Evaluation Report CCMC 13674-R
Hydrostar AG (Drainage)

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that "Hydrostar AG (Drainage)," when used as a foundation wall drainage material in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the Ontario Building Code 2012:

- Clause 1.2.1.1.(1)(a) of Division A, using the following acceptable solutions from Division B:
  - Clause 9.14.2.1.(2)(b), Foundation Wall Drainage

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

Ruling No. 14-20-316 (13674-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 2014-10-27 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 black high-density polyethylene, quasi-rigid plastic sheet membrane extruded in a manner that results in a dimpled surface on one side and a flat surface on the other. The dimpled surface is intended to provide an air gap between the wall and the adjacent soil. The product is produced from a mixture of virgin and recycled plastic materials. The product has dimples that are 7 mm high and is available in rolls that are 0.635 mm thick (the flat, i.e., non-dimpled area), 20 m long, and either 2.4 m, 2.1 m, 1.98 m, 1.8 m, 1.5 m or 1.2 m wide.

To ensure correct application, a range of accessories, such as fasteners, washers, plugs, and moulding strips is included with the product.

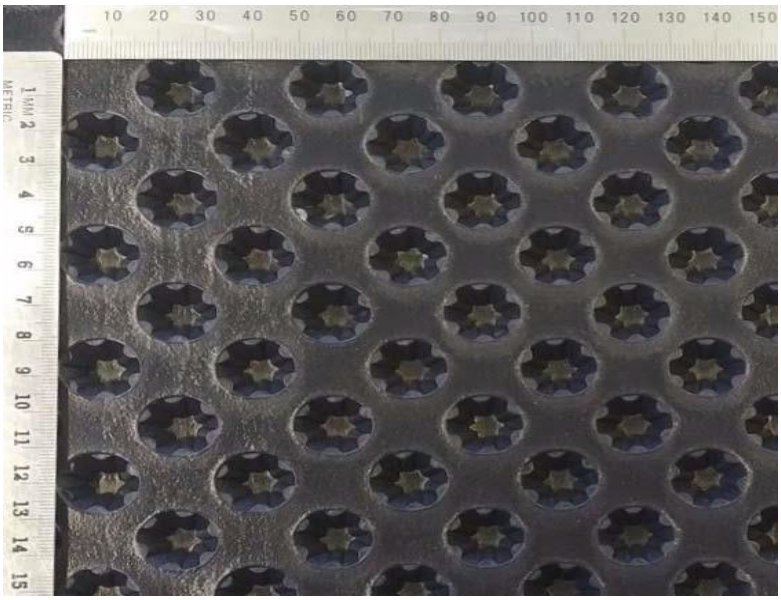

Figure 1. Side-facing soil

Figure 2. Side-facing wall

Figure 3. Anchor with washer

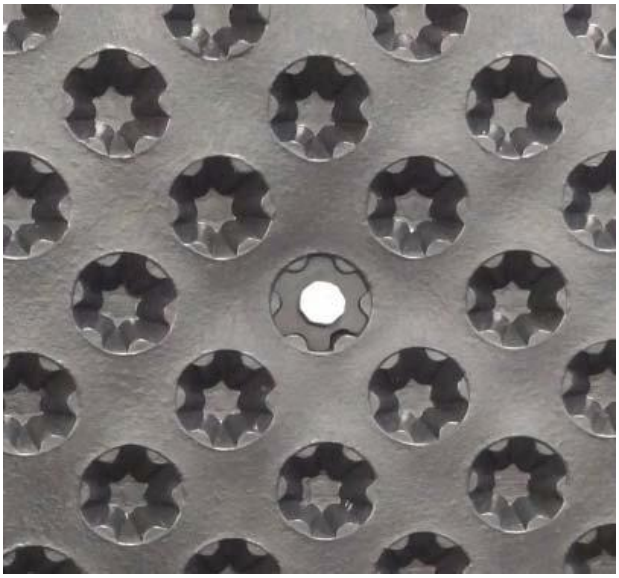

Figure 4. Anchor with plug

3. Conditions and Limitations

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

- Based on the evidence provided, the product has been classified as Type 2, Class B (descriptions below).
- The product must be installed in accordance with the manufacturer's instructions.
- The product was evaluated for use against cast-in-place concrete and concrete block foundations only.
- The product is a dimpled membrane drainage product designed to act as a protective layer or a capillary breaking layer against the foundation wall to protect the wall against transient or intermittent water that may come in contact with the surface of the wall.
- The product has been evaluated for use in vertical applications in depths of 3.7 m (Type 2) below grade. Applications greater than 3.7 m are considered to be outside the scope of this Evaluation.
- The product is only one portion of the total foundation drainage system, which consists of a combination of design and construction processes that use different products. In particular, it must be bent at the footing to guide water past the cold joint to a drainage pipe located outside of the footing at the bottom of the wall. This pipe will drain the water collected by the product toward an outflow (i.e., sewer). The product relies on a foundation wall drainage system that conforms to Subsection 9.14.3., Drainage Tile and Pipe, or to Subsection 9.14.4., Granular Drainage Layer, of Division B of the OBC 2012.
- The placement and grading of backfill must conform to the requirements of Subsection 9.12.3., Backfill, of Division B of the OBC 2012. It is recommended that an impervious "topping off" layer of clay or silt material be placed on top of the backfill with a positive slope leading surface water away from the building.
