Evaluation Report CCMC 14144-R
Hygrothane

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "Hygrothane," when used as a waterproofing membrane for below-ground concrete foundation walls 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), Division A, using the following acceptable solutions from Division B:
  - Sentence 9.13.3.1.(1), Required Waterproofing

- Clause 1.2.1.1.(1)(b), Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
  - Sentence 9.13.3.2.(2), Waterproofing Materials
  - Sentence 9.13.3.4.(1), Application of Waterproofing Membranes

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

2. Description

The product is a cold, spray-applied, polyurea membrane system consisting of two liquid components mixed during application that when cured form a seamless, monolithic waterproofing membrane. The first component is a Special Pre-Polymer ISO and the second component is a Reactive Polyamine Crosslinker. The product is intended to be used as a waterproofing membrane. The product is intended to be installed on poured concrete or concrete block wall substrates of below-grade foundation wall systems.

The spray-applied membrane is applied by the manufacturer's qualified installers to a thickness 1.27 mm (50 mils) in accordance with the manufacturer's instructions.

3. Conditions and Limitations

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

- The scope of this evaluation is for applications falling under the scope of Part 9, Housing and Small Buildings, of Division B of the NBC 2015. The foundation walls must meet the structural requirements of the NBC 2015.
- The maximum hydrostatic pressure that the membrane can sustain is 48 kPa for five days.
- The poured-in-place concrete wall must be cured to a maximum measured moisture content of 20% and the outside temperature shall not be below -5℃ prior to the application of the product.
- Unit masonry or poured-in-place concrete walls must meet the surface preparation requirements of Article 9.13.3.3., Preparation of Surface, of Division B of the NBC 2015.
- The chemicals (Part A and B of the waterproofing system) must be stored on site as per the manufacturer's recommendations.
- The thickness of the membrane installed throughout the foundation wall must meet the minimum thickness of the evaluated product.
- While the waterproofing continuity of the membrane to other parts of the wall (e.g., slabs, footing) is beyond the scope of this Evaluation Report, the installer must follow manufacturer-approved solutions to provide the waterproofing continuity.
- This Evaluation Report only covers the spray-applied installation of the membrane.

- Patching materials used to fill voids in the substrate wall system must be compatible with the substrate and the membrane.
- During application of the membrane, the manufacturer's recommendations must be followed to ensure risks associated with exothermic reactions and subsequent fire risks are eliminated.
- Following its application, the entire membrane must be protected from exposure to ultraviolet (UV) radiation within six weeks of its application and in accordance with the manufacturer's additional recommendations.
- The exposed above-grade portion of the membrane after soil settling must be protected from UV radiation with a compatible exterior top coat paint finish or flashing for in-service UV protection or additional backfill to protect the membrane that would be graded away from the foundation.
- The use of the product is limited to installation over foundation walls facing normal soil conditions. When used in soils containing high levels of organic matters, chemicals, or microbiological activity, the manufacturer must be consulted to determine suitability.
- Prior to backfilling:
    - the membrane must be first inspected to detect any defects (e.g., holes, cracks, thin areas, bubbles) and be repaired in accordance with the manufacturer's instructions.
    - the membrane must be protected on the exterior side before backfill with a protection board in accordance with Sentence 9.13.3.4.(3) of the NBC 2015.
- The foundation wall must be backfilled in accordance with the requirements of Subsection 9.12.3., Backfill, of Division B of the NBC 2015.
- The product must be applied by qualified installers in accordance with the manufacturer's installation instructions using the recommended tools.
- The product must be identified with the phrase "**CCMC 14144-R**."

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

Table 4.1.1 Material Properties of the Membrane – Original Product

Property			Unit	Requirement	Result
Dry film thickness			mm	± 10% of the manufacturer declared value - 1.27 (50 mils)	1.165 (46 mil - average of 30 readings)
Tensile strength at 23˚C		**MD**	N	Report value	392
		XD			400
Elongation at 23˚C		**MD**	%	> 200%	334
		XD			347
Load strain energy at 23˚C	**MD**	**strain energy**	kN.m/m^2	Report value	29.1
		peak load	kN/m		18.2
		ultimate elongation at 5% of max load	%		317
	XD	**strain energy**	kN.m/m^2	Report value	25.1
		peak load	kN/m		16.5
		ultimate elongation at 5% of max load	%		303

Table 4.1.1 Material Properties of the Membrane – Original Product (continued)

