MATERIAL SPECIFICATION FOR GEOTEXTILES

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1860-A Commentary

1860.01 SCOPE

This specification covers the material requirements for geotextiles.

1860.01.01 Significance and Use of Appendices

Appendices are not a mandatory part of this specification unless invoked by the Owner.

Appendix 1860-A is a commentary appendix to provide designers with information on the use of the specification in a Contract.
This specification refers to the following standards, specifications, or publications:

**ASTM International**

D 4355-02  Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus
D 4833-00  Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
D 4873-02  Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls

**Canadian General Standards Board (CGSB)**

4.2-01  Textile Test Methods
148.1-M03  Method of Testing Geosynthetics

For the purpose of this specification, the following definitions apply:

**Business Day** means any Day except Saturdays, Sundays, and statutory holidays.

**Filtration Opening Size (FOS)** means the opening size of a geotextile in microns corresponding to 95% by mass particle diameter passing through the geotextile in the hydrodynamic sieving test CAN/CGSB 148.1, Method No.10.

**Geosynthetic** means a synthetic material used in geotechnical engineering applications. Geosynthetics may include such items as geotextiles, geomembranes, geocells, geogrids, geonets, and geocomposites.

**Geotextile** means a permeable synthetic textile material that is used in association with foundation, soil, rock, earth, or other geotechnical related material for one or more of the following functions: separation, filtration, drainage, or protection. They may be woven, non-woven, or knitted.

**Minimum Average Roll Value (MARV)** means the average value minus two standard deviations of a given property established by the manufacturer during production. The average roll value for a given property must meet or exceed this value.

**Quality Assurance (QA)** means a system or series of activities carried out by the Owner to ensure that materials received from the Contractor meet the specified requirements.

**Quality Control (QC)** means a system or series of activities carried out by the Contractor to ensure that materials supplied to the Owner meet the specified requirements.

Geotextile fibre or yarn shall be composed of at least 95% by mass of polypropylene, polyethylene, polyester, or other synthetic polymers, excluding polyamides.

Geotextiles shall contain stabilizers or inhibitors, if necessary, to make the filaments resistant to deterioration by excessive ultraviolet (UV) light and heat exposure. Geotextiles shall be resistant to acid and alkali action and shall be unaffected by micro-organisms and insects.
Woven geotextiles shall be produced by interlacing two or more sets of filaments, yarns, fibres, film, tape, or other elements in such a way that the elements pass each other, essentially at right angles and with one set of elements parallel to the fabric axis. The edge of woven geotextiles shall be finished to prevent the outer yarn from pulling away.

Non-woven geotextiles shall consist of a manufactured sheet, web, or batt of directionally or randomly oriented fibres, filaments, or other elements produced by bonding or interlocking the elements by mechanical, thermal, or chemical means.

Knitted sock geotextiles shall be produced by interlooping one or more yarns, fibres, or filaments in a continuous tube. Knitted sock geotextiles are suitable only for wrapping of subdrain pipe.

When sections of geotextile are joined by sewing, the seam strength shall be at least 90% of the minimum tensile strength requirements for the class of geotextile shown in Table 1.

Seams of the geotextile shall be sewn with thread meeting the material requirements for the geotextile or shall be bonded by thermal or chemical means.

Woven and non-woven geotextiles are classified as either Class I or Class II and shall meet the physical requirements shown in Table 1.

Knitted sock geotextiles shall meet the physical property requirements shown in Table 2.

Geotextiles for silt fence shall be woven or non-woven and shall meet the physical property requirements shown in Table 3.

Geotextiles shall be protected against excessive UV exposure and contamination from dirt, dust, moisture, and any other deleterious materials, until they are installed. All geotextiles shall be wrapped in an opaque protective covering from the time of manufacture to the time of installation. The geotextiles and protective wrapping shall be free of tears and punctures upon delivery to the work.

Geotextiles intended to be covered by soil, rock, earth, or other materials shall not be exposed for more than 72 hours following the removal of the protective wrap.

Geotextiles shall be protected from temperatures greater than 60°C.
1860.07.07 Identification

Each roll of geotextile or geotextile covered pipe or tubing shall be clearly marked according to ASTM D 4873 with a permanently legible identification tag or label on the protective wrap or the inner core or affixed to the geotextile covered pipe or tubing. Product labels shall show the name of the manufacturer or supplier, product number, type, Class, roll number, and date of manufacture.

