Evaluation Report CCMC 12969-R
InsulROCK, PUCCS and PUCCS NC Exterior Insulation Finish Systems

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1.0 Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "InsulROCK, PUCCS and PUCCS NC Exterior Insulation Finish Systems," when used as an exterior wall cladding 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, comply with:

- Clause 1.2.1.1.(1)(a) of Division A of the National Building Code (NBC) of Canada 2015[(1)], using the following acceptable solutions from Division B:
  - Article 3.1.5.5., Combustible Components for Exterior Walls,
  - Clause 3.1.5.15.(3)(a), Combustible Insulation and its Protection,
  - Clause 3.2.3.8.(1)(b), Protection of Exterior Building Face,
  - 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), Thermal Insulation, Polystyrene, Boards and Pipe Covering,
  - Sentence 9.27.1.1.(5), General (Cladding, Application),
  - 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,
  - Article 9.27.3.1., Elements of the Second Plane of Protection, and
  - Article 9.27.13., Exterior Insulation Finish Systems.

(1) The products comply with the requirements of the NBC 2010 and 2015 simultaneously.

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

Ruling No. 00-13-84 (12969-R) authorizing the use of the products in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2006-11-01 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.

2.0 Description

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

- a water-resistive barrier (WRB),
- an adhesive or mechanical fastener attachment,
- an insulation board, and
- a coating system (lamina[(2)])

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

The following describes the different components of the systems:

2.1 Substrates

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 installed horizontally over framed walls must not exceed 3.0 mm.

2.2 Water-Resistive Barrier (WRB)[3][4]

(3) The water-resistive barrier (WRB) is a coating or self-adhered modified bituminous membrane 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.

When the WRB is a coating, the continuity of the second plane of protection across joints and junctions at openings, penetrations and expansion joints must be maintained through the use of 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 must be installed in two coats with sufficient time between applications to allow the first coat to cure before the second coat is applied.

(4) When the WRB is a single layer of self-adhered modified bituminous membrane installed over the substrate and around penetrations and openings, the insulation boards must be attached via mechanical fasteners to the studs or to the substrate that supports the cladding.

The products use the following coatings as WRBs:

2.2.1 Trowel-Applied Coatings

- "Cement Bear" is a polymer-based, fibre-reinforced, wet paste coating supplied in 19-L/27-kg pails and mixed on site with Type 10 Portland cement (1:1 by weight). It is intended for use on glass-fibre-faced gypsum sheathing, cement board, concrete or masonry substrates. It is trowel-applied in a continuous layer over the substrate to achieve a minimum wet thickness of 1.25 mm per coat. "Cement Bear" is also used to pre-coat gaps between sheathing boards prior to the application of the WRB to the field surface of the sheathing boards. This is required for the application of "Roller Bear" and "FRI Bear."
- "FRI Bear" is a factory-blended, ready-to-use, non-cementitious polymeric wet mix coating supplied in 19-L/25-kg pails. It is intended for use exclusively over wood substrates. It is applied in a continuous layer to achieve a minimum thickness of 0.28 mm per coat. "FRI Bear" is applied in a single layer in conjunction with a second layer of "Polar Bear."
- "Polar Bear" is a factory-blended, ready-to-use, non-cementitious polymeric wet mix coating supplied in 19-L/26-kg pails. It is intended for use on all substrates, including wood. It is applied with a flat stainless steel trowel in a continuous layer to achieve a minimum wet thickness of 1.5 mm per coat. "Polar Bear" is also used to pre-coat gaps between sheathing boards prior to the application of the WRB to the field surface of the sheathing boards. This is required for the application of "Roller Bear" and "FRI Bear." "Polar Bear" may also be used to wrap rough openings and penetrations.
- "Vapour Block" is a polymer-based, elastomeric, wet paste coating supplied in 19-L/26-kg pails. It is intended for use on glass-fibre-faced gypsum sheathing, cement board, concrete, or masonry substrates. It is trowel-applied in a continuous layer over the substrate to achieve a minimum dry thickness of 0.8 mm per coat.

2.2.2 Spray-, Brush- or Roller-Applied Coatings

"Roller Bear" is a factory-blended, ready-to-use, non-cementitious polymeric wet mix coating supplied in 19-L/28-kg pails. It is intended for use over all acceptable substrates identified in Section 2 of this Report. It is applied in a continuous layer to achieve a minimum thickness of 0.28 mm per coat. "Roller Bear" is applied in a single coat when used in conjunction with a single coat of "Polar Bear," "Cement Bear" and/or "Vapour Block." When used over wood substrates, "Roller Bear" is applied in conjunction with one coat of "Polar Bear." "Roller Bear" can be used in two coats over all non-wood substrates.

"Roller Bear" is applied over the entire surface of the intended substrate by spray, brush, or roller. The first layer must be allowed to dry prior to the application of the second coat WRB.

Note: Some WRB products such as "Polar Bear," "Cement Bear" and "Vapour Block" can be used as an adhesive and/or base coat.

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2.2.3 Self-Adhered Modified Bituminous Membrane

"SOPRASEAL STICK 1100 T" is a self-adhered modified bituminous membrane consisting of a styrene-butadiene-styrene (SBS) rubberized asphalt compound, which is integrally laminated to a woven polyethylene film on one side and has a silicone-treated release backing on the reverse side. The membrane has a minimum thickness of 1 mm. "SOPRASEAL STICK 1100 T" or equivalent must meet the waterproof characteristics of CGSB 37-GP-56M-85, "Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing."

2.4 Adhesive(5)

- "Polar Bear" – see description in Section 2.2.1.
- "Cement Bear" – see description in Section 2.2.1.
- "Prep Coat" is a ready-to-use, polymer-based, wet paste adhesive supplied in 19-L/30-kg pails and mixed on site with Type 10 Portland cement (1:1 cement by weight). Workability may be adjusted by the addition of clean potable water as specified by the manufacturer.
- "Prep Coat D" is a ready-to-use, polymer-based adhesive supplied in 22.7-kg powder bags. The material is mixed on site with clean potable water (3.8:1 by weight of dry mix to water).

When used as an adhesive in the "InsulROCK EIFS," "Cement Bear," "Prep Coat" or "Prep Coat D" are applied with a 9.5-mm, stainless steel, notched trowel, held at a 30º angle and rendered in such a way as to align the adhesive in vertical ribbons.

When used as an adhesive in the "PUCCS System," "Cement Bear," "Prep Coat" or "Prep Coat D" can be applied either in a continuous layer over the substrate to achieve a minimum thickness of 1.0 mm or applied with a 9.5-mm, stainless steel, notched trowel, held at a 30º angle, and rendered in such a way as to align the adhesive in vertical ribbons.

(5) 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 and/or cement on site, or a wet paste that does not require any additives. Certain adhesives are also used as base coats, as in the case of "Prep Coat" and Prep Coat D." Consequently, the description of "Prep Coat" and "Prep Coat D" has been placed in this section.

2.5 Mechanical Fasteners

"DuROCK Mechanical Fasteners," to be used with self-adhered modified bituminous membrane as the WRB, consist of a corrosion-resistant anchoring screw and low-profile, high-density polypropylene washers (Wind-Lock/Wind-Devil 2) that are used to secure the insulation. The spacing and frequency of the fasteners will vary depending on the type of substrate. The outside face of the low-profile plastic washer should always be flush with the outside face of the tongue of the expanded polystyrene (EPS) insulation board. Fastening of the insulation boards to the substrate should precede the application of the reinforcing mesh.

"PUCCS NC Mechanical Fasteners" consist of a corrosion-resistant anchoring screw and low-profile, high-density polypropylene washers ("Windlock ULP-302") that are used to secure the "DuROCK PUCC-ROCK" geometrically defined drainage cavity (GDDC) mineral fibre insulation. Please see "DuROCK PUCCS NC, Non-Combustible Cladding Exterior Insulation Finish System (EIFS)," Manufacturer's Specification 07 24 40, September 2019, for the installation instructions for "DuROCK PUCCS NC" Fasteners.

2.6 Insulation

EPS Insulation

- "DuROCK Insulation Board" and "DuROCK PUCCS Insulation Board" are Type 1 or Type 2 polystyrene-foam insulation boards made of 100% virgin materials and manufactured and packaged by a DuROCK-approved and -licensed manufacturer/moulder. The insulation boards are aged in ambient air for a minimum of five weeks or kiln-dried.
- "DuROCK Insulation Board" is a typical flat EPS board.
- "DuROCK PUCCS Insulation Board" has drainage pathways cut into the insulation in a series of circles, 86 mm in diameter, 10 mm deep and 16 mm apart (see Figure 1).

The two polystyrene insulation boards must conform to the following:

- CAN/ULC-S701-11, "Thermal Insulation, Polystyrene, Boards and Pipe Covering," Type 1 or Type 2,
- minimum board thickness: 25 mm when using "DuROCK Insulation Board,"
- minimum board thickness: 38 mm when using "DuROCK PUCCS Insulation Board" or the "Uni-Track" starter strip in conjunction with "DuROCK Insulation Board,"

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- maximum board thickness:
  - as designed when used in combustible construction, and
  - 127 mm when used in noncombustible construction,
- maximum board size: 600 mm × 1 219 mm,
- average density: 16 kg/m^3 for Type 1 and 24 kg/m^3 for Type 2, and
- flame-spread rating: 25 - 500, per CAN/ULC-S102.2-10, "Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies."

