1)(a), Division A, using the following acceptable solutions from Division B:
 - Sentence 5.6.1.1.(1),
 - Clause 9.25.2.2.(1)(c),
 - Article 9.27.3.7.,
 - Article 9.27.4.2.,

- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
 - Sentence 9.27.1.1.(5),
 - Article 9.27.2.1.,
 - Sentence 9.27.2.2.(4),
 - Sentence 9.27.2.3.(1),
 - Article 9.27.3.1., and
 - Sentence 9.27.5.1.(1).

This opinion is based on CCMC’s evaluation of the technical evidence in Section 4.1 provided by the Report holder.

2. Description

“Ispro Green System/Ispro Green System Plus” are non-loadbearing exterior insulation and finish systems (EIFS), either assembled in panels under factory-controlled conditions or field-applied. The systems are composed mainly of the following key components:

- a water penetration barrier (WPB) coating,
- an adhesive attachment,
- an insulation board, and
- a coating system (lamina⁽¹⁾).

(1) *The lamina refers to all the coats (base coats and finish coat) applied to the outer face of the insulation board together with the glass-fibre mesh reinforcement.*

“Ispro Green System/Ispro Green System Plus” EIFS falling under the scope of this Report are intended to be installed over a specific structural substrate that is specified in this section.

A detailed description follows of the different components of the two systems.

Substrate

The substrate can be brick, masonry, monolithic concrete walls, cementitious panels and/or glass-mat-surfaced gypsum boards over wood or steel framing. Gaps between the sheathing boards of framed walls shall not exceed 3.2 mm.

Water Penetration Barrier (WPB) Coating⁽²⁾

(2) *The water penetration barrier (WPB) is a coating that is installed to provide a continuous membrane over water-sensitive substrate and around penetrations and openings to provide, along with other built-in features, the second plane of protection against water infiltration reaching the structure. In order to provide the intended level of protection against water infiltration, the water penetration barrier shall be installed in a two-coat application in which the first coat shall have sufficient time to cure before the second coat is applied. The water penetration barrier shall be applied in accordance with Ispro’s Installation Manual, dated March 2008. The continuity of the second plane of protection across joints and junctions at openings, penetrations and expansion joints shall be maintained through accessories (such as self-adhering membranes, tapes, etc.) as specified by the manufacturer, prior to the installation of these systems.*

“Pearl MPI”

“Pearl MPI” is a polymer-based, fibre-reinforced, wet paste coating supplied in 25-kg pails, and mixed on site with Type 10 Portland cement (1:1 by weight). “Pearl MPI” is applied in a continuous layer over the substrate and wrapped around the framing and penetrations to achieve a minimum wet thickness of 3.2 mm. Gaps between the sheathing boards of wood-/steel-framed walls are sealed with a joint tape consisting of a 508 g/m² “Vitrulan” glass-fibre mesh embedded with “Pearl MPI” coating. Openings and penetrations in wood-/steel-framed walls are treated with a self-adhering modified bituminous membrane prior to the installation of the EIFS.

Adhesive⁽³⁾

(3) *Adhesives are products for bonding the insulation to the substrate coated with the WPB. They are generally available in the following forms: a dry powder mix requiring the addition of water on site, or a wet paste that does not require any additives.*

“Ispro Polybond”

“Ispro Polybond” is a polymer-based adhesive supplied in 25-kg pails (17.5 L). The adhesive is mixed on site with Type 10 Portland cement (1:1 by weight). Workability may be adjusted by the addition of a maximum of 1 cup of clean, potable water.

“Ispro Polybond” is applied in a continuous layer over the “Ispro Flat Insulation Board” and/or the “Ispro Drainage Board” using a stainless steel U-shaped notched trowel and rendered in such a way as to align the adhesive in vertical ribbons. The spacing between the ribbons shall be 6 mm and the size of the notches shall be 9 mm in width and 9 mm in depth.

Insulation

“Ispro Flat Insulation Board” and “Ispro Drainage Board” are Type 1 or Type 2 polystyrene-foam insulation boards that are made from 100% virgin materials and manufactured and packaged by an Ispro-approved manufacturer/molder. The insulation boards are aged in ambient air for a minimum of five weeks or kiln-dried.

