Evaluation Report CCMC 13062-R
Senerflex Wall System

MasterFormat:	07 24 13.01
Evaluation issued:	2002-05-21
Re-evaluated:	2018-03-14
Revised:	2020-11-24

1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "Senerflex Wall System," when used as an exterior wall cladding that is designed to be a weather barrier and to provide thermal insulation in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code (NBC) of Canada 2015:

Clause 1.2.1.1.(1)(a) of Division A, as an acceptable solution from Division B:

- Clause 3.1.4.2.(1)(c), Protection of Foamed Plastics
- Article 3.1.5.5., Combustible Cladding on Exterior Walls
- Clause 3.1.5.15.(2)(a), Foamed Plastic Insulation
- Clause 3.2.3.8.(1)(b), Protection of Exterior Building Facade
- Sentence 5.6.1.1.(1), Required Protection from Precipitation
- Subsection 5.9.4., Exterior Insulation Finish Systems
- Clause 9.25.2.2.(1)(d), Insulation Materials (CAN/ULC-S701-11, "Thermal Insulation, Polystyrene, Boards and Pipe Covering")
- Sentence 9.27.1.1.(5), General (Exterior Insulation Finish System)
- Article 9.27.2.1., Minimizing and Preventing Ingress and Damage
- Clause 9.27.2.2.(1)(e), Minimum Protection from Precipitation Ingress
- Sentence 9.27.2.3.(1), First and Second Planes of Protection
- Subsection 9.27.13., Exterior Insulation Finish Systems
- Article 9.27.3.1., Elements of the Second Plane of Protection, and

CAN/ULC-S716.1-12, "Standard for Exterior Insulation and Finish Systems (EIFS) – Materials and Systems."

This opinion is based on CCMC's evaluation of the technical evidence in Section 4 provided by the Report Holder.

Ruling No. 03-15-104 (13062-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2003-10-10 pursuant to s.29 of the *Building Code Act*, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

2. Description

The product is a non-loadbearing exterior insulation and finish system (EIFS) that can be assembled in panels under factory-controlled conditions or field-applied. The system is composed of the following key components:

- a water-resistive barrier (WRB),
- an adhesive,
- an insulation board, and
- a coating system (lamina[(1)]).

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

The following describes the different components of the system:

2.1 Substrate

For applications falling under the scope of this Report, the substrate can be brick, masonry, monolithic concrete walls, and/or cementitious panels, glass-mat-surfaced gypsum boards, plywood or oriented strand board (OSB) over wood or steel framing. Gaps between the sheathing boards of framed walls must not exceed 3.0 mm.

2.2 Water-Resistive Barrier (WRB)(2)

"Senershield-R" is a one-component water based coating provided in 27 kg pails. Senershield-R is roller-, spray-, trowel- or brush-applied in a continuous layer (wet film thickness is 10 mil or 0.254 mm) over the substrate. The WRB is used in a combination with sheathing fabric to wrap rough openings and treat sheathing joints.

(2) The water-resistive barrier (WRB) is a coating that is installed to provide, along with other built-in features, the second line of defence against water infiltration reaching the structure. The WRB must be applied in accordance with the products' installation manuals.

In systems with a WRB consisting of a coating, the continuity of the second plane of protection across joints and junctions at openings, penetrations and expansion joints must be maintained through accessories such as self-adhering membranes, tapes, etc., as specified by the manufacturer, prior to the installation of these systems. Furthermore, in order to provide the intended level of protection against water infiltration, the coating (WRB) must be installed in a two-coat application in which the first coat must have sufficient time to cure before the second coat is applied.

2.3 Adhesives(3)

- "Alpha Base Coat" is a 100% acrylic adhesive and base coat that is field-mixed with Types 10 (GU) Portland cement (1:1 by weight). It is supplied in 27 kg pails. It is applied to the back of the insulation board using a notched trowel, 13 mm wide × 13 mm deep, spaced 50 mm apart.
- "Alpha Dry Base Coat" is a dry mix polymer adhesive that is field-mixed with water (4:1 by weight powder to water). It is supplied in 22.6 kg bags. It is applied to the back of the insulation board using a notched trowel, 13 mm wide × 13 mm deep, spaced 50 mm apart. "Alpha Dry Base Coat" is noncombustible, conforming to the requirements of CAN/ULC-S114-05, "Test for Determination of Non-Combustibility in Building Materials" (Intertek Listing Spec ID: 38825). Only systems including "Alpha Dry Base Coat" defined in Table 2.1 below are acceptable for use on buildings required to be of noncombustible construction. Refer to the "Conditions and Limitations" section of this report for further details.

(3) Adhesives are used for bonding the insulation to the substrate coated with the WRB. They are, in general, available in the following forms:
    - a dry powder mix requiring the addition of water on site, or
    - a wet paste that requires the addition of cement on-site, or
    - a form that does not require any additives.