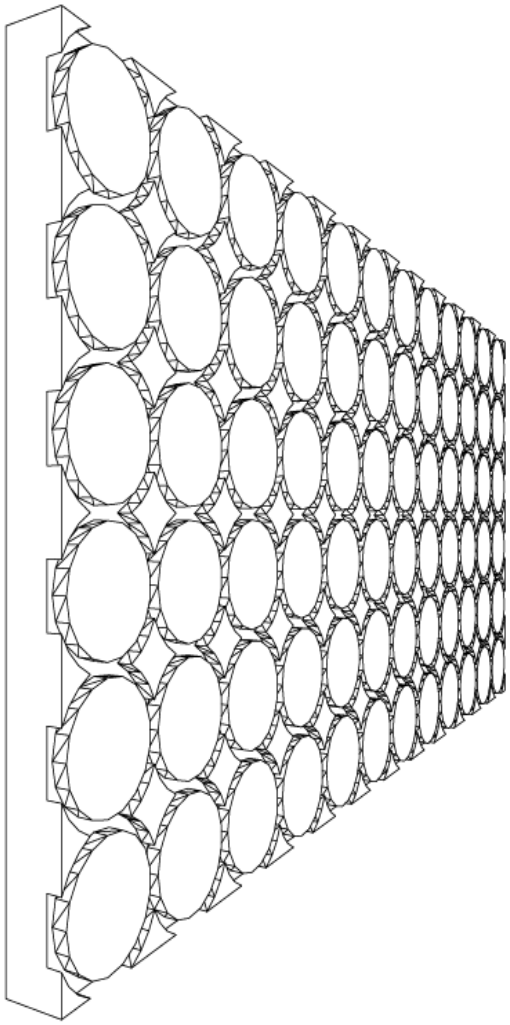

Figure 1. Example of "DuROCK PUCCS Insulation Board"

Mineral Fibre Insulation

"DuROCK PUCC-ROCK" is a Type 1 mineral fibre insulation board manufactured and packaged for DuROCK Alfacing International Limited by an approved manufacturer. "DuROCK PUCC-ROCK Insulation Board" is available in 51 mm, 76 mm, 102 mm, 127 mm, and 152 mm thicknesses. "DuROCK PUCC-ROCK Insulation Board" incorporates a GDDC on the back side that is 10 mm deep and 37% open. "DuROCK PUCC-ROCK Insulation Board" includes an integral alkali-resistant fibreglass mesh on the front side.

Mineral fibre insulation boards shall conform to the following:

- CAN/ULC-S702.1-14;
- having a minimum flat board thickness of 51 mm;
- having a maximum board thickness of 152 mm;

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- having a maximum board size of 610 mm × 1 219 mm; and
- having an average density of 131 kg/m^3.

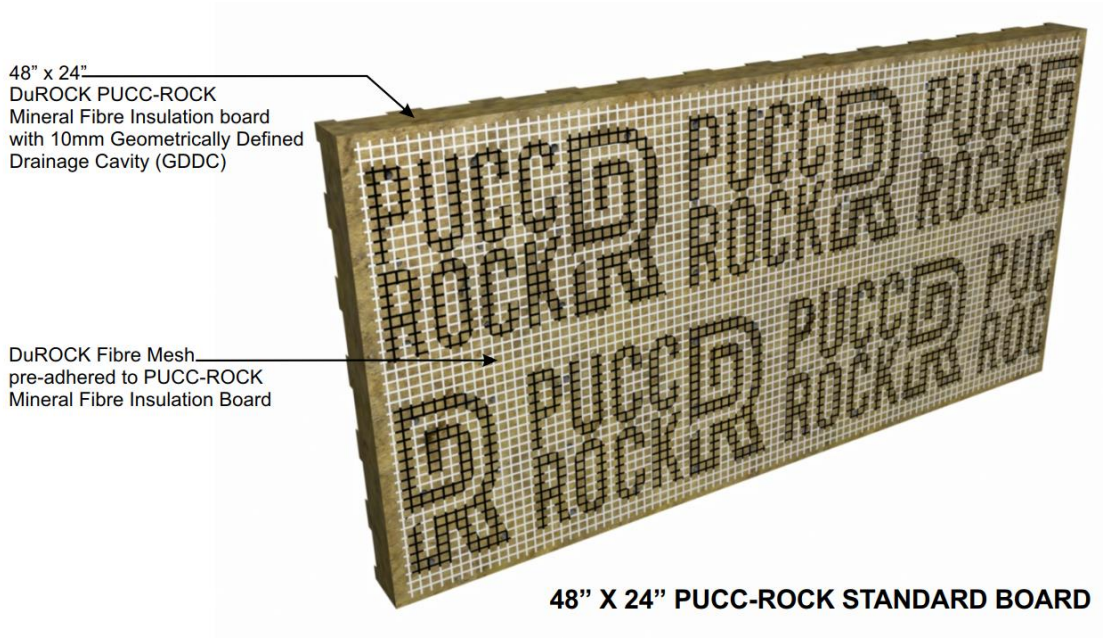

Figure 2. Example of "DuROCK PUCC-ROCK Insulation Board"

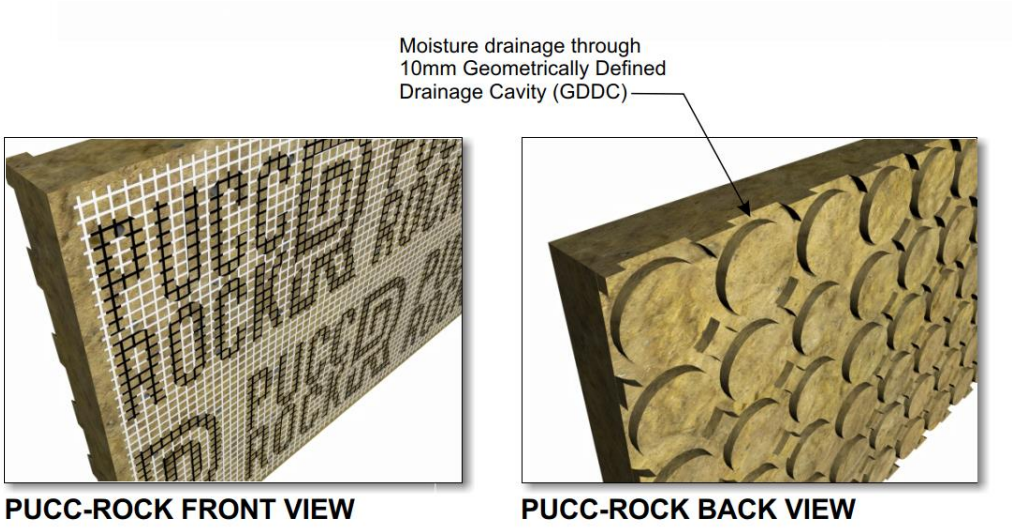

Figure 3. Front and back views of "DuROCK PUCC-ROCK Insulation Board"

2.7 Synthetic Coating System (Lamina)

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

2.7.1 Base Coat[6]

- "Prep Coat" – see description in Section 2.4.
- "Prep Coat D" – see description in Section 2.4.
- "Jewel Stone" is a two-component base coat consisting of a dry-mix cementitious powder supplied in 22.7-kg bags and a wet mix polymeric admixture supplied in 19-L/19-kg pails. The material is mixed in a ratio of 4.5:1 (dry mix to wet mix) by weight.

When used as a base coat, "Prep Coat," "Prep Coat D" and "Jewel Stone" are applied with a stainless steel trowel to the entire surface of the insulation to a uniform dry thickness of not less than 2.0 mm.

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(6) The thickness of the base coat required depends on the number of layers and the type of reinforcing mesh used. The base coat needs to be thicker when more than one layer of reinforcing mesh is incorporated into the lamina. Ultimately, the base coat must be sufficiently thick to fully embed the "DuROCK Fibre Mesh" so that no mesh is visible.

2.7.2 Reinforcing Mesh

"DuROCK Fibre Mesh" is an alkali-resistant, glass-fibre reinforcing fabric that has a minimum nominal weight of:

- 165 g/m^2 (4.9 oz./yd^2) when using reinforcing fabric manufactured by Gavazzi S.A., and
- 140 g/m^2 (4.2 oz./yd^2) or greater when using products manufactured by Saint-Gobain ADFORS.

The mesh is white and available in rolls 1 m wide × 44 m long in the case of Gavazzi S.A. rolls, and 965 mm, 241 mm, or 318 mm wide × 45.7 m long in the case of the Saint-Gobain ADFORS rolls.

The reinforcing mesh is available in five different grades, represented in descending order of strength[7]:

1. 15 oz Impact Mesh: minimum 522 g/m^2,
2. 11 oz Reinforcing Mesh: minimum 370 g/m^2,
3. 5.2 oz Reinforcing Mesh: minimum: 174 g/m^2,
4. 5.0 oz Reinforcing Mesh: minimum: 165 g/m^2, and
5. 4.2 oz Reinforcing Mesh: minimum 140 g/m^2.

(7) Higher-grade meshes are intended to be used in areas requiring high impact resistance. All five grades of "DuROCK Fibre Mesh" may be used in conjunction with the two proposed systems.

2.7.3 Primer

"Base Primer" is a water-based pigmented acrylic primer that provides a uniformly absorbent surface for selected DuROCK exterior finishes. The primer is supplied in 19-L/30-kg ready-mix pails. It is applied using a roller/brush or sprayed uniformly over the base coats.

