



## Evaluation Report CCMC 13209-R Delta Drain (Standard) Drainage

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### 1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Delta Drain (Standard) 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 2006:

- Clause 1.2.1.1.(1)(a), 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. 07-13-171 (13209-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 2007-04-05 (revised on 2013-07-11) 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 geocomposite drainage system composed of a high-density polyethylene, quasi-rigid plastic sheet core membrane that is extruded in such a way that results in a dimpled surface on one side and a smooth surface on the other. A polypropylene heat-bonded geotextile filter fabric is attached to the raised dimples.

The product sheet is 0.6 mm thick and is available in rolls 20 m long and 1.8 m or 2.45 m wide.

To ensure correct application, the product's geocomposite drainage system includes a range of accessories such as fasteners and molding strips.

The product’s geocomposite drainage system is installed with the geotextile surface facing away from the foundation wall against the surrounding soil. The geotextile acts as a filter to prevent suspended soil particles from clogging the flow passages in the dimpled core. Details of the composite drainage system are shown in Figure 1 and a typical installation is illustrated in Figure 2.

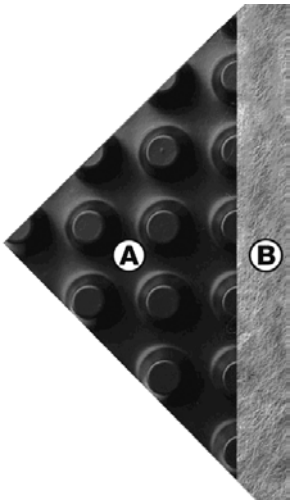


Figure 1. “Delta Drain (Standard) Drainage” membrane:

- A. polyethylene dimpled core membrane – placed against the wall
- B. polypropylene geotextile fabric – placed against the soil

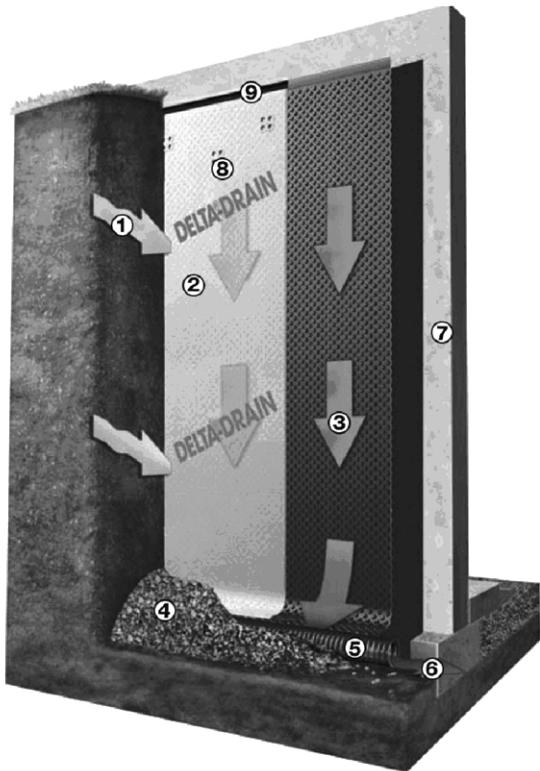


Figure 2. Typical installation of the product on a foundation wall with the geotextile fabric placed against the soil:

- 1. ground water seepage
- 2. filter fabric
- 3. water flowing through the core
- 4. gravel
- 5. footing drain
- 6. water flow to sump
- 7. foundation wall
- 8. fasteners
- 9. molding strip

### 3. Conditions and Limitations

CCMC’s compliance opinion in Section 1 is bound by the “Delta Drain (Standard) Drainage” being used in accordance with the conditions and limitations set out below.