Certain adhesives are also used as base coats, as in the case with all noted adhesives. Consequently, the description of base coats has been placed in this section.

2.4 Insulation

- "Senergy Insulation Board" is a typical flat EPS board.
- "Senergy GDC Insulation Board" is a geometrically-defined EPS board that includes 25 mm wide × 10 mm deep grooves spaced 305 mm on centre and a 12.5 mm wide by 10 mm deep chamber around the entire perimeter of the board.

Insulation boards are Type 1 EPS made from 100% virgin materials and are dried 5 weeks at minimum, or are kiln-dried.

The two insulation boards must conform to the following:

- CAN/ULC-S701-11, Type 1 or Type 2,
- a minimum board thickness of:
    - 19 mm for the "Senergy Insulation Board," and
    - 38 mm for the "Senergy GDC Insulation Board"
- a maximum board thickness of:
    - as designed, when used in combustible construction,
    - 152 mm, when used in noncombustible construction meeting Article 3.1.5.5 of Division B of the NBC 2015 and when applied over steel framing (spaced at 400 mm o.c.) covered with a minimum 12.7-mm glass-mat gypsum sheathing complying with ASTM C 1177 or when applied over concrete or masonry, and
    - 102 mm, when used in noncombustible construction meeting Clause 3.2.3.8.(1)(b) of Division B of the NBC 2015.
- a maximum board size of 610 mm × 1220 mm, and
- a flame-spread rating of 25 – 500, per CAN/ULC-S102.2-11, "Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies."

2.5 Synthetic Coating System (Lamina)

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

2.5.1 Base Coat(4)

- "Alpha Base Coat" – see description in the Adhesives section.
- "Alpha Dry Base Coat" – see description in the Adhesives section.

When used as a base coat, the above are applied with a stainless steel trowel to the entire surface of the insulation to a uniform dry rendered thickness of nominal 1.6 mm. The thickness of the base is thicker when more than one layer of reinforcing mesh is incorporated into the lamina.

(4) The thickness of the base coat required depends on the number of layers and the type of reinforcing mesh used. The base coat thickness is thicker when more than one layer of reinforcing mesh is incorporated into the lamina. The final thickness of the base coat must be sufficient to fully embed the reinforcing mesh in the base coat and with no mesh colour visible.

2.5.2 Reinforcing Mesh

The reinforcing mesh is an alkali-resistant, interwoven glass-fibre reinforcing fabric having a minimum 142 g/m^2 nominal weight that is used with the Senergy. base coat. The mesh is white with the name "Senergy" imprinted on it. It is available in rolls that are 965 mm wide × 45.7 m long. Starter mesh for rendering surface articulations and terminations is available in rolls 229 mm wide. The reinforcing mesh is available in six grades of strength:

- Flexguard 4": 142 g/m^2,
- Intermediate 6": 190 g/m^2,
- Intermediate 12": 373 g/m^2,
- Strong 15": 508 g/m^2, and
- Hi Impact 20": 678 g/m^2.

Higher-weight meshes are designed for use in high-impact resistance areas.

"Sheathing Fabric" is a non-woven 83 g/m^2 polyester fabric with random fibers used with "Senershield-R" at sheathing joints and into rough openings

2.5.3 Primer

"Tinted Primer" is a water-based, pigmented acrylic primer applied over the base coat prior to finish application.

Note: Primer is typically required for spray- or roller-applied finishes.

2.5.4 Finish Coat

"Senerflex Finish" is a ready-mix acrylic-based finish coat supplied in 32 kg pails and tinted to a desired color.

The finish coat provides texture that is governed by the aggregate size and trowel motion during application.

Textures offered are:

- "Belgian Lace,"
- "Classic,"
- "Coarse,"
- "Fine,"
- "Limestone,"
- "Sahara,"
- "Senerbrick," and
- "Texture."

Senergy Wall System

Table 2.1 "Senergy Exterior Insulation Finish Systems"

System	Distinctive System Components						
	Insulation	Intended Substrate	Water-Resistive Barrier	Adhesive	Base Coat	Base Coat	Finish Coat
Senerflex Channeled Adhesive Design	Flat EPS	cement board, concrete masonry, glass mat gypsum, plywood/OSB	Senershield-R	Alpha Base, Alpha Dry Base	Alpha Base, Alpha Dry Base	Tinted Primer (optional)	Senerflex Classic Finish
Senerflex GDC Design	Geometrically -Defined EPS	cement board, concrete masonry, glass mat gypsum, plywood/OSB	Senershield-R	Alpha Base, Alpha Dry Base	Alpha Base, Alpha Dry Base	Tinted Primer (optional)	Senerflex Finish

