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CAN/CGSB-51.34-2022

Supersedes CAN/CGSB-51.34-M86



Polyethylene sheet for use in building construction – Material specification

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Polyethylene sheet for use in building construction – Material specification

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS
FRANÇAISE ET ANGLAISE.

ICS 83.140.10, 91.120

Published July 2022 by the
Canadian General Standards Board
Ottawa, Ontario K1A 0S5

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Translation of this National Standard of Canada was conducted by the Government of Canada.

Preface

This National Standard of Canada CAN/CGSB-51.34-2022 supersedes the 1986 edition.

Changes since the previous edition

- Title has been updated.
- Scope has been modified.
- Normative references have been updated, new tests have been added and ones not referenced have been removed.
- Terms and definitions have been expanded.
- Symbols, acronyms and abbreviated terms added.
- General requirements have been modified and resin requirements have been moved under this clause. Recycled material is now accepted as raw material.
- Table 1 – Resin requirements added.
- Sampling, specimens and conditioning have been modified.
- Detailed requirements have been modified. Sheet length and width has been moved to general requirements, air leakage rate – material has been added, and water resistance has been added.
- Table 2 – Material properties added.
- Section 10 on packaging, packing, labelling and marking requirements has been modified.
- Informative annex added to help facilitate environmental considerations.

The following definitions apply in understanding how to implement this National Standard of Canada:

- "shall" indicates a **requirement**;
- "should" indicates a **recommendation**;
- "may" is used to indicate that something is **permitted**;
- "can" is used to indicate that something is **possible**, for example, that an organization is able to do something.

Notes accompanying clauses do not include requirements or alternative requirements. The purpose of a note accompanying a clause is to separate explanatory or informative material from the text. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

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Polyethylene sheet for use in building construction – Material specification

1 Scope

This National Standard of Canada establishes a classification system and specifies physical property requirements. Test methods to determine the properties for each class of polyethylene sheet material are specified. This document covers a material intended to be used in building construction applications, that may be used above grade or in contact with the ground. The material can provide the vapour barrier, air barrier, and/or moisture barrier function, whether installed on a building site or in a prefabrication (manufacturing) facility.

The test methods listed in this document are used to determine the values for the material properties. These values are intended for use in specifications, product evaluations and quality control. They are not intended to predict in situ end-use product performance.

The polyethylene sheet material is not intended to be used where the continuous service temperature of the substrate or ambient air is outside the range of -60 to +65 °C.

Values used in this standard are provided in units from the International System of Units (SI units).

Applications and installation requirements are not covered in this standard.

Note: This standard is intended to be used in a conformity assessment program.

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This standard does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any applicable regulatory requirements prior to its use.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

Note: The contact information provided below was valid at the date of publication of this standard.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this standard. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 ASTM International

ASTM D882 — *Standard Test Method for Tensile Properties of Thin Plastic Sheeting*

ASTM D1709 — *Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method*

ASTM D3895 — *Standard Test Method for Oxidative - Induction Time of Polyolefins by Differential Scanning Calorimetry*

ASTM D4397 — *Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications*

ASTM D6988 — *Standard Guide for Determination of Thickness of Plastic Film Test Specimens*

ASTM E96 — *Standard Test Methods for Water Vapor Transmission of Materials*

ASTM E2178 — *Standard Test Method for Determining Air Leakage Rate and Calculation of Air Permeance of Building Materials*

ASTM G155 — *Standard Practice for Operating Xenon Arc Lamp Apparatus for Exposure of Materials*

2.1.1 Contact information

The above may be obtained from ASTM International. Telephone: 610-832-9585. Fax: 610-832-9555. Web site: www.astm.org, or from IHS Canada. Telephone: 613-237-4250 or 1-800-387-4408. Fax: 613-237-4251. E-mail: gic@ihscanada.ca. Web site: <https://ihsmarkit.com>.

2.2 American Association of Textile Chemists and Colorists

AATCC TM127 — *Test Method for Water Resistance: Hydrostatic Pressure*

2.2.1 Contact information

The above may be obtained from the American Association of Textile Chemists and Colorists (AATCC). Telephone: 919-549-8141. Web site: www.aatcc.org.

3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply.

air barrier material

primary element that retards the diffusion of air and the principal material which, when combined with accessories into an air barrier assembly, will retard both the diffusion and infiltration of air.

continuous service temperature

temperature range at which the material can be used, for a continuous and prolonged period, without significant change in its properties.

moisture barrier material

primary element that provides a barrier to liquid water and the principal material, which, when combined with accessories into a water-resistive barrier assembly, will provide a continuous barrier to the ingress of liquid water.

outdoor weathering resistance

ability of a material to resist deterioration due to temperature, moisture, and sunlight exposure.

radon gas barrier material

primary element that retards the diffusion of radon gas and the principal material, which, when combined with accessories into a radon gas barrier assembly, will retard both the diffusion and infiltration of radon gas.

transparent

ability to see through a material to read markings on the other side.

vapour barrier material

primary element that retards water vapour transmission.

4 Symbols, acronyms and abbreviated terms

The following abbreviations and acronyms are used in this National Standard of Canada.