“Ispro Flat Insulation Board” is a typical flat EPS board. “Ispro Drainage Board ” has drainage pathways cut into the insulation in a series of channels, 12 mm deep, 25 mm wide and 140 mm apart.

“Ispro Flat Insulation Board” and “Ispro Drainage Board” EPS insulation boards shall conform to the following:

- CAN/ULC-S701-01 and CAN/ULC-S701-05, “Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering”;
- minimum board thickness of 38 mm when using both insulation boards;
- maximum board thickness as designed, when used in combustible construction;
- maximum board size is 600 mm x 1 219 mm;
- average density of 16 kg/m³; and
- flame-spread rating: 25 to 500 as per CAN/ULC-S102.2-07, “Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.”

Synthetic Coating System (Lamina)

The synthetic coating system (lamina) consists of the base coat embedding the reinforcing mesh, a primer and a finish coat.

Base Coat

“Ispro Polybase”

“Ispro Polybase” is a polymer-based adhesive supplied in 25-kg pails (17.5 L). The adhesive is mixed on site with Type 10 Portland cement (1:1 by weight). Workability may be adjusted by the addition of a maximum of 1 cup of clean potable water.

“Ispro Polybase” is applied in a continuous layer over the entire surface of the “Ispro Flat Insulation Board” and/or the “Ispro Drainage Board” to a uniform dry thickness not less than 1.6 mm using a stainless steel trowel. The base coat thickness must be thicker when more than one layer of reinforcing mesh is incorporated into the lamina.

Reinforcing Mesh

“Vitrulan”

“Vitrulan” is an alkali-resistant, glass-fibre reinforcing fabric, having a minimum 200 g/m² nominal weight, used with the base coat. The mesh is green in colour and is available in rolls 965 mm wide. Starter mesh for rendering surface articulations and terminations is available in rolls 240 mm wide.

The reinforcing mesh comes in two grades represented in ascending order of strength: Extra Standard, minimum 200 g/m²; and Extra Strength, minimum 508 g/m². Higher grade meshes are intended to be used in areas requiring high impact resistance.

Primer

“Isproll”

“Isproll” is a water-based pigmented acrylic primer that provides a uniformly absorbent surface for selected Ispro finish coats. The primer is supplied in 24-kg ready-mix pails (19 L).

Finish Coat

“Ispro Finish”

“Ispro Finish” is a ready-mix polymer-based finish coat, supplied in 30-kg pails. It is factory tinted to the desired colour. The finish coats provide a texture that is governed by the aggregate size as well as the trowel motion used to render the wall surface. The following represents the different textures offered and their respective coating thickness: “Quartz” (2.0 mm), “Marble Coat” (1.5 mm), “Canyon” (1.25 mm), “Sable” (1.25 mm), “Brume” (0.75 mm) and “Tornado” (1.0 mm).

All finish-coats are colour-tinted to the desired colour.

Table 2.1. Product Details for “Ispro Green System/Ispro Green System Plus”

System Components							
System	Intended Substrate	Insulation	Water Penetration Barrier (WPB)	Adhesive	Base Coat	Primer	Finish Coat
Ispro Green System	- concrete - masonry - glass-mat-surfaced gypsum sheathing - cement board	Ispro Flat Insulation Board EPS	Pearl MPI	Ispro Polybond	Ispro Polybase	Ispro I	Ispro Finish
Ispro Green System Plus	- concrete - masonry - glass-mat-surfaced gypsum sheathing - cement board	Ispro Drainage Board EPS	Pearl MPI	Ispro Polybond	Ispro Polybase	Ispro I	Ispro Finish