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

2.7.4 Finish Coat

- "DuROCK Finish" is a ready-mix polymer-based finish coat that is supplied in 19-L/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:

  - "Airless" (0.25 mm),
  - "Coarse Coat" (2.0 mm),
  - "Desert Sand" (0.75 mm),
  - "Fine Coat" (0.75 mm),
  - "Grain" (2.0 mm),
  - "Marble Coat" (1.25 mm),
  - "Max Coat" (1.5 mm),
  - "Pebble Coat" (0.75 mm),
  - "Pebble Rock" (1.5 mm),
  - "Roll On" (0.50 mm),
  - "Sand Coat" (1.0 mm),
  - "Spacco" (2.0 mm),
  - "Spray" (2.0 mm),
  - "Tricol" (0.75 mm), and

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- “Venetian” (1.25 mm)

“Grain,” “Pebble Rock,” “Max Coat” and “Venetian” produce an open-textured pattern in a regular or random style. “Marble Coat,” “Sand Coat,” “Pebble Coat,” “Fine Coat,” “Desert Sand” and “Tricol” produce a rough, pebbly texture, while “Coarse Coat” and “Spacco” are used to achieve any desired trowel texture. The texture of the “Spray” finish is governed by the spray-gun orifice and air compressor settings. “Airless” and “Roll On” are either roller- or spray-applied and finished to a flat coarse surface.

- “Gemstone” is a ready-mix polymer-based finish coat that consists of coloured quartz aggregates in a clear polymeric resin that can include metallic flakes for architectural purposes. “Gemstone” is supplied in 19-L/27-kg pails and available in an array of factory-tinted colours.

Table 2.1 “InsulROCK EIFS”

System	Distinctive System Components					
	Insulation (Flat EPS)	**Intended Substrate**	**Water-Resistive Barrier**	**Adhesive**	**Base Coat**	**Finish Coat**
InsulROCK	Type 1 or Type 2	cement board, concrete masonry, glass mat gypsum	Cement Bear, Polar Bear, Roller Bear, Vapour Block	Cement Bear, Polar Bear, Prep Coat, Prep Coat D	Jewel Stone, Prep Coat, Prep Coat D	DuROCK Finish, Gemstone
		cement board, concrete masonry, glass mat gypsum, plywood/OSB	modified bituminous membrane	DuROCK Mechanical Fasteners	Jewel Stone, Prep Coat, Prep Coat D	DuROCK Finish, Gemstone

Table 2.2 “PUCCS EIFS”

System	Distinctive System Components					
	Insulation (Geometrically defined)	**Intended Substrate**	**Water-Resistive Barrier**	**Adhesive**	**Base Coat**	**Finish Coat**
PUCCS	Type 1 or Type 2 EPS	cement board, concrete masonry, glass mat gypsum	Polar Bear, Roller Bear	Polar Bear(1)	Jewel Stone, Prep Coat Prep Coat D	DuROCK Finish, Gemstone
			Cement Bear, Polar Bear, Roller Bear, Vapour Block	Cement Bear Prep Coat Prep Coat D		
			modified bituminous membrane	DuROCK Mechanical Fasteners		
		plywood/OSB	Polar Bear	Polar Bear(1)		
			Roller Bear	Polar Bear(1)		
			FRI Bear	Polar Bear(1)		
			modified bituminous membrane	DuROCK Mechanical Fasteners		
PUCCS NC(2)	PUCC-ROCK	cement board, concrete masonry, glass mat gypsum	Cement Bear	PUCCS NC Mechanical Fasteners	Prep Coat Prep Coat D	DuROCK Finish

Notes to Table 2.2:

(1) When “Polar Bear” is applied as an adhesive, it must be applied continuously with a flat trowel.

(2) Minimum reinforcing mesh grade used in the “PUCCS NC” system shall be 165 g/m^2.

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Figure 4. "InsulROCK EIFS" with moisture barrier over masonry, concrete, and brick

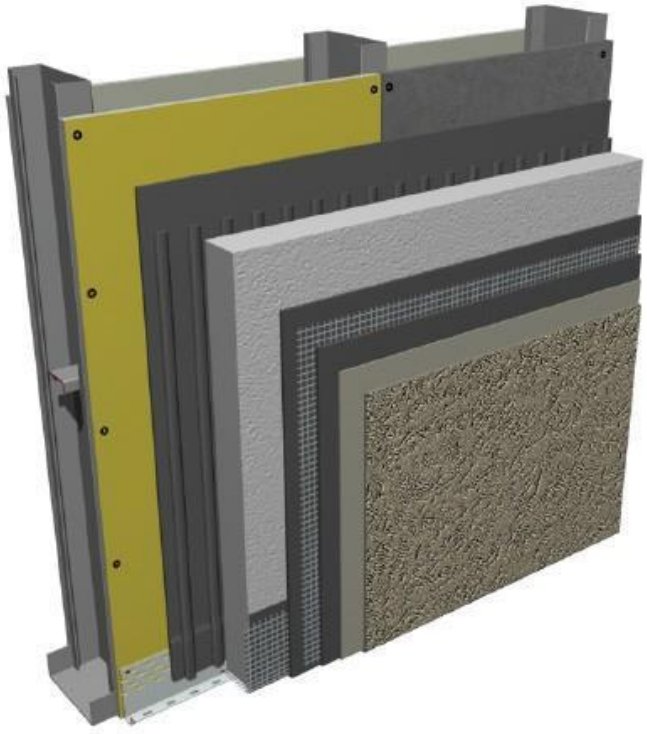

Figure 5. "InsulROCK EIFS" with moisture barrier over glass-fibre-faced gypsum sheathing and cement board

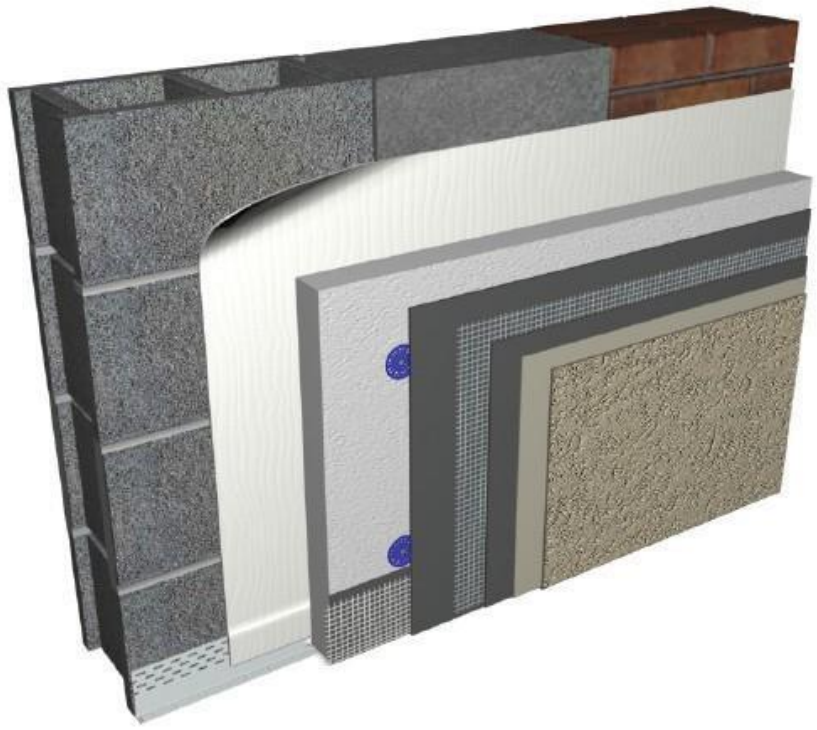

Figure 6. "InsulROCK EIFS" over modified bituminous membrane on masonry, concrete, and brick

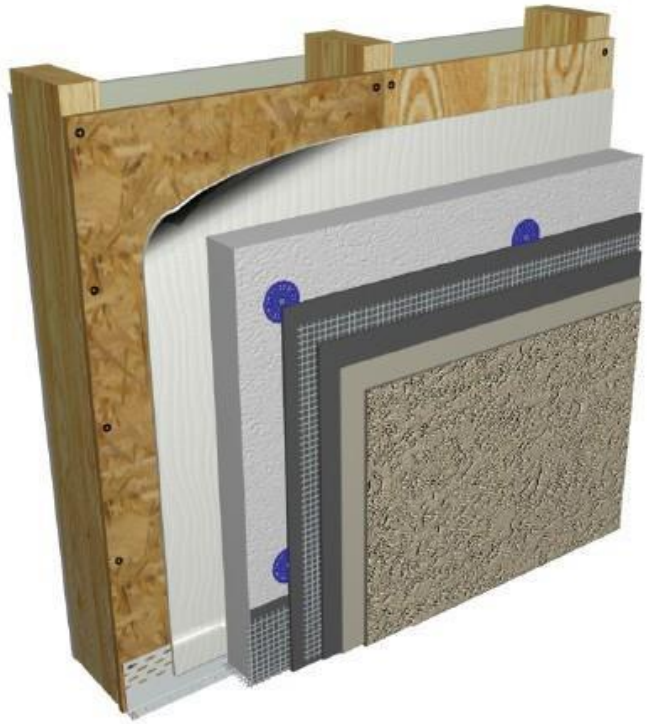

Figure 7. "InsulROCK EIFS" over modified bituminous membrane on OSB and plywood

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Figure 8. "PUCCS EIFS" with moisture barrier over masonry, concrete, and brick

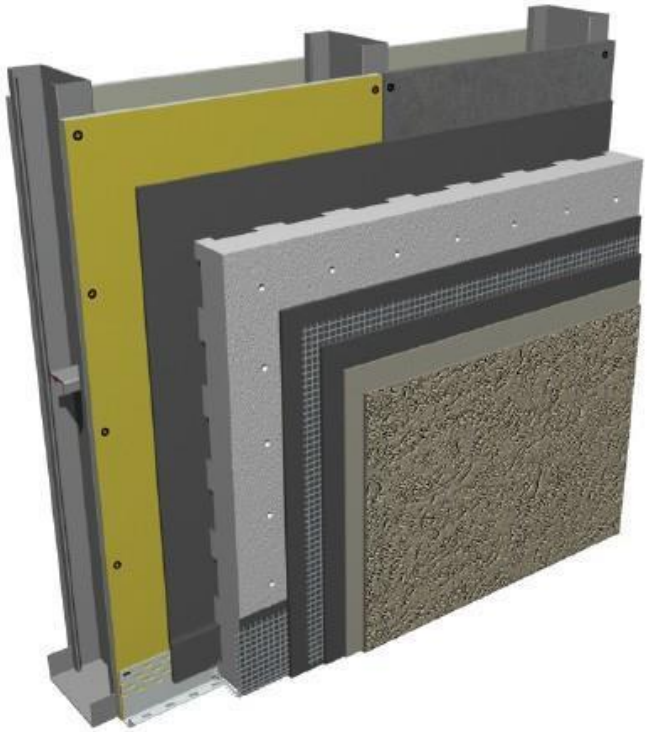

Figure 9. "PUCCS EIFS" with moisture barrier over glass-fibre-faced gypsum sheathing and cement board