- The product must be protected from exposure to ultraviolet (UV) sunlight within a maximum of 30 days of its installation.
- Class "B" products (cups facing the soil) must be backfilled before runoff water hits the geotextile (e.g., during heavy rainfall) to prevent clogging of the filter by fine particles of the soil carried by the running water.
- Long-term performance of a drainage system will depend on local conditions such as the soil type, hydrogeology of the site, mineralogy and presence of microorganisms in the soil (i.e., iron ochre), as well as compatibility of the filter with the soil, among other issues. There should be a proper engineering design for the drainage system.
- The performance of fixtures used to anchor the product in the wall was evaluated for a single anchor. It is the manufacturer's responsibility to define the pattern and spacing of anchors considering the anchor strength as well as site-specific issues such as the type of soil, how it will interact with the product and the backfilling method used.
- The top of the membrane and all vertical joints and terminations must be mechanically fastened and sealed to prevent soil particles from entering behind the membrane. Accessories used to anchor the product are part of the Evaluation.
- The product must be labelled with the manufacturer's name or logo and the phrase "CCMC 13674-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 General

Table 4.1.1 Test Results for "Hydrostar AG"

Property		Unit	Requirement	Result
Compressive strength (initial)		kPa	≥ 150	357.7
Dynamic impact resistance (mean failure energy)		J	≥ 2.45	10.4
Creep resistance (residual thickness at 25 years/10°C)		%	≥ 40% at 25 years/10°C	86.2
Cold bending at -30°C		N/A	No visible crack	No visible crack
Tensile strength	**at yield**	kN/m	≥ 8	XD 9.5(1)
	elongation at break	%	≥ 25	XD 27.5
	anisotropy ratio		≥ 0.5	0.99
	OIT after 2 weeks	minutes	5	14.2(2)
	dimensional change	%	≤ 1	MD -0.6, XD -0.4
	weight change	%	≤ –0.1	-0.3
	residual compression strength	%	≥ 80 of initial	107
Heat Aging (for 2 weeks)	**OIT after 2 weeks**	minutes	≥ 5	14.2(2)
	dimensional change	%	≤ 1	MD -0.6, XD -0.4
	weight change	%	≤ –0.1	-0.3
	residual compression strength	%	≥ 80 of initial	107
	Creep resistance after heat aging (residual thickness at 25 years/10°C	%	Class B: ≥ 40% 25 years/10°C	88.4
Resistance to alkaline environment	**appearance**	N/A	No visible crack	No visible crack
	residual compression strength	%	≥ 80 of initial	98.7
	bending resistance	N/A	No visible crack	No visible crack
Hydraulic transmissivity (flow rate)		$m^3/h.m$	≥ 1.33	127
Geometrical Properties:				
Orientation of the dimples		-	Report value	Diagonal lMD/CD
Number of dimples per unit area		dimples/m^2	Report value	1 554
Overall thickness		mm	Report value	6.96
Sheet thickness		mm	Report value	0.82
Hollow core thickness		mm	Report value	6.14
Anchorage performance		kN/washer	Report value	0.29
anchorage efficiency		kN/plug	Report value	0.31

Notes to Table 4.1.1:

(1) "MD" refers to the "machine direction" of the product. "XD" refers to the "cross direction" of the product.
(2) For products exhibiting an oxidation induction time (OIT) greater than five minutes after exposure to heat for two weeks, the test duration is limited to two weeks in lieu of 8 weeks.

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