Property			Unit	Requirement	Result
Load strain energy at -18˚C	**MD**	**strain energy**	kN.m/m^2	Report value	18.7
		peak load	kN/m		29.9
		ultimate elongation at 5% of max load	%		122
	XD	**strain energy**	kN.m/m^2	Report value	7.6
		peak load	kN/m		27.7
		ultimate elongation at 5% of max load	%		53
Water vapour transmission at 127 mm thickness			ng/(Pa·s·m^2)	< 60	58
Dynamic impact	**at 23˚C, impact height 25 cm**		n/a	Rating 3 or 4	Pass
	at -15˚C, impact height 25 cm		n/a	Rating 3 or 4	Pass
Static puncture	**at 23˚C, 25 kg**		n/a	Rating 3 or 4	Pass
	at -15˚C, 25 kg		n/a	Rating 3 or 4	Pass
Dimensional stability, 4 d at 50˚C water bath			%	< 1	MD 0.38
					XD 0.43
Water absorption, 4 d at 50˚C water bath			%	< 3	0.43
Plastic flow			mm	< 1	0.5
Adhesion in peel	**after water immersion, 1 day (d) at 50˚C**		N/m	> 200	1 249
	at standard installation temperature 23˚C without water immersion			> 200	1 726
	at lowest installation temperature- -10˚C without water immersion			> 200	1 058
Back-to-back peeling (lap peel)			N	Report value	42
			N/m		1 680
Crack bridging	**at -20˚C (14 d at 70˚C)**		n/a	No visible cracking, splitting or loss of adhesion	Pass
	at 40˚C (14 d at 70˚C)			No visible cracking, splitting or loss of adhesion	
Low temperature flexibility, at -40˚C			n/a	No cracks	No visible cracks 5/5
Water tightness on original, after static puncture, dynamic puncture, after chemical aging			n/a	No evidence of leakage	No leakage – 48 kPa or 4.89 m water head pressure, 5 days
Pinholing			n/a	No pinhole revealed when viewed against 300 W flash lamp from 300 mm distance	Pass
Pull adhesion	**without primer – on pavement blocks**		MPa	Report value	3.56
	with primer – on concrete slab on pavement blocks				5.84

Table 4.1.2 Material Properties of the Membrane – After Heat Aging

Property			Unit	Requirement	Result
Retention properties after chemical resistance					
Peel adhesion after NaOH immersion			N/m	> 200	1101 with Primer
Tensile strength after H_2O immersion		**MD**	%	≥ 75% of original	145
		XD			117
% elongation after H_2O immersion		**MD**	%	≥ 75% of original	106
		XD			117
Tensile strength after NaCl solution immersion		**MD**	%	≥ 75% of original	123
		XD			131
% elongation after NaCl solution immersion		**MD**	%	≥ 75% of original	98
		XD			96
Retention properties after heat aging					
Peel adhesion after heat aging			N/m	> 200	552 with Primer
Tensile strength after heat aging		**MD**	%	≥ 90 of original	121
		XD			134
% elongation after heat aging		**MD**	%	≥ 90 of original	93
		XD			97
Retention properties after accelerated weathering FL/UV – 200 h					
Tensile strength after UV weathering		**MD**	%	≥ 90 of original	92
		XD			99
% elongation after UV weathering		**MD**	%	≥ 90 of original	96
		XD			98
Peel adhesion after only UV weathering			N/m	> 200	393
Glass transition temperature	**before heat or UV (original)**		n/a	Report value	Pass (Not found between -74˚C and 95˚C)
	after heat aging			< -10˚C	
	after UV aging			< -10˚C	
Water tightness	**after static puncture**		n/a	No leakage observed after 5 days at 5 m height of water head	Pass
	after dynamic puncture				
	after chemical aging (NaOH / NaCl / acetic)				
	after heat aging				
	after heat plus UV aging				
Crack bridging performance	**after water immersion at -20˚C and 30˚C**		n/a	No visible cracking, splitting or loss of adhesion	Pass
	after chemical aging (NaOH), at -20˚C and 30˚C				
	after chemical aging (acetic acid), at -20˚C and 30˚C				
	after UV, at -20˚C and 30˚C				

Report Holder

Elastochem Specialty Chemicals Inc.
37 Easton Road
Brantford, ON N3P 1J4

Tel.: 877-787-2436

Plant(s)

Brantford, ON

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