

November 17, 2023

TO: PARTIES INTERESTED IN BENTONITE CLAY BELOW-GRADE DAMPPROOFING AND/OR WATERPROOFING SHEET MEMBRANES

SUBJECT: Proposed Acceptance Criteria for Bentonite Clay Below-Grade Dampproofing and/or Waterproofing Sheet Membranes (AC561), Subject AC561-0224-R1 (YM, VC)

Hearing Information:

WebEx Event Meeting Wednesday, February 21, 2024 8:00 am Pacific Standard Time Click the date above to register

Dear Colleague:

You are invited to comment on a proposed new acceptance criteria, AC561, which will be discussed at the Evaluation Committee hearing noted above. The criteria includes requirements for the evaluation of sheet membranes of bentonite clay encapsulated between two needle-punched geotextile layers for use in dampproofing and waterproofing in accordance with IBC Section 1805 and IRC Section R406. The criteria also includes requirements for evaluation of waterproofing products in shotcrete applications as described in Section 3.3 of the proposed criteria. The proponent of this criteria is AVM Industries.

The requirements listed in Table 1 of the proposed criteria are based on requirements developed by the City of Los Angeles Department of Building and Safety. Some of the requirements are also consistent with the ICC-ES Acceptance Criteria for Self-Adhered, Thermoplastic, Below-Grade, Dampproofing and Waterproofing Sheet Membranes (AC527).

You are invited to submit written comments on this or any other agenda item and attend the Evaluation Committee hearing to support your written comments in person. If you wish to contribute to the discussion, please note the following:

- 1. Regarding written comments and presentations:
 - a. You should submit these via e-mail to <u>es@icc-es.org</u> by the applicable due date.
 - b. The deadline for submitting written comments is <u>December 14, 2023.</u> These comments will be forwarded to the committee and posted on the ICC-ES web site shortly after the deadline. Comments that are not submitted by this deadline will not be considered at the meeting.

- c. The deadline for submitting rebuttal comments, from the proponent noted in this letter, is <u>January 10, 2024</u>. These comments will be forwarded to the committee and posted on the ICC-ES web site shortly after the deadline. Comments that are not submitted by the deadline will not be considered at the meeting.
- d. The deadline for submitting a presentation is <u>January 24, 2024.</u> If a company wants to present a visual presentation at the hearing, it shall be received in PowerPoint format. These will be forwarded to the committee and posted on the ICC-ES web site approximately two weeks before the hearing. Presentations that are not submitted by the deadline cannot be presented at the meeting. **Note:** Videos will not be posted on the web site.
- e. ICC-ES staff memo addressing public comments, rebuttal comments, and presentations (as deemed necessary) will be posted to the ICC-ES web site on <u>February 7, 2024</u>.
- 2. Keep in mind that all materials submitted for committee consideration are part of the public record and will not be treated as confidential. It is the presenter's responsibility to certify to ICC-ES staff that no materials infringe copyright.
- 3. Please do not communicate with committee members before the meeting about any items on the agenda.

We appreciate your interest in the work of the Evaluation Committee. If you have any questions, please contact me at (800) 423-6587, extension 3691, or Vincent Chui, S.E., Regional Vice President of Engineering, at extension 3244. You may also reach us by e-mail at <u>es@icc-es.org</u>.

Yours very truly,

Ýamil Moya, P.E. Senior Staff Engineer

YM/ls

Encl.

cc: Evaluation Committee



ICC EVALUATION SERVICE, LLC, RULES OF PROCEDURE FOR THE EVALUATION COMMITTEE

1.0 PURPOSE

The purpose of the Evaluation Committee is to review and approve acceptance criteria on which evaluation reports may be based.

2.0 MEMBERSHIP

2.1 The Evaluation Committee has a membership of not fewer than nine, with one of the members named by the ICC-ES president each year to serve as the chairman-moderator.

2.2 All members of the committee shall be representatives of a body enforcing regulations related to the built environment.

2.3 Persons are appointed to the committee by the ICC-ES president, from among individuals who have formally applied for membership.