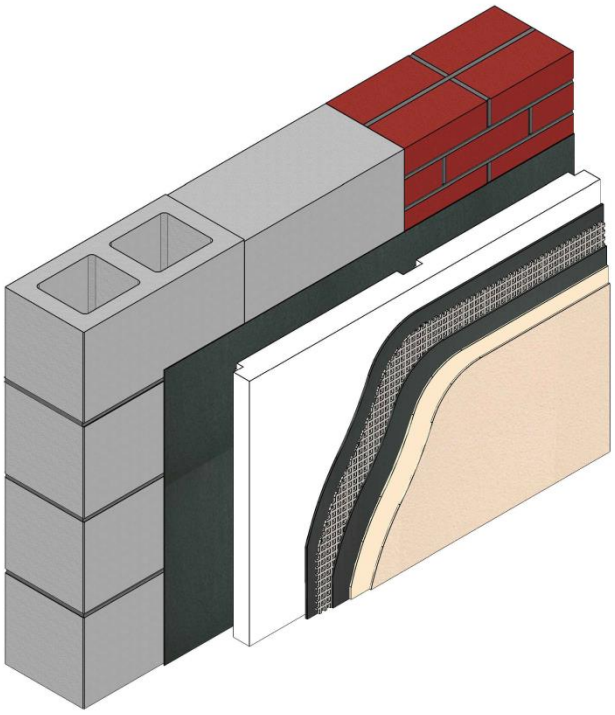

Figure 1. "Senerflex" over concrete, concrete masonry unit and masonry

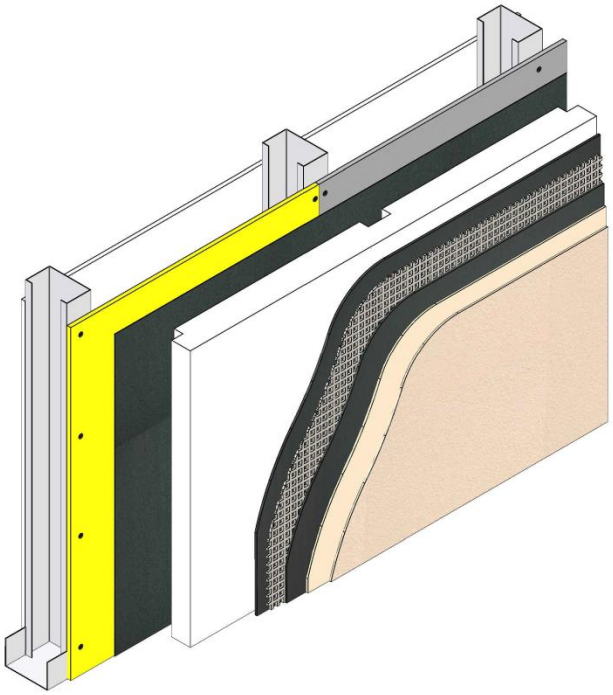

Figure 2. "Senerflex®" over glass-mat gypsum or cement board over steel framing

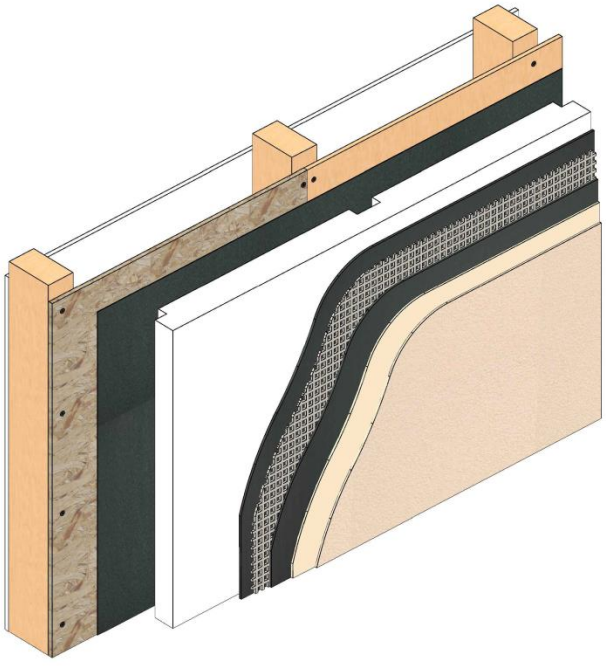

Figure 3. "Senerflex®" over wood-based sheathing over wood framing

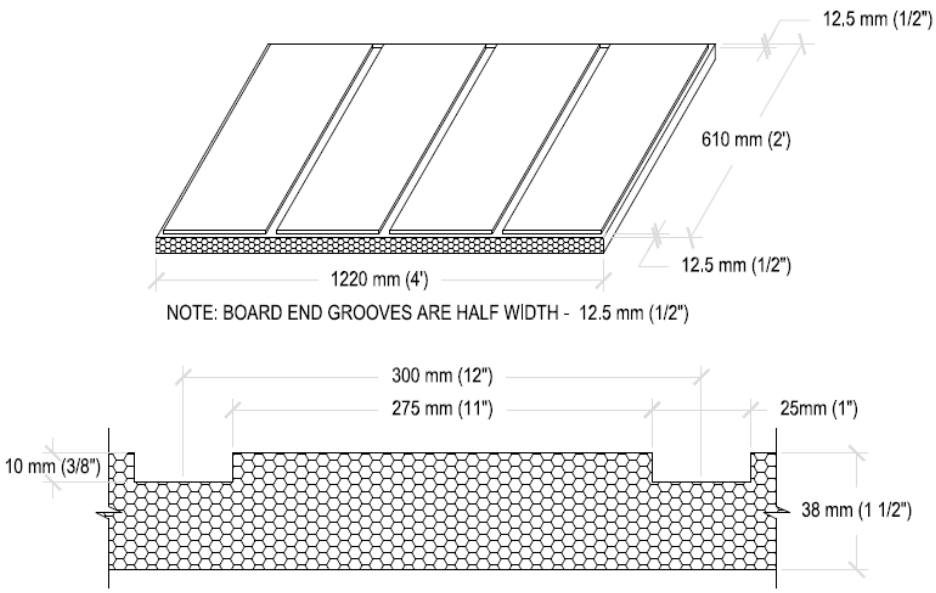

Figure 4. Senerflex "Geometrically Defined EPS Boards"

3. Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "Senerflex® Wall System" being used in accordance with the conditions and limitations set out below.

- The products are intended to be used as an exterior insulation and finish wall system applied directly to vertical walls of brick, masonry, monolithic concrete walls, and/or cementitious, glass-mat surfaced gypsum, plywood or OSB sheathing boards installed over wood or steel framing.
- Gaps between the sheathing boards of framed walls shall not exceed 3.0 mm.
- The products are acceptable for use on new and existing exterior, vertical walls. The systems are not acceptable for use on horizontal surfaces. (Note: The present limitation doesn't include protected soffit applications.)
- When the products 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 manufacturer's criteria and the requirements of the NBC 2015.
- The products are not suitable for use as a structural sheathing for bracing purposes.
- The products are not intended for use as a below-grade insulation and should terminate at least 200 mm above grade level.