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Figure 10. "PUCCS EIFS" with moisture barrier over OSB and plywood

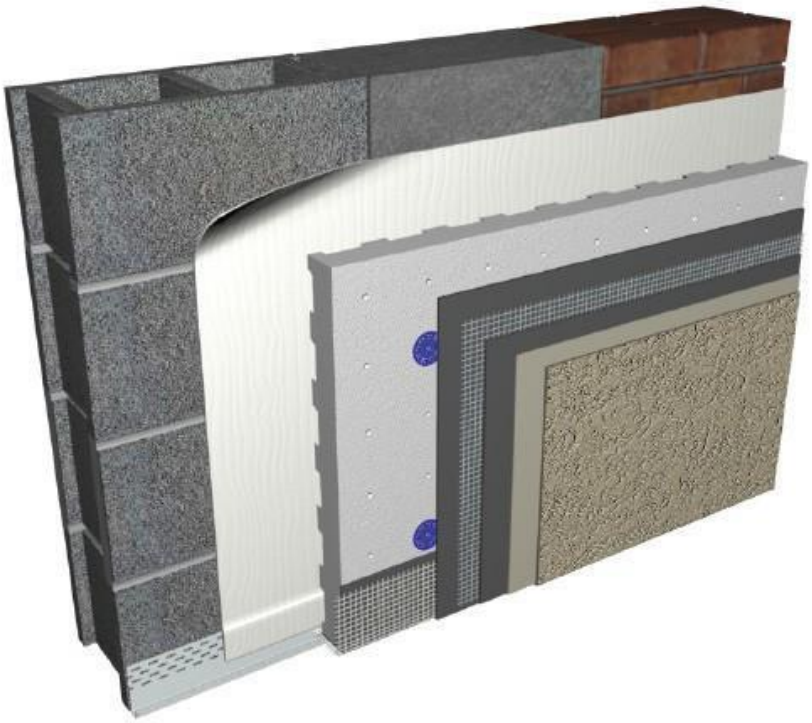

Figure 11. "PUCCS EIFS" over modified bituminous membrane on masonry, concrete, and brick

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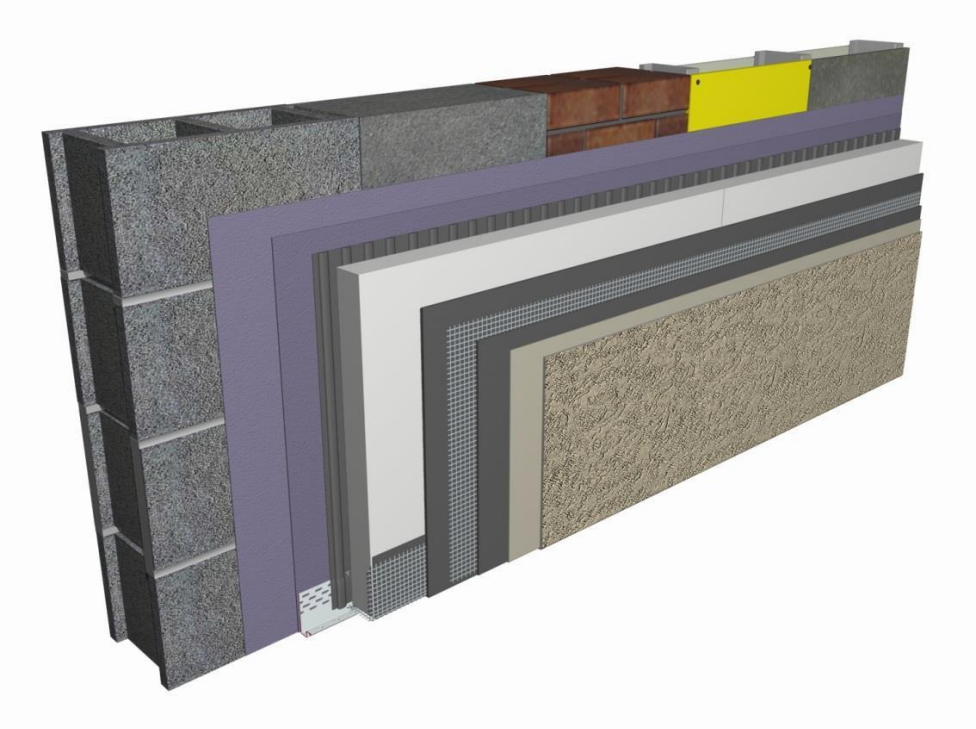

Figure 12. "InsulROCK EIFS" with "Roller Bear" and "Prep Coat" (or "Prep Coat D") over masonry, concrete, brick, glass-fibre-faced-gypsum board and cement board

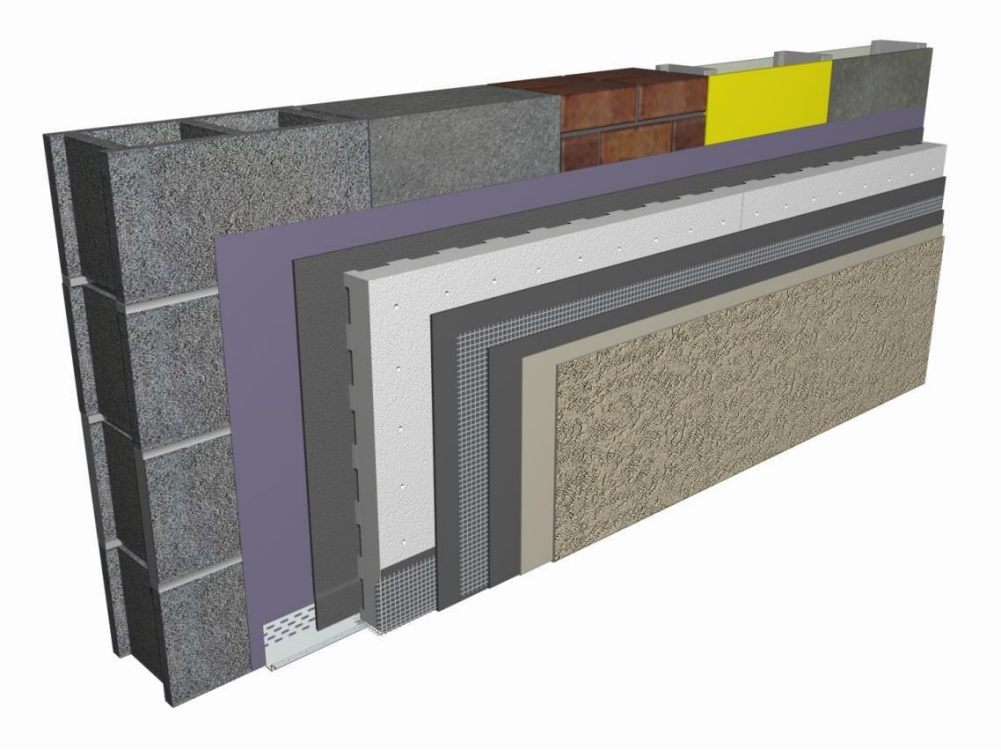

Figure 13. "PUCCS EIFS" with "Roller Bear" and "Cement Bear" over masonry, concrete, brick, glass-fibre-faced-gypsum board and cement board

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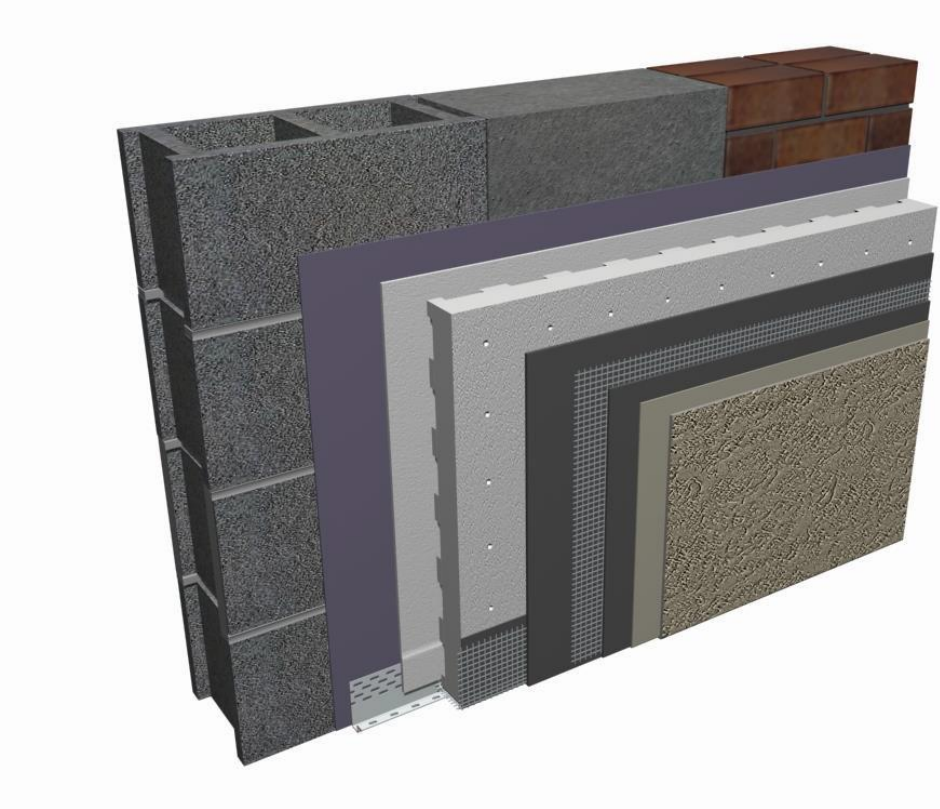