AATCC – American Association of Textile Chemists and Colorists

ASTM International – formerly American Society for Testing and Materials

RH – Relative humidity

SI – International System of units

5 Classification

The material is classified into two types based on thickness and the associated performance of the material's thickness. The types are:

- a) Type 1 – 150 µm (6 mil) with material performance properties provided in Tables 1 and 2;
- b) Type 2 – 250 µm (10 mil) with material performance properties provided in Tables 1 and 2.

6 General requirements

6.1 Appearance

The material shall be uniform in appearance and shall be free from visible defects such as holes, tears, and blisters in accordance with good industry practice. Type 1 materials shall be transparent.

6.2 Blocking

The material shall not stick together to an extent that will cause tearing or damage during unrolling.

6.3 Integrity

Each roll shall consist of a continuous piece of material. The measured length and width of the roll shall not be less than what is indicated on the label.

6.4 Resin requirements

The resin shall meet the property values specified in Table 1. All the resin components shall be made of polyethylene resins in accordance with the definition of ASTM D4397.

The recycled resin shall be made of clear materials made of post-consumer recycled (PCR) resin, post-industrial recycled (PIR) resin or a blend thereof. The recycled resin shall be free of foul odours.

Note: Resin and/or final sheet composition may contain pigments for type 2 and some minor functional components (< 1%) such as antioxidants, light-stabilizers, erucamide, mineral antblock, processing aids, antistatic agents.

6.4.1 Virgin resin content

Virgin resin of polyethylene shall be employed at a rate of not less than 50% of the resin blend.

6.4.2 Recycled resin content

Recycled resin of polyethylene shall not be employed at a rate greater than 50% of the resin blend.

Table 1 – Resin requirements

Resin requirements	Test method	Unit	Requirements			
			Minimum		Maximum	
			Type 1 150 µm (6 mil)	Type 2 250 µm (10 mil)	Type 1 150 µm (6 mil)	Type 2 250 µm (10 mil)
Chemistry	Polyethylene resins as described per ASTM D4397 requirements.					
Virgin content	No test method	weight %	50		—	
Recycled content	No test method	weight %	—		50	

7 Detailed requirements

The material shall meet the property values specified in Table 2.

Table 2 – Material properties

Property	Test method	Unit	Requirements			
			Minimum		Maximum	
			Type 1 150 μm (6 mil)	Type 2 250 μm (10 mil)	Type 1 150 μm (6 mil)	Type 2 250 μm (10 mil)
Air leakage rate ^a	ASTM E2178	L/s·m ²	—		0.02	
Impact strength	ASTM D1709 Method A for type 1	g	300	—	—	
	ASTM D1709 Method B for type 2		—	500	—	
Outdoor weathering	ASTM G155	—	—		—	
Retained tensile elongation	ASTM D882	%	50			
Oxidative induction time	ASTM D3895	min	30		—	
Tensile elongation	ASTM D882	%	225 MD ^b 350 TD ^c		—	
Tensile strength	ASTM D882	MPa	12 MD ^b 10 TD ^c		—	

Thickness – Average	ASTM D6988 Method A	µm	150	250	–	–
Thickness – Minimum individual value			120	200	–	–
Water vapour permeance	ASTM E96, Procedure A	ng/Pa·s·m²	–	–	15	7
Water resistance ^d	AATCC TM127, Method B, option 2	–	No visible drops of water		–	–
^a Material at a pressure difference of 75 Pa.						
^b Machine direction.						
^c Transverse direction.						
^d Hydrostatic head test.						

8 Testing

8.1 Sampling

The sample shall consist of a single roll of material. The roll shall be randomly chosen from a production lot with enough material selected to complete all the testing.

8.2 Specimens

Remove a minimum of three outer turns of the roll before cutting the test specimens. The specimens shall be cut at least 100 mm from the edge or end of the roll.

8.3 Conditioning

Unless otherwise specified in the test procedure, specimens shall be conditioned at $23 \pm 2\text{ }^{\circ}\text{C}$ and $50 \pm 10\%$ RH for 24 h.

9 Test methods

9.1 Air leakage rate – material

The air leakage rate of the material shall be determined in accordance with ASTM E2178.

The results shall be reported as the average of the five specimens and shall not be greater than $0.02\text{ L}/\text{s}\cdot\text{m}^2$ reported at a pressure difference of 75 Pa.

9.2 Impact strength

The impact strength of the material shall be determined in accordance with ASTM D1709, method A for type 1 material and ASTM D1709, method B for type 2 material.

The results shall be reported as the average of the three specimens and shall not be less than 300 g for type 1 material and 500 g for type 2 material.

9.3 Outdoor weathering resistance and retained tensile elongation

The material shall be properly stabilized against ultraviolet light degradation. The material shall be exposed to 750 kJ/m² total irradiance at 340 nm in a xenon arc type weathering instrument in accordance with ASTM G155, cycle 1. After weathering, the tensile elongation of the material shall be measured in accordance with ASTM D882.

The results shall be reported as the percentage retained tensile elongation of the weathered specimen compared to the results reported for un-weathered specimen. The results shall not be less than 50% retention of the tensile elongation value.