- When used in coastal areas for residential occupancies for buildings falling under the scope of Part 9 of Division B of the NBC 2015, the products must be installed in conjunction with a capillary break conforming to Clause 9.27.2.2.(1)(e), Minimum Protection from Precipitation Ingress, of Division B of the NBC 2015. Coastal areas are defined in Sentence 9.27.2.2.(5) of the NBC 2015.
- The WRB coating must be installed in a two-coat application.
- The continuity of the second plane of protection across joints and junctions at openings, penetrations and expansion joints must be maintained through accessories such as self-adhering membranes, tapes, etc., as specified by the manufacturer, prior to the installation of these systems.
- The use of the products with the adhesive indicated in Table 2.1 is limited to geographical areas where the wind design value is Q50 < 1.0 kPa.
- 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 potential of moisture accumulation as a result of the addition of materials is very specific to the existing wall construction being retrofitted. Therefore, 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 Appendix Note A-5.1.2.1.(1), Application (Environmental Separation), of Division B of the NBC 2015.
- When the systems are used in new construction, the design of the inboard/outboard insulation of the systems shall be in accordance with the requirements of Section 9.25., Heat Transfer, Air Leakage and Condensation Control, of Division B of the NBC 2015.
- When the systems are used 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 Appendix Note A-9.25.2.4.(3)., Loose-Fill Insulation in Existing Wood-Frame Walls, of Division B of the NBC 2015. As a result, existing exterior walls that are intended to be retrofitted with EIFS must meet the requirements of the NBC 2015 for heat transfer, air leakage and condensation control.