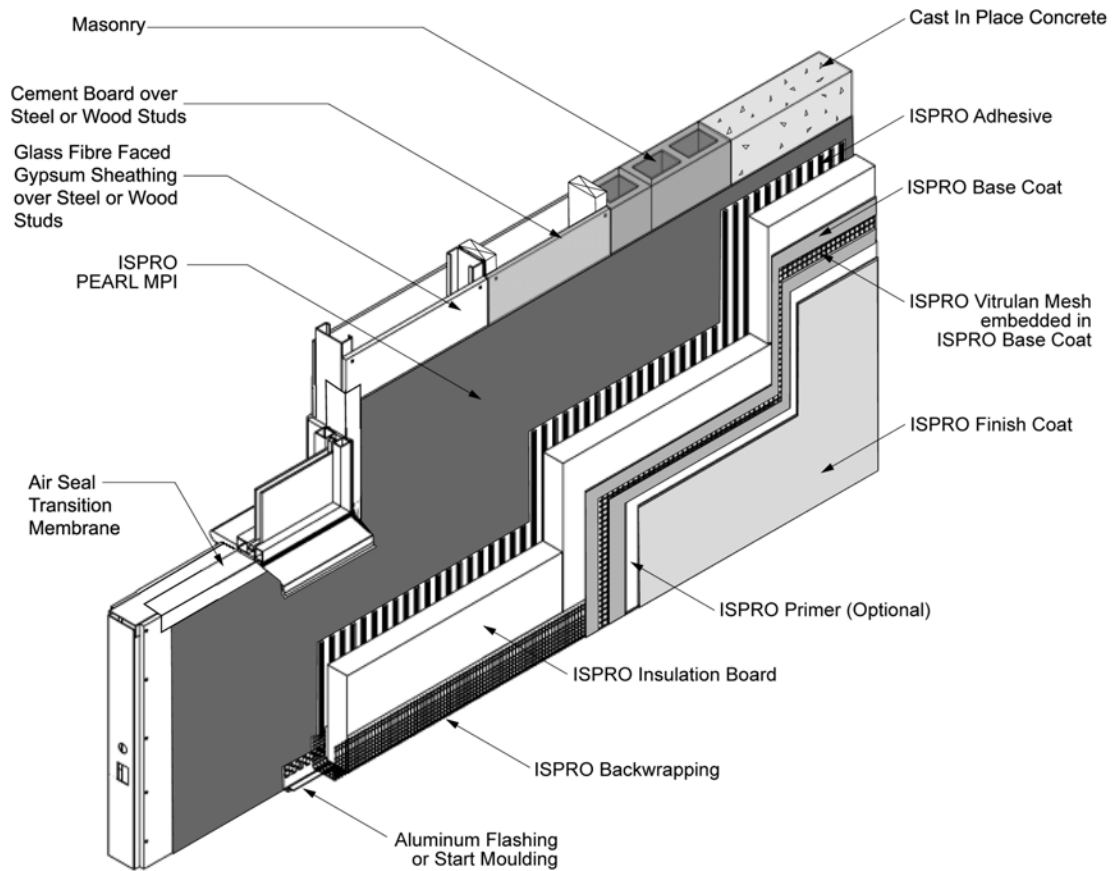


Figure 1. Product details for the “Ispro Green System/Ispro Green System Plus.” Note: The Ispro adhesive is applied in vertical ribbons on back of the EPS insulation.

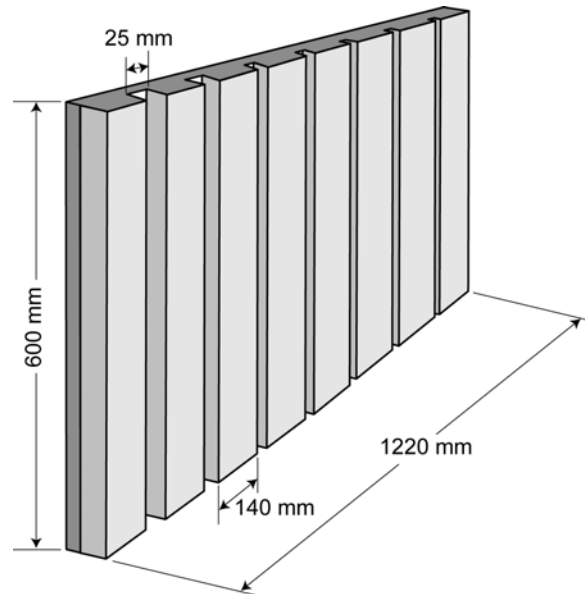


Figure 2. Product details for the “Ispro Drainage Board.”

3. Conditions and Limitations

CCMC’s compliance opinion in Section 1 is bound by the “Ispro Green System/Ispro Green System Plus” being used in accordance with the conditions and limitations set out below.

