

## Evaluation Report CCMC 13209-R

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### ***Delta Drain (Standard) Drainage***

#### ***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 1.2.1.1.(1)(a), Division A, as an acceptable solution 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 4.1 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 2009-11-30) 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.

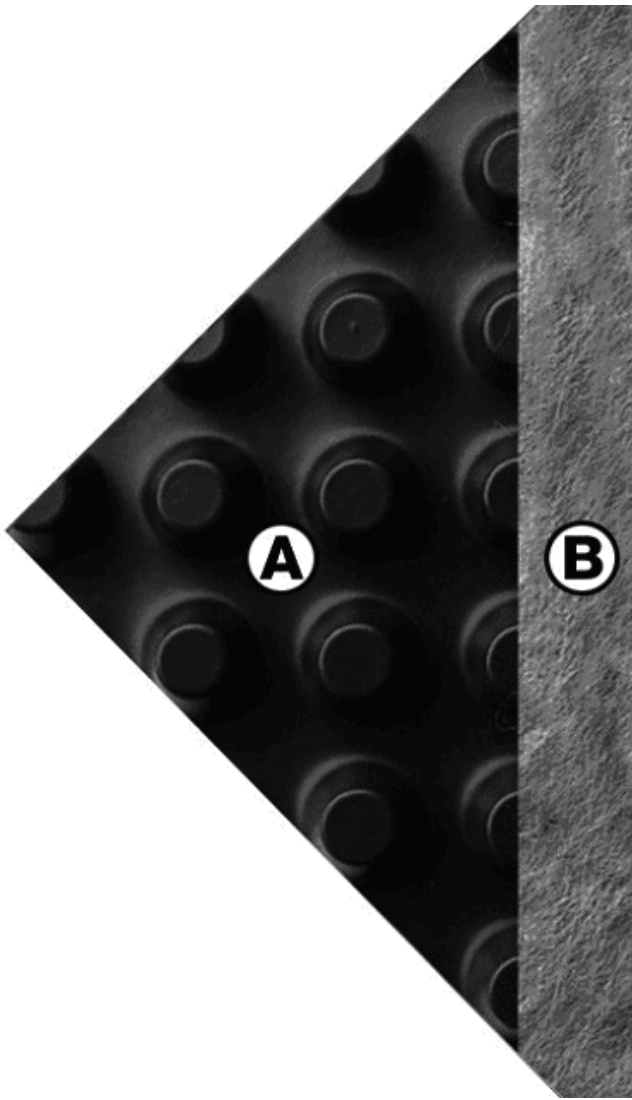
#### ***2. Description***

The “Delta Drain (Standard) Drainage” is a geocomposite drainage system composed of a high-density polyethylene, quasi-rigid plastic sheet core membrane, 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.

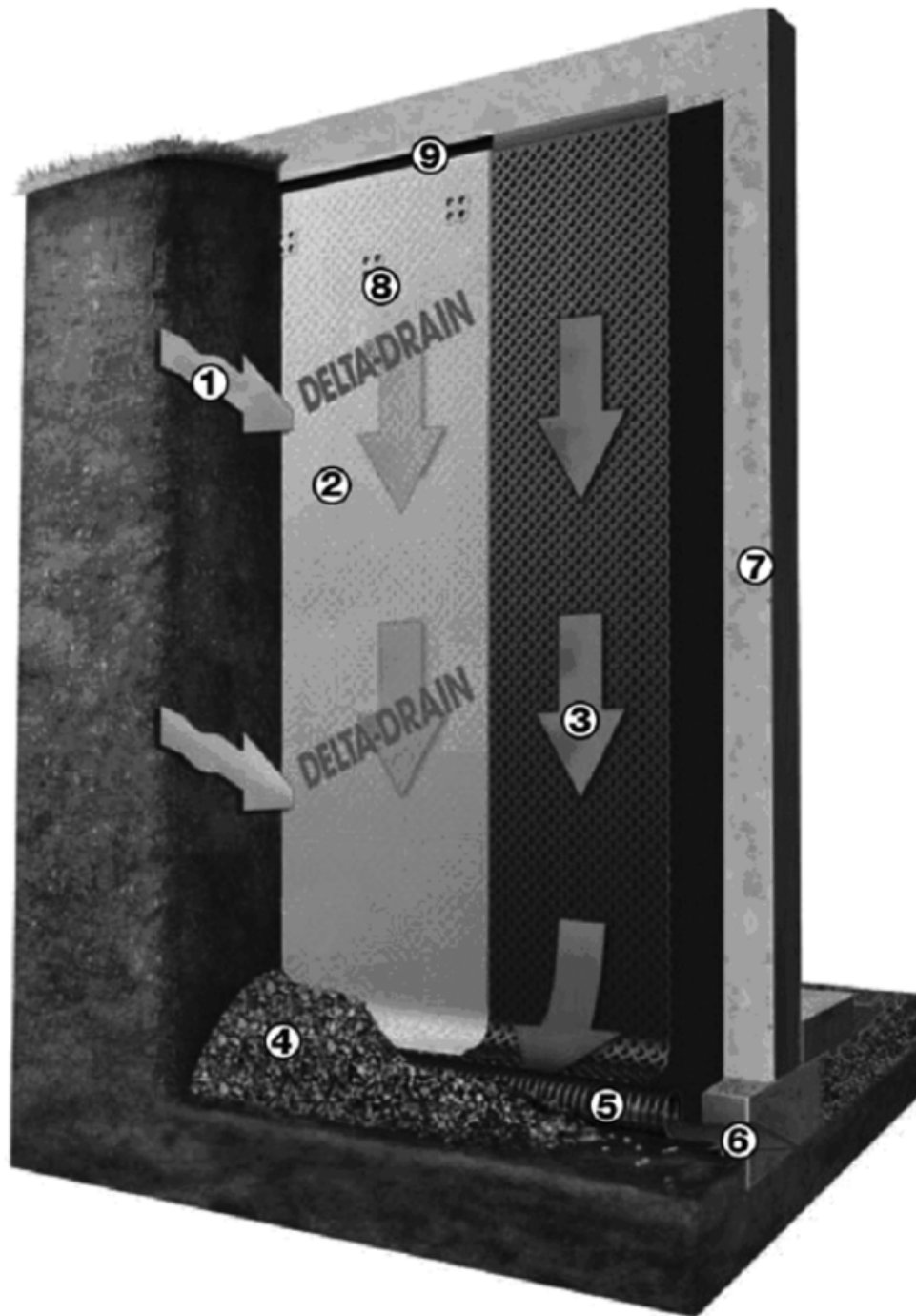
The “Delta Drain (Standard) Drainage” sheet is 0.6 mm thick and is available in rolls 20 m long and 1.8 m or 2.45 m wide.