- The products can provide additional thermal insulation to the wall assembly in retrofit construction with no detrimental effects if properly designed and installed with knowledge of the existing wall configuration and performance.
- The products alone may not provide the full amount of the required wall insulation. The thermal resistance of the wall system shall conform to the energy requirements of the applicable building code. The wall system may have to conform to the National Energy Code of Canada for Buildings.
- The polystyrene thermal insulation blocks shall be aged for a minimum of five weeks or kiln-dried before installation in accordance with Annex B, "Aging requirements," of CAN/ULC-S701, before cutting into insulation boards.
- When used in combustible construction, the polystyrene insulation must be protected from the inside of the building in accordance with Clauses 3.1.4.2.(1)(c), Protection of Foamed Plastics and 9.10.17.10.(1)(c), Protection of Foamed Plastics, of Division B of the NBC 2015.
- When used in noncombustible construction, the polystyrene insulation must be protected from the inside of the building in accordance with Sentences 3.1.5.15.(2) and (3), Foamed Plastic Insulation, of Division B of the NBC 2015.
- Where allowed by the Code through conformance to Sentence 3.1.5.5.(1), Combustible Cladding on Exterior Walls, of Division B of the NBC 2015, **the system with "Senerflex Alpha Dry Base" base coat and adhesive** is acceptable for use on buildings required to be of noncombustible construction, where not more than three storeys in height if unsprinklered, and to an unlimited number of storeys if sprinklered, provided the interior surfaces of the wall assembly are protected by a thermal barrier conforming to Article 3.1.5.15., Foamed Plastic Insulation, of Division B of the NBC 2015. For a detailed description of the compliance to the requirements of Sentence 3.1.5.5.(1) of Division B of the NBC 2015, please refer to Intertek Fire Listing Spec ID: 38825 and Design No. Senergy/WDEIFS 25-01 (please note that backup wall assemblies covered by the design listing do not include wood framing and wood sheathings and extend to noncombustible substrates only (steel stud over sheathings such as gypsum board, concrete and masonry)).
- Where allowed by the Code through conformance to Clause 3.2.3.8.(1)(b) of Division B of the NBC 2015, **the system with "Senerflex Alpha Dry Base" base coat and adhesive** is acceptable for use in the exposed face of buildings required to be of combustible or noncombustible construction, provided the interior surfaces of the wall assembly are protected by a thermal barrier conforming to Article 3.1.5.15. of Division B of the NBC 2015. For a detailed description of the compliance to the requirements of Clause 3.2.3.8.(1)(b) of Division B of the NBC 2015, please refer to Intertek Fire Listing Spec ID: 38825 and Design No. Senergy/WDEIFS 25-01 (please note that backup wall assemblies covered by the design listing do not include wood framing and wood sheathings and extend to noncombustible substrates only (steel stud over sheathings such as gypsum board, concrete, masonry and ICF)).
- The systems should be kept at least 50 mm, or as required in building regulations and safety codes, from heat-emitting devices, such as recessed light fixtures and chimneys.
- The requirements of the NBC 2015 regarding fire stops shall be implemented.
- The polystyrene thermal insulation must have a flame-spread rating of not more than 500 when tested in accordance with the requirements of CAN/ULC-S102.2-10, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies."
- Expansion joints are required to accommodate expansion and contraction of building materials due to thermal changes, moisture, wind, gravity, vibration and seismic activity. Expansion joints in the cladding must be used in the following situations:
  - at joints that occur in the substrate,
  - at any abutment of the system with other materials,
  - where changes in the substrate might create deflection or movement,
  - where significant structural movement occurs,
  - where deflections in excess of L/240 are expected, and
  - at the floor line in wood-frame construction (may not be required where fully engineered framing and floor systems are used).
- 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.
- The product must be installed according to the manufacturer's installation manual (dated no earlier than April 2015), by a trained applicator who possesses a valid manufacturer certificate for the system being installed.
- 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 other moisture sources until sufficiently dry (set and hardened) to prevent wash-off or other moisture-related damage.

- The product 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. 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-13, "Glass Mat Gypsum Substrate for Use as Sheathing," or have been evaluated by CCMC.
- Specification of surface sealers must be provided by the manufacturer.
- OSB and/or plywood sheathing boards used in conjunction with the systems must comply with the requirements of CSA O86-14, "Engineering Design in Wood," CSA O437 SERIES-93 (R2011), "OSB and Waferboard." Plywood sheathing boards: CSA O121-08, "Douglas Fir Plywood," CSA O151--09, "Canadian Softwood Plywood," CSA O153-13, "Poplar Plywood" or CSA O325.07, "Construction Sheathing."
- The OSB and/or plywood sheathing boards must have a minimum thickness of 11.1 mm and 12.7 mm, respectively. The boards must have their principal strength-direction across the studs, must be continuously supported by framing, and must be gapped at least 2.0 mm, but not more than 3.0 mm.
- OSB and/or plywood sheathing boards used in conjunction with "Exterior Insulation and Finish System (EIFS) Class PB" must be fastened to the framing in conformance with Article 9.23.3.5., Fasteners for Sheathing or Subflooring, of Division B of the NBC 2015.
- The products intended for use over wood shall have the moisture content of lumber and/or wood sheathing not greater than 19% at the time of the application of the water penetration barrier.
- When using notched trowel adhesive ribbons as the drainage mechanism, the application of the ribbons must be conducted in a way as to form clear and parallel drainage paths behind the insulation boards and to avoid the creation of any V-grooves (V-grooves refer to ribbons touching and closing the drainage path). The wet ribbons must be a minimum of 13 mm deep, 13 mm wide and 50 mm apart.
- The drained air space behind the insulation boards shall remain unobstructed so as to form a clear drainage cavity behind the insulation board and it shall terminate in such a way as not to obstruct the dissipation of incidental rainwater.

4. Technical Evidence

The Report Holder has submitted technical documentation for CCMC's evaluation. Testing was conducted at laboratories recognized by CCMC. The corresponding technical evidence for this product is summarized below.