- “Ispro Green System/Ispro Green System Plus” are intended for use as exterior insulation wall systems applied directly to vertical walls of brick, masonry, monolithic concrete walls, cementitious panels and/or glass-mat-surfaced gypsum boards over wood or steel framing. Gaps between the sheathing boards of framed walls shall not exceed 3.2 mm.
- “Ispro Green System/Ispro Green System Plus” are acceptable for use on new and existing exterior, vertical walls. The systems are not acceptable for use on horizontal surfaces.
- When the EIFS are part of a prefabricated panel system that incorporates structural components, the prefabricated panel system shall be designed by a professional engineer or architect in accordance with the manufacturer’s criteria and the requirements of the NBC 2005.
- “Ispro Green System/Ispro Green System Plus” alone may not provide the full amount of the required wall insulation. The thermal resistance of the wall system shall conform to the condensation resistance and energy requirements of the applicable building code. The wall system may have to conform to the Model National Energy Code of Canada for Buildings 1997 as a minimum to meet the Canada Mortgage and Housing Corporation’s technical requirements.
- “Ispro Green System/Ispro Green System Plus” are not suitable for use as a structural sheathing for bracing purposes.
- “Ispro Green System/Ispro Green System Plus” are not intended for use as a below-grade insulation and should terminate at least 200 mm above grade level.
- In retrofit construction, the addition of thermal insulation onto existing exterior walls will increase the thermal efficiency and airtightness of the wall. Deficiencies in flashing and other elements in the building assembly, including mechanical systems, may result in detrimental effects of moisture accumulation as highlighted in the NBC 2005, Division B, Appendix Note A-9.25.2.4.(3). As a result, existing exterior walls that are intended to be retrofitted with EIFS must meet the requirements of the NBC 2005 for heat transfer, air leakage and condensation control.

- The possibility of moisture accumulation within the wall construction is mainly a function of the ability of the wall assembly to deflect bulk water entry; the physical properties of the cladding being installed and its impact on the thermal, air leakage and vapour diffusion characteristics of the existing wall must be in accordance with the NBC 2005, Division B, Appendix Note A-5.1.2.1.(1).
- “Ispro Green System/Ispro Green System Plus” can provide additional thermal and air leakage resistance to the wall assembly with no detrimental effects if properly installed with knowledge of the existing wall configuration and performance.
- When used in new construction, the design of “Ispro Green System/Ispro Green System Plus” shall be in accordance with the requirements of Section 9.25. of Division B of the NBC 2005.
- The polystyrene thermal insulation shall be aged for a minimum of five weeks or kiln-dried before installation.
- “Ispro Green System/Ispro Green System Plus” are limited in use for combustible construction not more than 3 storeys in building height.
- When used in combustible construction, the polystyrene insulation shall be protected from the inside of the building in accordance with NBC 2005, Division B, Clauses 3.1.4.2.(1)(c) and 9.10.17.10.(1)(c).
- The systems should be kept at least 50 mm from heat-emitting devices, such as recessed light fixtures and chimneys, or as required in building regulations and safety codes.
- The requirements of the NBC 2005 regarding fire stops shall be implemented.
- The polystyrene thermal insulation shall have a flame-spread rating of not more than 500 when tested in accordance with the requirements of CAN/ULC-S102.2-M88, “Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies.” The mineral wool thermal insulation shall have a flame-spread rating of not more than 25 when tested in accordance with the requirements of CAN/ULC-S102.2-M88.
- Expansion joints must be carried through the cladding. Movement joints are required to accommodate expansion and contraction of building materials due to thermal changes, moisture, wind, gravity, vibration and seismic activity. Expansion joints must be used in the following situations:
 - at joints that occur in the substrate,
 - at any abutment of the system with other materials,
 - where the substrate changes,
 - where significant structural movement occurs,
 - where deflections in excess of L/240 are expected, and
 - at the floor line in wood-frame lumber construction (may not be required when using engineered wood joists and beams).
- Closed cell backer rods should be used at expansion joints so that the low-modulus sealant may be installed as per the sealant manufacturer’s instructions.
- “Ispro Green System/Ispro Green System Plus” must be installed according to Ispro’s Installation Guide, Version No. 1, dated March 2008, by applicators certified by the manufacturer, and/or holding an EIFS QAP certificate.
- Wet materials must be applied at temperatures above 4°C and maintained above 4°C for a period not less than 24 hours. The substrate must be maintained above 4°C for a period not less than 24 hours. Cool and humid climatic conditions may extend drying time beyond 24 hours. Temporary protection

and heat must be provided during colder conditions. Materials must be stored at temperatures between 5°C and 32°C. Previously frozen materials must not be used.