1860.07.08 Quality Control

The Contractor shall obtain a certificate from the manufacturer stating the name of the manufacturer, product name, style number, chemical composition, and other pertinent information to fully describe the geotextile as evaluated under the manufacturer's QC program. The certificate shall identify the name of the supplier of the geotextile covered pipe or tubing. A person having legal authority to bind the manufacturer or supplier shall attest to this certificate. Documentation describing the manufacturer's or the supplier's QC program shall be made available to the Contract Administrator upon request.

The Contractor shall provide documentation certifying that the geotextile meets the requirements of this specification.

1860.08 QUALITY ASSURANCE

1860.08.01 General

The Contract Administrator may elect to carry out testing of the QA sample to ensure that material used in the Work is in accordance to the requirements of this specification. The Contract Administrator shall be allowed access to all sampling locations and reserves the right to request a QA sample at any time without notice to the Contractor. Testing shall be carried out at a laboratory designated by the Owner. The Owner will be responsible for all costs associated with QA testing. A copy of the roll label or identification tag shall be attached to the sample.

When the Owner has elected to carry out QA testing, one sample per 10,000 m² of installed product or as specified in the Contract Documents shall be tested according to the methods identified in Tables 1 and 3, as applicable.

1860.08.02 Sampling

Sampling shall be according to CAN/CGSB 148.1. QA sampling shall be carried out by the Contractor in the presence of the Contract Administrator. Each QA sample shall be a minimum of two metres in length in the machine direction for the full width of the roll. The QA laboratory shall divide each sample of geotextile along the roll width into two equal samples: one for QA testing and the other for referee testing. Each sample shall be dry, free of damage, dust, or any contamination and stored in a UV protective container.

1860.08.03 Acceptance

When the Contract Administrator has elected not to test the QA sample, the material shall be deemed acceptable as provided. Otherwise, QA test results shall be used for acceptance purposes, except where referee testing has been carried out.

When QA test results show that the material meets the physical requirements of this specification, the material shall be accepted.

When QA test results show that the material does not meet the physical requirements of this specification, the Contract Administrator shall notify the Contractor that materials represented by the test results shall not be accepted. This notification shall take place in writing within 3 Business Days of receipt of the non-conforming data.
1860.08.04 Referee Testing

When QA test results do not meet the requirements of this specification, the Contractor has the option of invoking referee testing of the test result that failed to meet the requirements. The Contractor shall notify the Contract Administrator of the selected option within 2 Business Days following notification of unacceptable material.

The Contract Administrator shall select a referee laboratory acceptable to the Contractor within 3 Business Days following the Contractor's notification to invoke referee testing. The Contract Administrator shall deliver referee samples to the referee laboratory. If referee materials are not available, the Contractor shall be responsible for obtaining and submitting new samples to the referee laboratory from a location to be decided by the Contract Administrator. The Contract Administrator shall be present to witness the sampling.

The Contractor may observe the testing at no cost to the Owner. Comments on the nonconformity of the test methods must be made and corrected at the time of testing. If the testing cannot be corrected or if agreement on the procedure cannot be reached, the testing shall be postponed until the procedure is corrected or agreement between the parties is reached. Referee test results shall be binding on both the Owner and the Contractor.

When a referee test result shows that the material does not meet the physical requirements of this specification, the material represented by the test result, including materials in the Work, shall not be accepted. The Contractor shall remove the material from the Work at no cost to the Owner. Alternatively, the Owner may consider a Contractor's request for a reduced price in lieu of removal of materials that fail to meet the physical requirements of this specification. Irrespective of the negotiation of a reduced price payment, the warranty provisions of the Contract Documents shall apply.

When a referee test result shows that the materials are in accordance with the physical requirements of this specification, the material represented by the sample shall be accepted.

The Owner will be responsible for the cost of referee testing, provided the referee test results show that the geotextile meets the applicable requirements of this specification. Otherwise, the Contractor shall be responsible for the costs.

1860.09 OWNER PURCHASE OF MATERIAL

1860.09.01 General

Geotextiles supplied to the Owner under this specification shall be of the type, Class, and FOS range specified in the Contract Documents and shall be delivered to the location specified in the purchasing order. Material not meeting the requirements of the specification may be rejected by the Owner.

1860.09.02 Measurement and Payment

Payment at the price specified in the purchasing order in square metres shall be full compensation for all labour, Equipment, and Material for the supply and delivery of geotextiles to the destination and at the time specified.