9.4 Oxidative induction time

The oxidative induction time measured on the sheet, in accordance with ASTM D3895, shall not be less than 30 min at a test temperature of 190 °C.

9.5 Tensile elongation

The tensile elongation of the material shall be determined in accordance with ASTM D882.

The results shall be reported as the average of the five specimens and shall not be less than 225% in the machine direction and 350% in the traverse direction.

9.6 Tensile strength

The tensile strength of the material shall be determined in accordance with ASTM D882.

The results shall be reported as the average of the five specimens and shall not be less than 12 MPa in the machine direction and 10 MPa in the traverse direction.

9.7 Thickness

The thickness of the material shall be measured in accordance with ASTM D6988, method A.

The results shall be reported as the average thickness of 5 readings along the width of the material and the minimum value of all individual tests. The average thickness of type 1 material shall be at least 150 µm and any individual value shall be at least 120 µm. The average thickness of type 2 material shall be at least 250 µm and any individual value shall be at least 200 µm.

9.8 Water vapour permeance

The water vapour permeance shall be determined in accordance with ASTM E96, procedure A.

The results shall be reported as the average of the five specimens and shall not be greater than 15 ng/Pa·s·m² for type 1 material and not greater than 7 ng/Pa·s·m² for type 2 material.

9.9 Water resistance – Hydrostatic head test

The water resistance of the material shall be determined in accordance with AATCC TM127, method B, option 2, using three specimens with a constant hydrostatic head of 55 cm for a period of 5 hours.

The results shall indicate no visible drops of water.

10 Packaging, packing, labelling and marking


10.1 General

Unless otherwise specified within this section, packaging, packing, labelling and marking shall be in accordance with normal commercial practice and regulations.

10.2 Marking of sheet

10.2.1 Required information

The sheet shall be clearly identified at least every metre, measured from the centre of one marking to the centre of the next marking and along the length of the roll, with a printed message. The message shall contain the following information (as a minimum):

- a) manufacturer's name, trademark or tradename, and lot number;
- b) certification mark and manufacturer's listing number (if applicable) (shall be bilingual if there are words);
- c) National Standard of Canada designation: "CAN/CGSB-51.34";
- d) sheet type and nominal thickness in metric μm units: "Polyethylene film type 1 - 150 μm (6 mil) thickness" or "Polyethylene film type 2 - 250 μm (10 mil) thickness"; and
- e) resin identification code:  (or other style resin identification code logo, warning label shall be bilingual if there are words).

Note: Individual layout may vary based on the manufacturer and is deemed acceptable upon meeting the requirements in 10.2.1. Further details and information by the manufacturer are permitted, such as the additional use of imperial units.

10.2.2 Marking colour

Sheet markings shall be printed using a colour that facilitates readability.


10.3 Packaging

Packaging shall protect the rolls from damage including puncturing and ultra-violet radiation during shipping and storage. The material shall be supplied in normal commercial rolls that are restrained to prevent unwinding.

10.4 Package, packing and labelling

Each roll of polyethylene material shall be packaged and labelled to contain the following information (as a minimum):

- a) manufacturer's name, trademark or tradename, and lot number;
- b) certification mark and manufacturer's listing number (if applicable) (shall be bilingual if there are words);
- c) National Standard of Canada designation: "CAN/CGSB-51.34";
- d) sheet type and nominal thickness in metric μm units (imperial may be displayed after, in brackets): "Polyethylene film type 1 - 150 μm (6 mil) thickness" or "Polyethylene film type 2 - 250 μm (10 mil) thickness";
- e) roll length and width in metric units, (imperial units may be displayed after, in brackets);

- f) resin identification code:  (or other style resin identification code logo, but shall be bilingual if there are words); and
- g) warning statement: “**Keep out of sunlight**” « **Tenir à l’écart des rayons du soleil** » (warning label shall be bilingual).

Note: Individual layout may vary based on the manufacturer and is deemed acceptable upon meeting the requirements in 10.4. Further details and information by the manufacturer are permitted, such as the additional use of imperial units.

Annex A

(informative)

Special considerations

A.1 Environmental, health and safety

A.1.1 Recycled, recovered, and/or environmentally preferable materials

Recycled, recovered, and/or environmentally preferable materials should be used to the maximum extent possible, provided that the materials meet resin and detailed requirements. Exceeding detailed requirements to promote economically advantageous life cycle costs.

A.1.2 Manufacturing processes

Manufacturing processes with minimal environmental impact are encouraged.

A.1.3 Materials and manufacturing methods

The use of environmentally preferable materials and manufacturing methods applies to the items covered by this specification as well as to any of the packaging and shipping materials and methods required for delivery.

Note: Packaging should be designed, and packaging materials selected to minimize waste and environmental impact, both during transport to and recovery from the consumer. The reuse of packaging or the use of recycled or recyclable components should be incorporated where recycling facilities exist. Where possible, any plastic components in the packaging should be identified with a composition code to facilitate recycling.

Bibliography

- [1] ASTM International. ASTM D1505 — *Standard Test Method for Density of Plastics by the Density-Gradient Technique*.