- The product was evaluated for use against cast-in-place and concrete block foundation only.
- The product is only one portion of the total foundation drainage system. It must be used in accordance with Article 9.14.2.1 of the OBC 2006.
- The product must be installed in accordance with the manufacturer’s instructions and be protected from exposure to ultraviolet radiation from the sun within 30 days.
- The product is evaluated for use in depths up to 3.7 m below grade. Application depths greater than 3.7 m are considered to be outside the scope of this Report.
- The product is suitable for use in pervious and semi-pervious soil conditions that allow for some drainage through the soil. Such soils include very fine sand, organic and inorganic silts, mixtures of sand, silt and clay, glacial till, and stratified clay deposits that have a soil grain size defined by  $D_{10} > 0.002$  mm, where  $D_{10}$  is the sieve size that permits 10% by weight of the soil to pass through it in a sieve analysis test.
- The product is not to be used in practically impervious soil conditions (homogeneous clays below zone of weathering) where the soil grain size is  $D_{10} < 0.002$  mm.
- The product must cover the foundation wall from the top of the footing to the final grade.
- 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.
- As the drainage membrane does not have to adhere to the surface and can permanently bridge any normal joint, tie hole, fault or shrinkage crack, the wall surface does not have to be parged, cleaned, patched or sealed before hanging the membrane.
- The product has been evaluated for use as a foundation wall dampproofing material. For details see CCMC 13208-R.
- The product label and/or packaging must be clearly identified with the following:
  - manufacturer’s name or logo, and
  - the phrase “CCMC 13209-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

The results of testing the product are summarized in Tables 4.1.1 to 4.1.3.

**Table 4.1.1. Test results for “Delta Drain (Standard) Drainage” dimpled membrane core**

Property		Requirement	Results
Thickness (mm)		Min. 0.6 in flat area	0.66
		Min. 0.5 in dimpled area	0.53
Weight (g/m <sup>2</sup> )		min. 500	619
Impact load		Min. 12 of 15 (shall pass a rating of 3)	15/15
Static puncturing (rating of 3)		Min. 5 of 6 (shall pass a rating of 3)	6/6
Cold bending		No visible cracking	No visible cracking
Original	tensile strength at yield (kN/m)	Min. 10	MD 14.7, XD 11.4
	elongation at break (%)	Min. 25%	MD 861, XD 143
Water immersion:	tensile strength at yield (%)	80% of original	MD 101.6, XD 102.4
	elongation at break (%)	70% of original	MD 96, XD 121.0

**Table 4.1.1. Test results for “Delta Drain (Standard) Drainage” dimpled membrane core (cont’d)**

Property		Requirement	Results
Heat aging:	dimensional change (%)	Max. $\pm 1\%$	MD $-1.2$ , <sup>1</sup> XD $-0.2$
	weight change (%)	Max. 0.10%	$-0.2$ <sup>1</sup>
	tensile strength at yield (%)	80% of original	MD 105.8, XD 112.7
	elongation at break (%)	70% of original	MD 86.3, XD 82.2
Chemical attack exposure:	Ammonium chloride:	tensile strength at yield (%)	80% of original
		elongation at break (%)	70% of original
	Sodium sulfate:	tensile strength at yield (%)	80% of original
		elongation at break (%)	70% of original
Compressive strength ( $\text{kN/m}^2$ ) <sup>2</sup>		Min. 100	336

**Notes to Table 4.1.1:**

- <sup>1</sup> Deemed acceptable based on an acceptable compressive strength test after heat aging.  
<sup>2</sup> The compressive load test was done on the dimpled surface.

**Table 4.1.2. Test results for the product’s geotextile fabric**

Property	Requirement	Result
Grab tensile strength (N)	Min. 485	MD 637.3, XD 716.3
Elongation (%)	Min. 20	MD 88.6, XD 65.2
Puncture resistance (N)	180	221.9
Apparent opening size (mm)	Max. 0.3	0.247
Water permittivity ( $\text{s}^{-1}$ )	Min. 0.4	1.81
Trapezoid tearing strength (N)	Min. 220	MD 312.6, XD 311.7

**Table 4.1.3 Test results for the product as a composite drainage system**

Property		Requirement	Result
In-plane side flow – under load ( $\text{m}^3/\text{h}\cdot\text{m}$ )			
After 15 minutes:	under 0.0625 gradient @ 60 kPa	Min. 0.72	1.3
	under 0.125 gradient @ 60 kPa	Min. 0.72	1.8
	under 0.25 gradient @ 60 kPa	Min. 0.72	2.7
	under 0.5 gradient @ 60 kPa	Min. 0.72	3.9
	under 1.0 gradient @ 60 kPa	Min. 0.72	5.7
After 300 hours:	under 0.0625 gradient @ 60 kPa	Min. 0.72	1.1
	under 0.125 gradient @ 60 kPa	Min. 0.72	1.7
	under 0.25 gradient @ 60 kPa	Min. 0.72	2.5
	under 0.5 gradient @ 60 kPa	Min. 0.72	3.8
	under 1.0 gradient @ 60 kPa	Min. 0.72	5.4

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