Figure 14. "PUCCS EIFS" with "Roller Bear" and "Polar Bear" over masonry, concrete, and brick

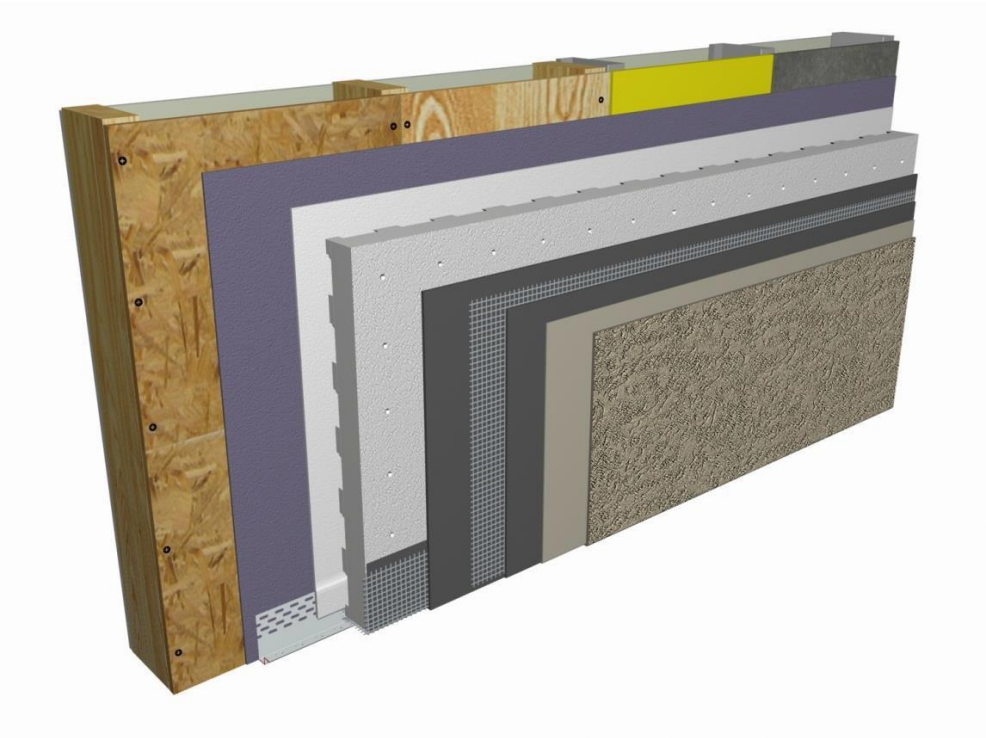

Figure 15. "PUCCS EIFS" with "Roller Bear" and "Polar Bear" over OSB, plywood, glass-fibre-faced-gypsum board and cement board.

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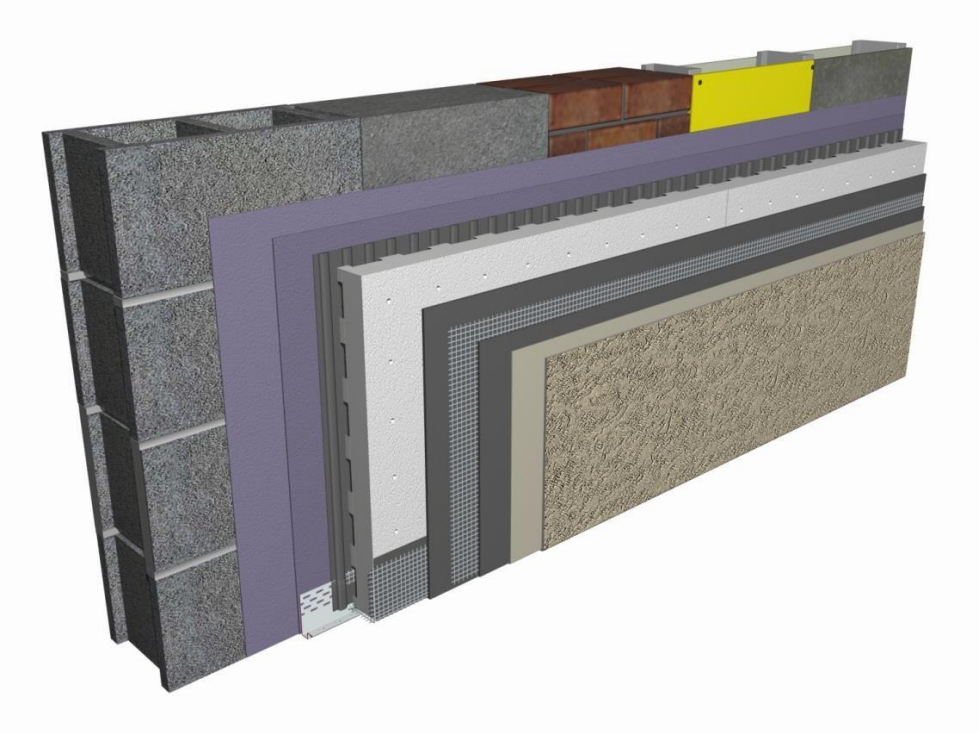
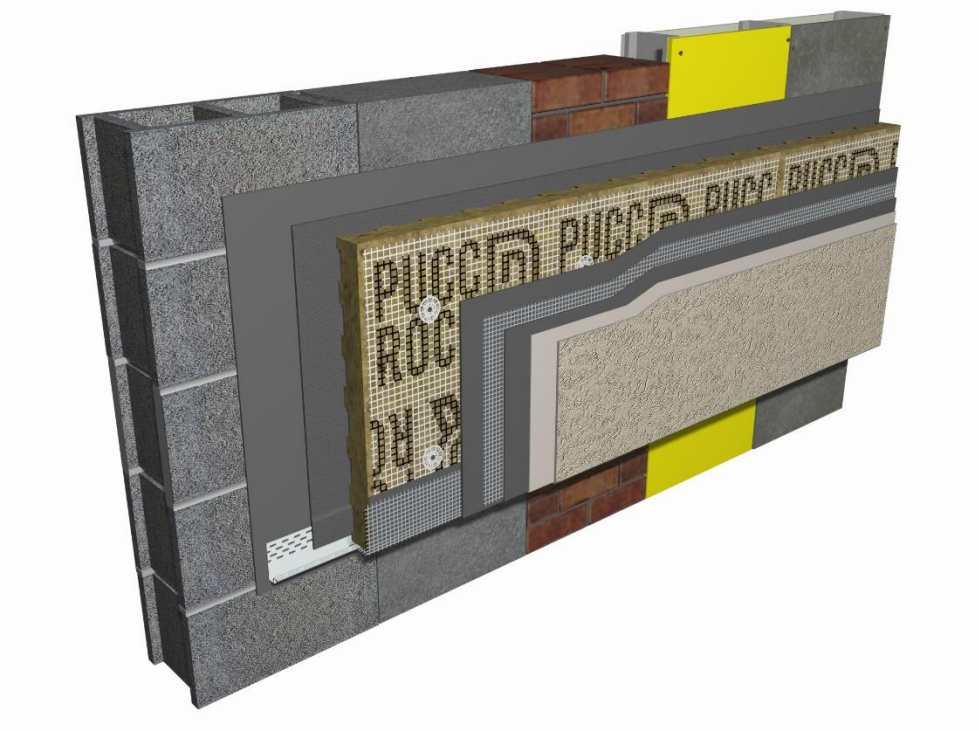


Figure 16. "PUCCS EIFS" with "Roller Bear" and "Prep Coat" (or "Prep Coat D") over masonry, concrete, brick, glass-fibre-faced-gypsum board and cement board.



Note: On framed walls, the mechanical fasteners must be connected to the structural framing.

Figure 17. "PUCCS NC EIFS" with "Cement Bear" and "Prep Coat" (or "Prep Coat D") over masonry, concrete, brick, glass-fibre-faced-gypsum board and cement board.

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3.0 Conditions and Limitations

CCMC's compliance opinion in Section 1 is bound by the "InsulROCK, PUCCS and PUCCS NC Exterior Insulation Finish Systems" being used in accordance with the conditions and limitations set out below.