- Wet, finished surfaces must be protected from rain and wind-driven moisture until the materials have set and hardened.
- Cap flashing must be installed immediately after completion of the finish coat or temporary protection must be provided.
- Glass-mat gypsum sheathing must be in compliance with the requirements of ASTM C 1177/C 1177M-04e1, “Glass Mat Gypsum Substrate for Use as Sheathing,” or have been evaluated by CCMC.
- The manufacturer must provide specifications and a description of surface sealers.
- The drainage cavity created by the use of the notched trowel adhesive ribbons and/or the channels in the EPS (in the case of “Ispro Drainage Board”) shall remain unobstructed so as to form a clear drainage cavity behind the insulation boards.
- The EIFS shall be installed with suitable flashing to drain any incidental water from the drainage cavity to the exterior and to protect the exposed top edge of the cladding.

4. Technical Evidence

CCMC’s Technical Guide for “Exterior Insulation and Finish Systems” sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an acceptable or alternative solution in compliance with the NBC 2005. The Report holder has submitted test results for CCMC’s evaluation. Testing was conducted at independent laboratories recognized by CCMC. The corresponding test results for “Ispro Green System/Ispro Green System Plus” are summarized below.

4.1 NBC 2005 Compliance Data for “Ispro Green System/Ispro Green System Plus” on which CCMC Based its Opinion in Section 1

Table 4.1.1. Test Results for “Ispro Green System/Ispro Green System Plus” Ash Content

Property	Unit	Requirement	Result
Ash content			
○ WPB	%	Report value	47.8
○ base coat			54.1
○ finish coat			76.5

Table 4.1.2. Test Results for “Ispro Green System/Ispro Green System Plus” Infrared Analysis

Property	Unit	Requirement	Result
Infrared analysis	No unit	Report value	Report on file

Table 4.1.3. Test Results for “Ispro Green System/Ispro Green System Plus” Adhesion Bond of WPB to Substrate

Property	Unit	Requirement	Result
Adhesion bond of WPB (WPB to substrate [cement board])		@	
○ dry state	MPa	0.3	0.94
○ 2 h drying		0.1	0.57
○ 7 d drying		0.3	0.93

Table 4.1.4. Test Results for “Ispro Green System/Ispro Green System Plus” Adhesion Bond of Adhesive to WPB

Property	Unit	Requirement	Result ⁽¹⁾
Adhesion bond of adhesive (adhesive to WPB)	MPa	@	
○ dry state		0.3	1.08
○ 2 h drying		0.1	0.41
○ 7 d drying		0.3	1.02

Note to Table 4.1.4.:

(1) Substrate failure occurred before the requirement of 0.3 MPa could be attained. The conformity of the respective coating (water penetration barrier or adhesive) to the 0.3 MPa criterion is established by testing over concrete substrate, on which it exceeded the minimum requirement.

Table 4.1.5. Test Results for “Ispro Green System/Ispro Green System Plus” Adhesion Bond of Adhesive to Insulation

Property	Unit	Requirement	Result ⁽²⁾
Adhesive bond strength (adhesive to insulation)	MPa	@	
○ dry state		0.3	0.39
○ 2 h drying		0.1	0.19
○ 7 d drying		0.3	0.28 ⁽²⁾ (deemed to pass)

Note to Table 4.1.5.:

(2) Substrate failure occurred before the requirement of 0.3 MPa could be attained. The conformity of the respective coating (water penetration barrier or adhesive) to the 0.3 MPa criterion is established by testing over concrete substrate, on which it exceeded the minimum requirement.

Table 4.1.6. Test Results for “Ispro Green System/Ispro Green System Plus” Lamina Bond Strength Tests

Property	Unit	Requirement	Result	
Lamina bond strength (base coat to insulation)	MPa	@		
○ dry state		0.3	0.39	
○ 2 h drying		0.1	0.19	
○ 7 d drying		0.1	0.28	
Lamina bond strength (finish coat to base coat)				
○ dry state		0.3	0.43	
○ 2 h drying		0.1	0.18	
○ 7 d drying		0.1	0.39	

Table 4.1.7. Test Results for “Ispro Green System/Ispro Green System Plus” Water Vapour Transmission (WPB)