Rejected material shall be replaced at no additional cost to the Owner.

The cost of all testing, except that performed by the Owner, shall be included in the price.
### Table 1
**Physical Requirements for Woven and Non-Woven Geotextiles**

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>Woven</th>
<th>Non-Woven</th>
<th>Woven</th>
<th>Non-Woven</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength, MARV, minimum</td>
<td>CAN/CGSB 148.1, Method No. 7.3</td>
<td>N</td>
<td>800</td>
<td>330</td>
<td>1100</td>
<td>660</td>
</tr>
<tr>
<td>Elongation at break, typical</td>
<td></td>
<td>%</td>
<td>≤15</td>
<td>≥50</td>
<td>&lt;15</td>
<td>&gt;50</td>
</tr>
<tr>
<td>Tear strength, MARV, minimum</td>
<td>CAN/CGSB 4.2, Method No. 12.2</td>
<td>N</td>
<td>300</td>
<td>180</td>
<td>400</td>
<td>250</td>
</tr>
<tr>
<td>Puncture strength, MARV, minimum</td>
<td>ASTM D 4833</td>
<td>N</td>
<td>300</td>
<td>180</td>
<td>400</td>
<td>250</td>
</tr>
<tr>
<td>Permittivity, minimum</td>
<td>CAN/CGSB 148.1, Method No. 4</td>
<td>s⁻¹</td>
<td></td>
<td></td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Filtration opening size (FOS), typical</td>
<td>CAN/CGSB 148.1, Method No. 10</td>
<td>µm</td>
<td></td>
<td></td>
<td></td>
<td>As specified in the Contract Documents</td>
</tr>
<tr>
<td>Ultraviolet stability, minimum</td>
<td>ASTM D 4355</td>
<td>%</td>
<td></td>
<td></td>
<td>50% retained tensile strength at 500 hours</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
A. s = seconds

### Table 2
**Physical Requirements for Knitted Sock Geotextiles**

<table>
<thead>
<tr>
<th>Laboratory Test</th>
<th>Test Method</th>
<th>Acceptance Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mullen Diaphragm Burst Strength, minimum, kPa</td>
<td>CAN/CGSB 4.2, Method No. 11.1</td>
<td>600</td>
</tr>
<tr>
<td>FOS, maximum, µm</td>
<td>CAN/CGSB 148.1, Method No. 10</td>
<td>500</td>
</tr>
<tr>
<td>Permittivity, minimum, s⁻¹</td>
<td>CAN/CGSB 148.1, Method No. 4</td>
<td>2.75</td>
</tr>
</tbody>
</table>
Table 3
Physical Requirements for Temporary Silt Fence Geotextiles

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Unit</th>
<th>Supported Silt Fence</th>
<th>Unsupported Silt Fence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Woven</td>
<td>Non-Woven</td>
</tr>
<tr>
<td>Maximum post spacing</td>
<td>-</td>
<td>m</td>
<td>1.2</td>
<td>2.0</td>
</tr>
<tr>
<td>Tensile strength, MARV, minimum</td>
<td>CAN/CGSB 148.1, Method No. 7.3</td>
<td>N</td>
<td>400</td>
<td>500</td>
</tr>
<tr>
<td>Elongation at break, typical</td>
<td></td>
<td>%</td>
<td>-</td>
<td>&lt;15</td>
</tr>
<tr>
<td>Permittivity, minimum</td>
<td>CAN/CGSB 148.1, Method No. 4</td>
<td>s⁻¹</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Filtration Opening Size (FOS), maximum</td>
<td>CAN/CGSB 148.1, Method No. 10</td>
<td>µm</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td>Ultraviolet stability, minimum</td>
<td>ASTM D 4355</td>
<td>%</td>
<td>70% retained tensile strength at 500 hours</td>
<td></td>
</tr>
</tbody>
</table>
Appendix 1860-A, Commentary for OPSS 1860, November 2004

Note: This appendix does not form part of the standard specification. It is intended to provide information to the designer on the use of this specification in a Contract.

Designer Action/Considerations

The designer should specify the following in the Contract Documents:

- Sampling frequency for larger quantities of geotextile. (1860.08.01)
- Class, type, e.g., woven or non-woven, and filtration opening size (FOS) range of the geotextile. (1860.09.01)

The designer should ensure that the Ontario Provincial Standards General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

None.