- The products are intended for use as exterior insulation and finish systems (EIFS) 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.
- The product must be installed according to the manufacturer's installation manuals or specifications listed below[(8)] by a trained applicator authorized by the manufacturer.
- Gaps between the sheathing boards installed horizontally over on framed walls must 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 systems are part of a prefabricated panel system that incorporates structural components, the prefabricated panel system must be designed and plant-inspected by a professional engineer or architect in accordance with the manufacturer's criteria and the requirements of the NBC 2010 and 2015.
- The products are not suitable for use as a structural sheathing for bracing purposes.
- The products are not intended for use as below-grade insulation and should terminate at least 200 mm above grade level.
- When used in coastal areas on residential occupancies that fall 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 Division B of the NBC 2015.
- WRBs that are coatings must be applied in two coats.
- The use of the systems with the adhesives indicated in Table 2.1 and Table 2.2 are limited to geographical areas where the wind design value is $Q_{50} \leq 1.00$ kPa.
- The "PUCCS NC EIFS" indicated in Table 2.2 is limited to geographical areas where the wind design value is $Q_{50} \leq 1.00$ kPa (maximum PUCCS NC mechanical fastener spacing is 406 mm horizontally and 305 mm vertically).
- When the products have a self-adhered modified bituminous membrane, their use is limited to geographical areas where the wind design value is $Q_{50} < 0.75$ kPa.[(9)] When used in locations where wind load resistance is required, the wind load resistance must be calculated based on test results that would have been conducted in accordance with CCMC's Technical Guide MasterFormat No. 07 24 13.01. (See Table 4.1.18 of this Report.)
- 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 Appendix Note A-5.1.2.1.(1), Application (Environmental Separation), of Division B of the NBC 2015.
- 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.
- When used in new constructions, the design of the inboard/outboard insulation of the products must be in accordance with the requirements of Section 9.25., Heat Transfer, Air Leakage and Condensation Control, of Division B of the NBC 2015.
- In retrofit constructions, adding thermal insulation to 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 the detrimental effects of moisture accumulation 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 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 constructions with no detrimental effects if properly 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 must 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 2015 as a minimum to meet Canada Mortgage and Housing Corporation (CMHC) technical requirements.
- The polystyrene thermal insulation must be in conformance with the requirements of CAN/ULC-S701-11.
- The polystyrene thermal insulation must be aged for a minimum of five weeks or kiln-dried before installation.

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- The mineral fibre thermal insulation must be in conformance with the requirements of CAN/ULC-S702.1-14.
- Where allowed by the Code through conformance to Article 3.1.5.5., Combustible Cladding on Exterior Walls, of Division B of the NBC 2015, the two systems having "Polar Bear," "Cement Bear" and "Vapour Block" as the WRB, "Polar Bear," "Cement Bear," "Prep Coat" and "Prep Coat D" as the adhesive, "DuROCK Insulation Board" and "DuROCK PUCCS Insulation Board" as the Type 1 or Type 2 EPS, up to 127 mm thick, "Prep Coat," "Prep Coat D" as the base coat, "DuROCK Finish" as the finish coat, "DuROCK Fibre Mesh" having a minimum weight of 150 g/m^2 and 100-mm mesh overlap, are acceptable for use in buildings required to be of noncombustible construction that are not more than three storeys in height if not sprinklered, and to an unlimited number of storeys in height if sprinklered. 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 Information of DuROCK PUCCS and InsulROCK EIFS, SPEC ID: 18050 and Design No. DAI/WDEIFS 30-01.
- Where allowed by the Code through conformance to Clause 3.2.3.8.(1)(b) of Division B of the NBC 2015, the two systems having "Polar Bear," "Cement Bear" and "Vapour Block" as the WRB, "Polar Bear," "Cement Bear," and "Prep Coat" as the adhesives, "Prep Coat" and "Prep Coat D" as the base coat, "DuROCK Insulation Board" and "DuROCK PUCCS Insulation Board" as the Type 1 or Type 2 EPS, up to 152 mm thick, "DuROCK Fibre Mesh" having a minimum weight of 150 g/m^2 and a 100-mm mesh overlap, and "DuROCK Finish" as the finish coat are acceptable for use in the exposed face of buildings required to be of noncombustible construction. For a detailed description of the compliance of the related systems to the requirements of Clause 3.2.3.8.(1)(b) of Division B of the NBC 2015, please refer to Intertek Listing Information of "DuROCK PUCCS and InsulROCK EIFS," SPEC ID: 18050 and Design No. DAI/WDEIFS 15-01.
- When used in noncombustible construction, the polystyrene insulation must be protected from the inside of the building in accordance with the applicable sentences of Article 3.1.5.15., Foamed Plastic Insulation, of Division B of the NBC 2015.
- 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.
- 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 must 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.
- Expansion/movement joints must be carried through the cladding. The joints are required to accommodate expansion and contraction of building materials due to thermal changes, moisture, wind, gravity, vibration and seismic activity. Expansion/movement 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 construction (may not be required when using engineered wood beams).
- Closed-cell backer rods should be used at expansion/movement joints so that the low-modulus sealant may be installed as per the sealant manufacturer's instructions.
- The products must be installed according to DuROCK Alfacing International Limited's installation manuals referenced in this Report[(8)] by applicators authorized by the manufacturer.
- 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 4°C and 40°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.
- The products must 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 must have been evaluated by CCMC.
- Specification of surface sealers must be provided by the manufacturer.
- When "Roller Bear" and "FRI Bear" are used in conjunction with panel type substrates, the joints between the different panels must be treated with "Polar Bear" or "Cement Bear" prior to the installation of the said WRBs.

- "Roller Bear" and "FRI Bear" are intended to be used in conjunction with one coat of "Polar Bear" when used over wood substrates and in conjunction with "Polar Bear" or "Cement Bear" when used on all other substrates. "Roller Bear" and "FRI Bear" are not intended to be used in conjunction with each other. "Roller Bear" used in two coats could be used on all substrate applications other than wood.
- For wood substrate applications, "Polar Bear" is trowel-applied into panel joints prior to the application over the field of the wall and/or prior to the application of "Roller Bear" or "FRI Bear."
- OSB and/or plywood sheathing boards used in conjunction with the products must comply with the requirements of CSA O86-14, "Engineering Design in Wood." In addition, the OSB must comply with CSA O325-07 (R2012), "Construction Sheathing," while plywood must comply with CSA O121-08, "Douglas Fir Plywood," CSA O151-09, "Canadian Softwood Plywood" and CSA O153-13, "Poplar Plywood."
- 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 and not more than 3.0 mm.
- OSB and/or plywood sheathing boards used in conjunction with the products 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-resistive barrier.
- The drained airspace behind the insulation board shall remain unobstructed so as to form a clear drainage cavity behind the insulation boards and it shall terminate in such a way as not to obstruct the dissipation of incidental rainwater to the exterior.

(8) DuROCK Alfacing International Limited's installation manuals and specification include:

- InsulROCK EIFS for Commercial and High Rise Construction, 2012,
- InsulROCK EIFS for Use Over Modified Bituminous Membranes, 2012,
- PUCCS EIFS for Commercial and High Rise Construction, 2012,
- PUCCS EIFS for Low Rise Residential Construction, 2012,
- PUCCS EIFS for Use Over Modified Bituminous Membranes, 2012, and
- DuROCK PUCCS NC, Non-Combustible Cladding Exterior Insulation Finish System (EIFS), Manufacturer's Specification 07 24 40, September 2019.

(9) The wind load testing of the products having a self-adhered modified bituminous membrane was conducted based on ASTM E 330- 02, "Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference." The obtained test pressure result of 2.80 kPa roughly corresponds to the "one in fifty" (Q_{50}) wind pressure loadings that are less than 0.75, $Q_{50} < 0.75$ kPa. The "one in fifty" (Q_{50}) wind pressure loadings that are less than 0.75, $Q_{50} < 0.75$ kPa, correspond to a sustained wind pressure load P_1, P_1' of 750 Pa, a cyclic load P_2, P_2' of 1 090 Pa and a gust load P_3, P_3' of 1 630 Pa.

4.0 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

Table 4.1.1 Results of Testing of Ash Content of the Products

Property		Unit	Requirement	Result
Ash content	WRB (Polar Bear)	%	Report value	57.38
	WRB (Cement Bear)			32.77
	WRB (Vapour Block)			39.35
	WRB (Roller Bear)			33.67
	Base coat (Prep Coat)			93.36
	Base coat (Prep Coat D)			85.34
	Base coat (Jewel Stone)			4.08
	Finish coat (Venetian)			87.49
	Finish coat (Gemstone)			90.14

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

Property		Requirement	Result
Infrared analysis	**WRB (Polar Bear)**	Report value	Report on file
	WRB (Cement Bear)		
	WRB (Vapour Block)		
	WRB (FRI Bear))		
	Base coat (Prep Coat)		
	Base coat (Prep Coat D)		
	Base coat (Jewel Stone)		
	Finish coat (Venetian)		
	Finish coat (Gemstone)		

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Table 4.1.3(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	Vapour Block to cement board	dry state	MPa	0.25	0.55
		2-h drying		0.08	0.20
		7-d drying		0.25	0.30
	Vapour Block to glass mat gypsum	dry state		0.25	0.39
		2-h drying		0.08	0.20
		7-d drying		0.25	0.33
	Cement Bear to concrete	dry state		0.25	0.69
		2-h drying		0.08	0.45
		7-d drying		0.25	0.55
	Cement Bear to cement board	dry state		0.25	0.52
		2-h drying		0.08	0.28
		7-d drying		0.25	0.48
	Cement Bear to brick	dry state		0.25	0.58
		2-h drying		0.08	0.27
		7-d drying		0.25	0.44
	Cement Bear to glass mat gypsum	dry state		0.25	0.30
		2-h drying		0.08	0.26
		7-d drying		0.25	0.40
	Polar Bear to cement board	dry state		0.25	0.78
		2-h drying		0.08	0.36
		7-d drying		0.25	0.38
	Polar Bear to glass mat gypsum	dry state		0.25	0.45
		2-h drying		0.08	0.19
		7-d drying		0.25	0.32
	Roller Bear to concrete	dry state		0.25	0.50
		2-h drying		0.08	0.37
		7-d drying		0.25	0.58
	Roller Bear to glass mat gypsum	dry state		0.25	0.16[(1)]
		2-h drying		0.08	0.02[(1)]
		7-d drying		0.25	0.05[(1)]

Note to Table 4.1.3(a):

(1) Cohesive failure of the substrate. Meeting the minimum requirements on concrete substrates would indicate the product met the established minimum requirements.