To ensure correct application, the “Delta Drain (Standard) Drainage” geocomposite drainage system includes a range of accessories such as fasteners and molding strips.

The “Delta Drain (Standard) Drainage” 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 “Delta Drain (Standard) Drainage” 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.

- “Delta Drain (Standard) Drainage” is a Class A drainage product for use in areas of high rainfall or flood zones, where there is high surface water drainage and subsequent water penetration into the subsurface soils (including stratified soils). It is designed to deliver transient water down the outside of the foundation wall to the footing drain.
- As a Type 2 drainage product, “Delta Drain (Standard) Drainage” has been evaluated for use in depths up to 3.7 m below grade.
- “Delta Drain (Standard) Drainage” is suitable for use in pervious and semi-pervious soil conditions that allow for some drainage through the soil. These soils are made up of 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% of the soil by weight to pass through it in a sieve analysis test.
- “Delta Drain (Standard) Drainage” must not be used as a stand-alone drainage system in practically impervious soil conditions (i.e. homogeneous clays below zone of weathering) where the soil grain size is  $D_{10} < 0.002$  mm. Under these circumstances additional measures in keeping with good geotechnical practice need to be implemented.
- “Delta Drain (Standard) Drainage” is only one portion of the total foundation drainage system, which consists of a combination of design and construction processes that use different products. A well-functioning weeping tile or pipe system to direct water away from the foundation wall is required.
- The placement and grading of backfill must conform to the requirements of Subsection 9.12.3., Backfill, of the OBC 2006. It is recommended that an impervious “topping off” layer of clay silt material be placed on top of the backfill with a positive slope so that surface water drains away from the building.
- “Delta Drain (Standard) Drainage” must be protected from exposure to ultraviolet radiation (sunlight) within a maximum of 30 days of its installation.
- “Delta Drain (Standard) Drainage” must be installed in accordance with the manufacturer's instructions.
- “Delta Drain (Standard) Drainage” has also been evaluated for its dampproofing characteristics. See CCMC 13208-R for details.
- The product packaging must be clearly identified with the CCMC 13209-R.

#### **4. Technical Evidence**

CCMC's Technical Guide for “Delta Drain (Standard) Drainage” sets out the nature of the technical evidence required by CCMC to enable it to evaluate a product as an acceptable or alternative solution in compliance with the OBC 2006. The Report Holder has submitted test results and assessments for CCMC's evaluation. Testing was conducted at independent laboratories recognized by CCMC. The corresponding test results for “Delta Drain (Standard) Drainage” are summarized below.

##### **4.1 OBC 2006 Compliance Data for “Delta Drain (Standard) Drainage” on which CCMC Based its Opinion in Section 1**

###### **4.1.1 General**

The results of testing the “Delta Drain (Standard) Drainage” are summarized in Tables 4.1.1.1 to 4.1.1.3.

**Table 4.1.1.1. Test Results for “Delta Drain (Standard) Drainage” Dimpled Membrane Core**

Property	Requirements	Results
Thickness (mm)	min. 0.6 in flat area	0.66
	min. 0.5 in dimple 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
Heat aging		
– Dimensional change (%)	max. ±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	MD 101.7, XD 110.6
– Elongation at break (%)	70% of original	MD 97.6, XD 89.0
Sodium sulfate		
– Tensile strength at yield (%)	80% of original	MD 104.6, XD 107.2
– Elongation at break (%)	70% of original	MD 91.8, XD 109.1
Compressive strength (kN/m <sup>2</sup> ) <sup>(2)</sup>	min. 100	336

**Notes to Table 4.1.1.1:**

- (1) Deemed acceptable based on an acceptable compressive strength test after heat aging.
- (2) The compressive load test was done on the dimpled surface.

**Table 4.1.1.2. Test Results for “Delta Drain (Standard) Drainage” Geotextile Fabric**

Property	Requirements	Results
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 (s <sup>-1</sup> )	min. 0.4	1.81
Trapezoid tearing strength (N)	min. 220	MD 312.6, XD 311.7

**Table 4.1.1.3. Test Results for “Delta Drain (Standard) Drainage” as a Composite Drainage System**

Property	Requirements	Results
In-plane side flow – under load (m <sup>3</sup> /h·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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