Property	Unit	Requirement	Result
Water vapour transmission (WPB)	ng/pa·s·m ²	Report value	561

Table 4.1.8. Test Results for “Ispro Green System/Ispro Green System Plus” Water Vapour Transmission (Lamina)

Property	Unit	Requirement	Result
Water vapour transmission (lamina)	ng/pa·s·m ²	≥ WVP of EPS	166

Table 4.1.9. Test Results for “Ispro Green System/Ispro Green System Plus” Water Absorption

Property	Unit	Requirement	Result
Water absorption test (base coat) (lamina)	%	≤ 20 of the dry weight	14 11.8

Table 4.1.10. Test Results for “Ispro Green System/Ispro Green System Plus” Water Absorption Coefficient of (WPB)

Property	Unit	Requirement	Result
Water absorption coefficient (WPB) @ 72 h	kg/(m ² . s ^{1/2})	≤ 0.004	0.0035

Table 4.1.11. Test Results for “Ispro Green System/Ispro Green System Plus” Impermeability to Water

Property	Unit	Requirement	Result
Impermeability to water (base coat) (lamina)	hours	no water penetration in less than 2 h	Pass Pass

Table 4.1.12. Test Results for “Ispro Green System/Ispro Green System Plus” Mildew and Fungus Resistance

Property	Unit	Requirement	Result
Mildew and fungus resistance	No unit	no growth	Pass

Table 4.1.13. Test Results for “Ispro Green System/Ispro Green System Plus” Accelerated Weathering

Property	Unit	Requirement	Result
Accelerated weathering resistance	No unit	no cracking, flaking or deleterious effects	Pass

Table 4.1.14. Test Results for “Ispro Green System/Ispro Green System Plus” Salt Spray Resistance

Property	Unit	Requirement	Result
Salt spray resistance @ 300 h	No unit	no cracking, flaking or deleterious effects	Pass

Table 4.1.15. Test Results for “Ispro Green System/Ispro Green System Plus” Durability Under Environmental Cyclic Conditions

Property	Unit	Requirement	Result
Durability under environmental cyclic conditions	No unit	No cracking, blistering or sagging of base coat, and no detachment of finish coat, or crazing	Pass

Table 4.1.16. Test Results for “Ispro Green System/Ispro Green System Plus” Reinforcement Mesh Breaking Strength Resistance

Property	Unit	Requirement	Result	
			Weft	Warp
Initial strength	N/mm	35	57	38
Loss of strength @: 30-day soak 60-day soak 90-day soak	%	≤ 60	29 36 35	44 56 53
Residual strength @: 30-day soak 60-day soak 90-day soak	N/mm	≥ 15	41 37 37	21 17 18

Table 4.1.17. Test Results for “Ispro Green System/Ispro Green System Plus” Impact Resistance

Property	Unit	Requirement	Result
Impact Extra Standard, min. 200 g/m ² mesh – (10 joules) – (3 joules)	J	Six of 10 free-fall drops shall show no failure No perforation (broken mesh) No cracks	 8/10 Pass 7/10 Pass

Table 4.1.18. Test Results for “Ispro Green System/Ispro Green System Plus” Wind Load Resistance

Reference Wind Pressure (kPa)	Sustained		Cycling		Gust		Deflection Test		
	P ₁ , P' ₁ (Pa)		P ₂ , P' ₂ (Pa)		P ₃ , P' ₃ (Pa)		Test Pressure (Pa) 3.3 P ₁ , P' ₁	Measured Maximum Net Mid-span Deflections (mm)	
								Stud Height 3 050 mm	Sheathing Span 406 mm
Q10 < .40	± 400	Pass	± 530	Pass	± 800	Pass	+ 1 320	9.5	0.9
							-1 320	8.4	1.1
Q10 < .60	± 600	Pass	± 800	Pass	± 1 200	Pass	+1 980	13.9	1.8
							-1 980	12.5	2.3
Q10 < .80	± 800	Pass	± 1 060	Pass	± 1 600	Pass	+2 640	19.9	2.9
							-2 640	18.7	4.2
Maximum test pressure @ L/180 deflection (no structural failure)							+2 480	16.9	Not applicable
							-2 525		
Ultimate structural test pressure							+2 750	Pass	
							-2 750	Sheathing separation from steel studs @ 2 800 Pa	

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