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Table 4.1.3(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	Roller Bear to Polar Bear to concrete	dry state	MPa	0.25	0.67
		2-h drying		0.08	0.59
		7-d drying		0.25	0.58
	Roller Bear to Cement Bear to concrete	dry state		0.25	0.58
		2-h drying		0.08	0.63
		7-d drying		0.25	0.64
Adhesion bond	Roller Bear to Prep Coat to concrete	dry state		0.25	0.55
		2-h drying		0.08	0.44
		7-d drying		0.25	0.49
	Roller Bear to Prep Coat D to concrete	dry state		0.25	0.42
		2-h drying		0.08	0.29
		7-d drying		0.25	0.49

Table 4.1.4 Results of Testing of Adhesion Bond of Adhesive to WRB

Property			Unit	Requirement No detachment at bonding plane @	Result
Adhesion bond	Prep Coat to Vapour Block	dry state	MPa	0.25	0.66
		2-h drying		0.08	0.35
		7-d drying		0.25	0.37
	Prep Coat D to Vapour Block	dry state		0.25	0.45
		2-h drying		0.08	0.43
		7-d drying		0.25	0.35
	Cement Bear to Vapour Block	dry state		0.25	0.74
		2-h drying		0.08	0.40
		7-d drying		0.25	0.52
	Prep Coat to Cement Bear	dry state		0.25	0.55
		2-h drying		0.08	0.37
		7-d drying		0.25	0.59
	Prep Coat D to Cement Bear	dry state		0.25	0.37
		2-h drying		0.08	0.25
		7-d drying		0.25	0.31
	Prep Coat to Polar Bear	dry state		0.25	0.64
		2-h drying		0.08	0.34
		7-d drying		0.25	0.63
	Prep Coat D to Polar Bear	dry state		0.25	0.41
		2-h drying		0.08	0.22
		7-d drying		0.25	0.49

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

Property			Unit	Requirement No detachment at bonding plane @	Result
Adhesion bond	Cement Bear to EPS	dry state	MPa	0.08	0.27
		2-h drying		0.08	0.25
		7-d drying		0.08	0.27
	Prep Coat to EPS	dry state		0.08	0.31
		2-h drying		0.08	0.20
		7-d drying		0.08	0.30
	Prep Coat D to EPS	dry state		0.08	0.14
		2-h drying		0.08	0.12
		7-d drying		0.08	0.22

Table 4.1.6 Results of Testing of Lamina Bond Strength (Base Coat/Finish Coat/Insulation)

Property			Unit	Requirement No detachment at bonding plane @	Result
Adhesion bond	Prep Coat/Sand Coat to EPS	dry state	MPa	0.08	0.35
		2-h drying		0.08	0.24
		7-d drying		0.08	0.39
	Prep Coat D/Sand Coat to EPS	dry state		0.08	0.35
		2-h drying		0.08	0.25
		7-d drying		0.08	0.40
	Jewel Stone to EPS	dry state		0.08	0.22
		2-h drying		0.08	0.16
		7-d drying		0.08	0.29
	Jewel Stone/Gemstone to EPS	dry state		0.08	0.34
		2-h drying		0.08	0.14
		7-d drying		0.08	0.32

Table 4.1.7 Results of Testing of Water Vapour Transmission (WVT) rate of WRB

Property		Unit	Requirement	Result
WVT	Vapour Block	ng/(Pa·s·m²)	Report value	76[(1)]
	Cement Bear			543[(2)]
	Polar Bear			115[(3)] 65[(4)]
	Roller Bear			99[(5)]
	Roller Bear			146.3[(6)]

Notes to Table 4.1.7:

(1) WVT rate measured at an average WRB thickness of 1.04 mm.
(2) WVT rate measured at an average WRB thickness of 0.93 mm.
(3) WVT rate measured on the composite DensGlass/Polar Bear at an average thickness of 1.49 mm.
(4) WVT rate measured on the composite OSB/Polar Bear at an average thickness of 1.41 mm.
(5) WVT rate measured on the composite of two-coat Roller Bear on DensGlass.
(6) WVT rate measured on the composite Roller Bear/Cement Bear on DensGlass.

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Table 4.1.8 Results of Testing of Water Vapour Transmission (WVT) of Lamina

Property		Unit	Requirement	Result
WVT	**Prep Coat/Sand Coat(1)**	ng/(Pa·s·m^2)	Report value	565
	Prep Coat D/Sand Coat(2)			761
	Jewel Stone/Gemstone(3)			170

Notes to Table 4.1.8:

(1) WVT rate measured at an average lamina thickness of 2.35 mm.
(2) WVT rate measured at an average lamina thickness of 2.33 mm.
(3) WVT rate measured at an average lamina thickness of 5.89 mm.

Table 4.1.9 Results of Testing of Water Absorption of the Base Coat

Property		Unit	Requirement	Result
Water absorption of base coat	**Prep Coat**	%	≤ 20% of the dry weight	12.6
	Prep Coat D			18.75
	Jewel Stone			8.0

Table 4.1.10 Results of Testing of Water Absorption Coefficient of WRB at 72 hours

Property		Unit	Requirement	Result
Water absorption coefficient of WRB @ 72 h	**Vapour Block**	kg/(m^2·s$^{1/2}$)	≤ 0.004	0.00035
	Cement Bear			0.0012
	Roller Bear			0.0012

Table 4.1.11 Results of Testing of Impermeability to Water of the Base Coat

Property		Unit	Requirement	Result
Impermeability to water of base coat	**Prep Coat**	h	No water penetration in less than 2 h	Pass
	Prep Coat D			Pass
	Jewel Stone			Pass

Table 4.1.12 Results of Testing of Mildew and Fungus Resistance

Property		Requirement	Result
Mildew and fungus resistance of finish coat	**Venetian**	No growth	Pass
	Gemstone		

Table 4.1.13 Results of Testing of Accelerated Weathering Resistance

Property		Requirement	Result
Accelerated weathering resistance of Lamina @ 2000 h	**Prep Coat/Venetian**	No cracking, flaking or deleterious effects	Pass
	Prep Coat D/Venetian		Pass
	Jewel Stone/Gemstone		Pass

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Table 4.1.14 Results of Testing of Salt Spray Resistance

Property		Requirement	Result
Salt spray resistance @ 300 h	Prep Coat/Venetian	No cracking, flaking or deleterious effects	Pass
	Prep Coat D/Venetian		Pass
	Jewel Stone/Gemstone		Pass

Table 4.1.15(a) Results of Testing of Durability under Environmental Cyclic Conditions (Prep Coat D/Venetian)

Property	Unit	Requirement	Result
Pre-conditioning	L	Report water quantity introduced	13.5
Pre-conditioning (drainage evaluation)	L	Report water quantity drained	12.4
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	0.08	0.35

Table 4.1.15(b) Results of Testing of Durability under Environmental Cyclic Conditions (Jewel Stone/Gemstone)

Property	Unit	Requirement	Result
Pre-conditioning	L	Report water quantity introduced	13.5
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	0.08	0.25

Table 4.1.15(c) Results of Testing of Durability under Environmental Cyclic Conditions (PUCCS NC)

Property	Unit	Requirement	Result
Pre-conditioning	L	Report water quantity introduced	13.5
Pre-conditioning (drainage evaluation)	L	Report water quantity drained	10.4
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	0.08	0.09(1) 0.10(2)

Notes to Table 4.1.15(c):

(1) Adhesion strength of base coat
(2) Adhesion strength of finish coat

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Table 4.1.16 (a) Results of Testing of Breaking Strength Resistance of Reinforcement Mesh (165.0 g/m^2 (4.5 oz) – (Gavazzi S.A.)

Property		Unit	Requirement	Result	
				Weft	Warp
Initial strength		N/mm	35	68	50
Loss of strength after	**30-day soak**	%	29	29	28
	60-day soak		38	38	28
	90-day soak		46	46	26
Residual strength after	**30-day soak**	N/mm	48	48	36
	60-day soak		42	42	36
	90-day soak		37	37	37

Note to Table 4.1.16(a):

(1) Gavazzi S.A. Conformance with the balance of the mesh tests is based on their Centre Scientifique et Technique du Bâtiment (CSTB) CSTB at certification.

Table 4.1.16(b) Results of Testing of Breaking Strength Resistance of Reinforcement Mesh (140.0 g/m^2 (4.1 oz) – (Saint-Gobain ADFORS)

Property		Unit	Requirement	Result	
Ash content		%	Report value	14.7	
Mass per unit area		g/m^2	Report value	140	
Tensile strength		N/mm		**Weft**	**Warp**
Initial tensile strength			≥ 35	37.2	40.3
Loss of tensile strength after	**28-day 3 ion soak**	%	≤ 50	17.7	7.3
Residual tensile strength after	**28-day 3 ion soak**	N/mm	≥ 20	30.6	37.3
Elongation @ break	**initial**	%	Report value	3.3	4.1
	after 28-day 3 ion soak			2.8	3.8

Table 4.1.17 Results of Testing of Impact Resistance

Property			Requirement	Result
Impact resistance	**10 joules**	**Prep Coat D (mesh 155 g/m^2 mesh / Sand Coat)**	6/10 free-fall drops must show no perforation (broken mesh)	Pass
	3 joules		6/10 free-fall drops must show no cracks	Pass
	10 joules	**Jewel Stone/(174 g/m^2 mesh) / Gemstone[(1)]**	6/10 free-fall drops must show no perforation (broken mesh)	Pass
	3 joules		6/10 free-fall drops must show no cracks	Pass

Note to Table 4.1.17:

(1) When Jewel Stone is used in conjunction with Gemstone, the mesh shall have a minimum weight of 174 g/m^2.