4.1 Performance Requirements

4.1.1 Ash Content

Table 4.1.1 Results of Testing of Ash Content of the Products

Property		Unit	Requirement	Result
Ash content	**WRB (Senershield-R)**	%	Report value	41.7
	Adhesive/base coat (Alpha Base)			64.8

4.1.2 Infrared Analysis

Table 4.1.2 Results of Infrared Analysis for Documenting Chemical Formulation of the Products

Property		Requirement	Result
Infrared analysis	**WRB (Senershield-R)**	Report value	Report on file
	Adhesive/base coat (Alpha Base)		

4.1.3 Adhesion Bond to WRB to Plywood/OSB

Table 4.1.3(a) Results of Testing of Adhesion of WRB Plywood/OSB

Property			Unit	Requirement: No detachment at bonding plane @	Result
Adhesion bond	Senershield-R to OSB[(1)]	dry state	MPa	0.25	0.62
		2-h drying		0.08	0.55
		7-d drying		0.25	0.59

Note to Table 4.1.3:

(1) Testing of adhesion bond on OSB substrate only. OSB substrate is deemed to be the Worst Case substrate.

4.1.4 Adhesion/Cohesion Bond of WRB to Substrate other than Plywood/OSB

Table 4.1.4(a) Results of Testing of Adhesion of WRB to Substrates other than Plywood/OSB

Property			Unit	Requirement: No detachment at bonding plane @	Result
Adhesion bond	Senershield-R to cement board	dry state	MPa	0.25	0.48
		2-h drying		0.08	0.33
		7-d drying		0.25	0.49
	Senershield-R to glass-mat gypsum	dry state		0.25	0.31
		2-h drying		0.08	0.13
		7-d drying		0.25	0.19

Table 4.1.4(b) Results of Testing of Adhesion/Cohesion Bond of WRB to Substrates other than Plywood/OSB

Property			Unit	Requirement: No detachment at bonding plane @	Result
Adhesion/ cohesion bond	Senershield-R to concrete	dry state	MPa	0.25	1.57
		2-h drying		0.08	1.21
		7-d drying		0.25	1.06

4.1.5 Adhesion bond of Adhesive to WRB

Table 4.1.5 Results of Testing of Adhesion Bond of Adhesive to WRB

Property			Unit	Requirement: No detachment at bonding plane @	Result
Adhesion bond	Alpha Base to Senershield-R	dry state	MPa	0.25	0.54
		2-h drying		0.08	0.24
		7-d drying		0.25	0.33
	Alpha Dry Base to Senershield-R	dry state		0.25	0.58
		2-h drying		0.08	0.20
		7-d drying		0.25	0.31

4.1.6 Adhesion Bond of Adhesive to Insulation

Table 4.1.6 Results of Testing of Adhesion Bond of Adhesive to Insulation

Property			Unit	Requirement	Result
Adhesion bond	Alpha Base to EPS	dry state	MPa	0.1	0.45
		2-h drying		0.1	0.23
		7-d drying		0.1	0.47
	Alpha Dry Base to EPS	dry state		0.1	0.39
		2-h drying		0.1	0.19
		7-d drying		0.1	0.39

4.1.7 Lamina Bond Strength

Table 4.1.7 Results of Testing of Lamina Bond Strength (Base Coat/Finish Coat/Insulation)

Property			Unit	Requirement	Result
Adhesion bond	Senergy Finish/Alpha Base to EPS	dry state	MPa	0.1	0.37
		2-h drying		0.1	0.24
		7-d drying		0.1	0.31
	Senergy Finish/Alpha Dry Base to EPS	dry state		0.1	0.36
		2-h drying		0.1	0.23
		7-d drying		0.1	0.29

4.1.8 Water Vapour Transmission of WRB

Table 4.1.8 Results of Testing of Water Vapour Transmission (WVT) of WRB of the Products

Property		Unit	Requirement	Result
WVT	Senershield-R over plywood	ng/(Pa·s·m^2)	Report value	103.3[(1)] 105.6[(2)]

Notes to Table 4.1.8:

(1) WVT rate measured with one coat application
(2) WVT rate measured with two coat application

4.1.9 Water Vapour Transmission of Lamina

Table 4.1.9 Results of Testing of Water Vapour Transmission (WVT) of Lamina

Property		Unit	Requirement	Result
WVT	Alpha Base	ng/(Pa·s·m^2)	Report value	754
	Alpha Dry Base	ng/(Pa·s·m^2)	Report value	760
	Alpha Base and Classic Finish Coat	ng/(Pa·s·m^2)	Report value	775
	Alpha Dry Base and Classic Finish Coat	ng/(Pa·s·m^2)	Report value	756

4.1.10 Water Absorption of Base Coat

Table 4.1.10 Results of Testing of Water Absorption of the Base Coat

Property		Unit	Requirement	Result
Water absorption of base coat	Alpha Base	%	≤ 20% of the dry weight	16.25
	Alpha Dry Base			12.65

4.1.11 Water Absorption Coefficient of WRB

Table 4.1.11 Results of Testing of Water Absorption Coefficient of WRB at 72 hours