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Table 4.1.18 Results of Testing of Impact Resistance (PUCCS NC)

Property			Requirement	Result
Impact resistance	**10 joules**	**Prep Coat D (mesh 165 g/m^2 mesh/Sand Coat)**	8/10 free-fall drops must show no perforation (broken mesh)	Pass
	3 joules		7/10 free-fall drops must show no cracks	Pass

Table 4.1.19 Results of Testing of Wind Load Resistance (InsulROCK EIFS)

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**
$Q_{50} \leq 0.45$	±450	Pass	±660	Pass	±980	Pass	+980	6.8	1.1
							−980	−6.4	−1.6
$Q_{50} \leq 0.55$	±550	Pass	±800	Pass	±1 200	Pass	+1 200	8.4	1.3
							−1 200	−7.8	−1.9
$Q_{50} \leq 0.60$	±650	Pass	±950	Pass	±1 410	Pass	+1 410	9.8	1.5
							−1 410	−9.2	−2.2
$Q_{50} \leq 0.75$	±750	Pass	±1 090	Pass	±1 630	Pass	+1 630	11.4	1.8
							−1 630	−10.70	−2.6
$Q_{50} \leq 0.85$	±850	Pass	±1240	Pass	±1850	Pass	+1 850	12.9	2.0
							−1 850	−12.1	−2.9
$Q_{50} \leq 1.00$	±1000	Pass	±1460	Pass	±2180	Pass	+2 180	15.2	2.4
							−2 180	−14.2	−3.5
Maximum test pressure @ L/180 Deflection							+2 424	16.9	–
							−2 586		
Ultimate structural test pressure							+2 939	Passed	
							−2 939	Sheathing separation from steel studs occurred	

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Table 4.1.20 Results of Testing of Wind Load Resistance (PUCCS NC EIFS)[(1)]

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	6.1	0.1
							−980	−5.0	−0.1
$Q_{50} \leq 0.55$	±550	Pass	±800	Pass	±1 200	Pass	+1 200	7.5	0.1
							−1 200	−6.1	−0.1
$Q_{50} \leq 0.60$	±650	Pass	±950	Pass	±1 410	Pass	+1 410	8.8	0.1
							−1 410	−7.2	−0.1
$Q_{50} \leq 0.75$	±750	Pass	±1 090	Pass	±1 630	Pass	+1 630	10.2	0.1
							−1 630	−8.3	−0.1
$Q_{50} \leq 0.85$	±850	Pass	±1 240	Pass	±1 850	Pass	+1 850	11.6	0.1
							−1 850	−9.4	−0.1
$Q_{50} \leq 1.00$	±1 000	Pass	±1 460	Pass	±2 180	Pass	+2 180	13.6	0.1
							−2 180	−11.1	−0.1
Maximum test pressure @ L/180 Deflection							+2 712	16.9	–
							−3 325		
Ultimate structural test pressure							+4 550	Passed[(1)]	
							−4 479	Steel studs buckled under pressure[(1)]	

Note to Table 4.1.20:

(1) Specimen configuration for wind-load resistance test: 18 gauge steel stud framing (41 mm × 92 mm) at 406-mm-spacing; 12.7 mm thick glass-mat gypsum board, sheathing fastened to framing with 31.6-mm No.6 Type S self-drilling screws spaced at 406 mm in the field and 203 mm along the edges; maximum PUCCS NC mechanical fastener spacing is 406 mm horizontally and 305 mm vertically.

Applications over Wood Substrates (Plywood/OSB)

Table 4.1.21 Results of Testing of Adhesion of WRB to Plywood/OSB Substrates

Property			Unit	Requirement	Result
Adhesion bond to OSB	Polar Bear	dry state	MPa	0.3	0.94
		1-h soak			0.88
		24-h soak			1.04
	Roller Bear	dry state			0.33
		1-h soak			0.32
		24-h soak			0.43

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Table 4.1.22 Results of Testing of Joint Disruption Resistance

Property	Unit	Requirement[1]	Result	
			Joint Width	
			2-mm	4-mm
Joint disruption resistance	–	The WRB at joints on two assemblies must show no cracking, delaminating or any other deleterious effects at a transverse bending of L/180	Pass	
Joint extension(1) @ L/170	mm	Report value	0.59	0.45

Note to Table 4.1.22:

(1) The system's joint disruption resistance was measured at L/170, which is considered more stringent than the L/180 required in this Report.

Table 4.1.23 Results of Testing of Joint Relaxation Resistance

Property	Unit	Requirement	Sample	Result
Joint relaxation resistance	kg/m²·s	Five 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/m²·s	1	1.10×10^{-7}
			2	1.30×10^{-7}
			3	1.39×10^{-7}
			4	1.09×10^{-7}
			5	1.08×10^{-7}

Table 4.1.24 Results of Testing of Water Transmission Resistance (WTR)

Property	Unit	Requirement	Sample No.	Result
WTR	kg/m²·s	Five WRB-coated OSB specimens subjected to a 25 mm head of water must have a maximum average WTR rate of 2×10^{-7} kg/m²·s measured at 10 days	1	0.93×10^{-7}
			2	0.53×10^{-7}
			3	0.91×10^{-7}
			4	0.88×10^{-7}
			5	0.85×10^{-7}
			Average	0.91×10^{-7}

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Table 4.1.25 Results of Testing of Water Vapour Transmission (WVT)[1]

Property		Unit	Requirement	Result		
				Sample No.	Coated	Uncoated
WVT	Polar Bear	ng/Pa·s·m²	Report value of the WVT rate of the WRB in combination with the OSB applied at the maximum thickness and the OSB alone	1	62	65
				2	93	58
				3	40	78
				Average	65	67
	FRI Bear/ Polar Bear			1	19	90
				2	68	118
				3	41	99
				Average	42.7	102.3

Note to Table 4.1.25:

(1) The tested WVT rate 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), Air and Vapour Permeance Values, of Division B of the NBC 2010.

Table 4.1.26 Results of Testing of Accelerated Weathering of WRB

Property		Requirement	Result
Accelerated weathering resistance	Polar Bear	The WRB applied over OSB must show no cracking, delamination, flaking or any deleterious effects following 250 hours exposure to Xenon arc	Pass
	Roller Bear		Pass
	FRI Bear		Pass

Table 4.1.27 Results of Testing of Drainage Capacity of the Products

Property		Requirement	Result		
			Retained Water (g) Per unit area (g/m²)		Drainage Capacity (%) After 1 h
			1 h	48 h	
Drainage capacity	Panel 1[1] total (g)	The unit-retained water (based on the projected drainage area) following one hour and 48 hours of drainage period must not be greater than 30 g/m²and 15 g/m², respectively, for any single test specimen.	28.4	14.3	99.5 Pass
	Panel 2[1] total (g)	The drainage capacity must not be less than 98% of the water mass delivered into the EIFS wall specimen.	15.2	3.3	99.7 Pass

Note to Table 4.1.27:

(1) Panels 1 and 2 consisted of the “PUCCS EIFS” applied on “Polar Bear.”

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Table 4.1.28 Results of Testing of Nail Popping Resistance of the Products

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

Table 4.1.29 Results from Testing the Product for Water Entry at Fastener Locations (PUCCS NC)[(1)(2)]

Property	Requirement	Evaluation Specimen[(3)]		Benchmark Specimen[(4)]	
		Specimen No.	Water Entry Rate (mL/min)	Specimen No.	Water Entry Rate (mL/min)
Fastener self-sealability	Specimens under evaluation to have equal to or less water entry than code-accepted solution specimens, and evaluation WRB has higher WVT rates than the code-accepted WRB.	A1	0.0	B1	0.0
		A2	0.0	B2	0.0
		A3	0.0	B3	0.0
		A4	0.0	B4	0.0
		A5	0.0	B5	0.0
		A6	0.0	B6	0.0
		A7	0.0	B7	0.0
		A8	0.0	B8	0.0
		A9	0.4[(5)]	B9	0.0
		A10	0.0	B10	0.0

Notes to Table 4.1.29:

(1) Water entry tests were conducted on the wind-load aged specimens. Wind load aging was performed per the protocol given in CAN/ULC-S742-11 and at P_1 = 1.00 kPa, P_2 = 1.46 kPa, P_3 = 2.18 kPa.

(2) Water entry tests were performed on the specimens in a vertical orientation and completed in NRC's Dynamic Wind and Wall Test Facility (DWTF). Water entry tests consisted of spraying the specimens with water at a deposition rate of 3.4 L/min-m^2 at pressure differences of 0, 50, 75, 150, 300, 700, 1 250, 1 500 and 2 200 Pa. The deposition rate was administered using solenoid actuated hydraulic nozzles which allow for low flow rates to be evenly spread across the entire specimen surface.

(3) Evaluation specimen consists of 18-regular gauge 41 mm × 92 mm × 1.12 mm steel stud, 12.7-mm-thick glass-mat gypsum board, "Cement Bear" WRB, 50-mm-thick "PUCC-ROCK" GDDC insulation and "DuRock Mechanical Fasteners."

(4) Benchmark specimen consists of 18-regular gauge 41 mm × 92 mm × 1.12 mm steel stud, 12.7-mm-thick glass-mat gypsum board, "SOPRASEAL STICK 1100 T" self-adhering membrane, 50-mm-thick mineral fibre insulation and "PUCCS NC Mechanical Fasteners."

(5) On this specific specimen, it was decided to conduct two further replications of the test protocol were completed with elevated water deposition rates. The first increased deposition rate was 7.5 L/min/m^2, and the second was 20.5 L/min/m^2. In both of these increased tests, this specimen showed no water entry rates, and not until pressures of 1 500 Pa. However, the resulting water entry at these extreme water deposition rates and applied pressures were less than 6 grams. This result is considered insignificant.

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