Property		Unit	Requirement	Result
Water absorption coefficient of WRB @ 72 hours	Senershield-R	$kg/(m^2 \cdot s^{1/2})$	≤ 0.004	0.0001

4.1.12 Base Coat Impermeability to Water

Table 4.1.12 Results of Testing of Impermeability to Water of the Base Coat

Property		Unit	Requirement	Result
Impermeability to water of base coat	Alpha Base	h	No water penetration in less than 2 h	Pass
	Alpha Dry Base			Pass

4.1.13 Mildew and Fungus Resistance

Table 4.1.13 Results of Testing of Mildew and Fungus Resistance

Property	Requirement	Result
Mildew and fungus resistance of finish coat (Senergy Finish)	No growth	Pass

4.1.14 Accelerated Weathering Resistance

Table 4.1.14 Results of Testing of Accelerated Weathering Resistance

Property	Adhesive Material	Applied Finish	Requirement	Result
Accelerated weathering resistance of Lamina @ 2000 hrs	Alpha Base + Alpha Dry	Senerflex Classic Finish	No cracking, flaking or deleterious effects	Pass

4.1.15 Salt Spray Resistance

Table 4.1.15 Results of Testing of Salt Spray Resistance

Property		Requirement	Result
Salt spray resistance @ 300 hours	Alpha Base and Senerflex Classic Finish	No cracking, flaking or deleterious effects	Pass
	Alpha dry Base and Senerflex Classic Finish		Pass

4.1.16 Durability under Environmental Cyclic Conditions

Table 4.1.16 Results of Testing of Durability under Environmental Cyclic Conditions

Property	Unit	Requirement		Result
Pre-conditioning (drainage evaluation)	L	Report water quantity	introduced	13.5
			drained	10.5
			retained	3.0
Environmental cycling (60 cycles)	–	No cracking, blistering or sagging of base coat and no detachment or crazing of finish coat		Pass
Adhesion bond strength after environmental cycling	MPa	0.1	base coat	0.38
			finish coat	0.35

4.1.17 Reinforcing Mesh

Table 4.1.17 Results of Testing of Breaking Strength Resistance of Reinforcement Mesh (142.0 g/m^2 (4.3 oz) – (St. Gobain)

Property		Unit	Requirement	Result	
Ash content		%	Report value	14.7	
Mass per unit area		g/m^2	Report value	140	
Breaking strength resistance				**Weft**	**Warp**
Initial tensile strength		N/mm	≥ 35	37.2	40.3
Loss of tensile strength after	**28-day 3 ion soak**	%	≤ 60% for adhered EIFS ≤ 50% mechanically fastened EIFS	17.7	7.3
Residual tensile strength after	**28-day 3 ion soak**	N/mm	≥ 15 N/mm for adhered EIFS ≥ 25 N/mm mechanically fastened EIFS	30.6	37.3
Elongation at break	**initial**	%	Report value	3.3	4.1
	after 28 day 3 ion soak			2.8	3.8

4.1.18 Impact Resistance

Table 4.1.18 Results of Testing of Impact Resistance

Property			Requirement	Result
Impact resistance	**10 joules**	**Senerflex Wall System**	6/10 free-fall drops must show no perforation (broken mesh)	7/10
	3 joules		6/10 free-fall drops must show no cracks	6/10

4.1.19 Wind Load Resistance

Table 4.1.19 Results of Testing of 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) 2.18 P_1 , P_1'	Measured Maximum Net Midspan Deflections (mm)	
								Stud Span 3 050 mm	Sheathing Span 406 mm
$Q_{50} \leq 0.45$	±450	Pass	±660	Pass	±980	Pass	+980	5.3	0.8
							−980	-5.2	-1.2
$Q_{50} \leq 0.55$	±550	Pass	±800	Pass	±1 200	Pass	+1 200	6.5	0.9
							−1 200	-6.4	-1.4
$Q_{50} \leq 0.60$	±650	Pass	±950	Pass	±1 410	Pass	+1 410	7.6	1.1
							−1 410	-7.5	-1.7
$Q_{50} \leq 0.75$	±750	Pass	±1 090	Pass	±1 630	Pass	+1 630	8.8	1.3
							−1 630	-8.6	-2.0
$Q_{50} \leq 0.85$	±850	Pass	±1 240	Pass	±1 850	Pass	+1 850	10.0	1.4
							−1 850	-9.8	-2.2
$Q_{50} \leq 1.00$	±1 000	Pass	±1 460	Pass	±2 180	Pass	+2 180	11.7	1.7
							−2 180	-11.6	-2.6
Maximum test pressure @ L/180 Deflection (no structural failure)							+3 137	16.9	-
							−3 188		
Ultimate structural test pressure							+3 250	OK	
							-3 150	Sheathing separation from steel studs occurred	

4.1.20 Joint Disruption Resistance

Table 4.1.20 Results of Testing of Joint Disruption Resistance

Property	Unit	Requirement	Result	
			Joint Width	
			2-mm	4-mm
Joint disruption resistance	–	The WRB at joints on 2 assemblies must show no cracking, delaminating or any other deleterious effects at a transverse bending of L/180	5.15	4.47
Joint extension @ L/180	mm	Report value	0.21	0.37

4.1.21 Joint Relaxation Resistance

Table 4.1.21 Results of Testing of Joint Relaxation Resistance

Property	Unit	Requirement	Sample No.	Result
Joint relaxation resistance	$kg/m^2 \cdot s$	5 WRB-coated OSB specimens subject to 1.3-mm extension following exposure to 15 24-h environmental cycles must have a maximum average Water Transmission Rate (WTR) of 2×10^{-7} $kg/m^2 \cdot s$	1	1.63×10^{-7}
			2	1.87×10^{-7}
			3	1.32×10^{-7}
			4	1.52×10^{-7}
			5	1.05×10^{-7}
			Average	1.48×10^{-7}

4.1.22 Water Transmission Resistance (over OSB)

Table 4.1.22 Results of Testing of Water Transmission Resistance (over OSB)[1]

Property	Unit	Requirement	Sample No.	Result
Water transmission resistance	$kg/m^2 \cdot s$	5 WRB-coated OSB specimens subjected to a 25-mm head of water must have a maximum average WTR rate of 2×10^{-7} $kg/m^2 \cdot s$ measured at 10 days	1	1.04×10^{-7}
			2	1.76×10^{-7}
			3	1.25×10^{-7}
			4	1.07×10^{-7}
			5	1.09×10^{-7}
			Average	1.24×10^{-7}

Note to Table 4.1.22:

(1) Testing of adhesion bond on OSB substrate only. OSB substrate is deemed to be the Worst Case substrate.

4.1.23 Water Vapour Transmission

Table 4.1.23 Results of Testing of Water Vapour Transmission (WVT)

Property		Unit	Requirement	Sample No.	Result	
					Uncoated	**Coated with Senershield-R**
Water vapour transmission	**OSB**	$ng/(Pa \cdot s \cdot m^2)$	Report value of the WVT rate of the WRB in combination with the OSB applied at the maximum thickness and the OSB alone	1	116	109
				2	130	106
				3	127	100
				Average	124.3	105
	plywood			1	123	148
				2	94	88
				3	100	74
				Average	105.7	103.3

Note to Table 4.1.23:

(1) The tested WVT of the OSB is specific to the product and thickness used in the test. For typical values of WVT rates of OSB, see Table A-9.25.5.1.(1) in Division B of the NBC 2015.

4.1.24 Accelerated Weathering of WRB

Table 4.1.24 Results of Testing of Accelerated Weathering of WRB[1]

Property		Requirement	Sample No.	Result
Accelerated weathering resistance	**Senershield-R 593**	The WRB applied over OSB must show no cracking, delamination, flaking or any deleterious effects following 250 hours exposure to Xenon arc	1	Pass
			2	Pass
			3	Pass
			4	Pass
			5	Pass
			6	Pass

4.1.25 Drainage Capacity

Table 4.1.25 Results of Testing of Drainage Capacity of the Products

Property		Requirement	Result		
			Retained Water (g) per Unit Area (g/m^2)		Drainage Capacity (%) After 1 h
			1 h	48 h	
Drainage capacity	Panel 1 total (g)	The unit-retained water (based on the projected drainage area) following 1 hour of drainage period shall not be greater than 30 g/m^2, and The unit-retained water following 48 hours of drying period shall not be greater than 15 g/m^2 for any single test specimen. The drainage capacity must not be less than 98% of the water mass delivered into the EIFS wall specimen.	20.0 15.4	<19.5 <15.0	99.7
	Panel 2 total (g)		29.2 22.5	<19.5 <15.0	99.6
	Panel 3 total (g)		18.9 14.5	<19.5 <15.0	99.8

4.1.26 Nail Popping Resistance

Table 4.1.26 Results of Testing of Nail Popping Resistance of the Products(1)

Property	Requirement	Sample No.	Result
Nail popping resistance	There must be no cracking or delamination of the WRB following 1-mm nail protrusion from the nail's original preset of 1 mm below the surface of the OSB substrate	1	Pass
		2	Pass
		3	Pass
		4	Pass
		5	Pass
		6	Pass

Note to Table 4.1.26:

(1) for Senershield R593

4.1.27 Fire Testing

For a detailed description of the compliance of the related systems to the requirements of Article 3.1.5.5. of Division B of the NBC 2015, please refer to Intertek Listing Spec ID: 38825 Design No. Senergy/WDEIFS 25-01 and Spec ID: 38825 Design No. Senergy/WDEIFS 15-01 for compliance to the requirements of Clause 3.2.3.8.(1)(b).

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Levittown, PA, USA
Newark, CA, USA
Streetsboro, OH, USA

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Date modified:
2020-11-24