2.4 The ICC-ES Board of Managers, using simple majority vote, shall ratify the nominations of the president.

2.5 Committee membership is for one year, coinciding with the calendar year. Members may be renominated and reappointed.

2.6 In the event that a member is unable to attend a committee meeting or complete a term on the committee, the ICC-ES president may appoint a replacement to fill in at the meeting or for the remainder of the member's term. Any replacement appointed for only one meeting must have prior experience as a member of the Evaluation Committee. Appointments under this section (Section 2.6) are subject to ratification as noted in Section 2.4.

3.0 MEETINGS

3.1 The Evaluation Committee shall schedule meetings that are open to the public in discharging its duties under Section 1.0, subject to Section 3.0.

3.2 All scheduled meetings shall be publicly announced. There shall be three to six meetings per year (as necessary).

3.3 More than half of the Evaluation Committee members, counting the chairman, shall constitute a quorum. A majority vote of members present is required on any action. To avoid any tie vote, the chairman may choose to exercise or not exercise, as necessary, his or her right to vote.

3.4 In the absence of the chairman-moderator, Evaluation Committee members present shall elect an alternate chairman from the committee for that meeting. The alternate chairman shall be counted as a voting committee member for purposes of maintaining a committee quorum and to cast a tie-breaking vote of the committee.

3.5 Minutes shall be kept and shall be the official record of each meeting.

3.6 An electronic record of meetings may be made by ICC-ES if deemed necessary; no other audio, video, electronic recordings of the meetings will be permitted. Visual aids (including, but not limited to, charts, slides, videos, or presentation software) viewed at meetings shall be permitted only if the presenter provides ICC-ES before the presentation with a copy of the visual aid in a medium which can be retained by ICC-ES with its record of the meeting and which can also be provided to interested parties requesting a copy.

3.7 Parties interested in the deliberations of the committee should refrain from communicating, whether in writing or verbally, with committee members regarding agenda items. All written communications and submissions regarding agenda items must be delivered to ICC-ES and shall be considered nonconfidential and available for discussion in open session of an Evaluation Committee meeting. Such materials will be posted on the ICC-ES web site (www.icc-es.org) prior to the meeting. Comments and submissions not meeting the following deadlines will not be considered at the meeting:

- Initial comments on agenda items shall be submitted at least 28 days before the scheduled meeting.
- A rebuttal comment period shall follow, whereby rebuttal comments to the initial comments may be submitted by the proponent at least 21 days before the scheduled meeting.
- Those planning on giving a visual presentation at the meeting must submit their presentation, in PowerPoint format only, at least 10 days before the scheduled meeting.

The committee reserves the right to refuse recognition of communications which do not comply with the provisions of this section.

4.0 CLOSED SESSIONS

Evaluation Committee meetings shall be open except that at the discretion of the chairman, staff counsel may be necessary. Also, matters related to clients or potential clients covered by confidentiality requirements of ICC-ES Rules of Procedure for Evaluation Reports are discussed only during closed meetings.

5.0 ACCEPTANCE CRITERIA

5.1 Acceptance criteria are established by the committee to provide a basis for issuing ICC-ES evaluation reports on products and systems under codes referenced in Section 2.0 of the Rules of Procedure for Evaluation Reports. They also clarify conditions of acceptance for products and systems specifically regulated by the codes.

Acceptance criteria may involve a product, material, or method of construction. Consideration of any acceptance criteria must be in conjunction with a current and valid application for an ICC-ES evaluation report, an existing ICC-ES evaluation report, or as otherwise determined by the ICC-ES President.

EXCEPTIONS: The following acceptance criteria are controlled by the ICC-ES executive staff and are not subject to committee approval:

• The Acceptance Criteria for Quality Documentation (AC10)

The Acceptance Criteria for Test Reports (AC85)

• The Acceptance Criteria for Inspections and Inspection Agencies (AC304)

5.2 Procedure:

5.2.1 Proposed acceptance criteria shall be developed by the ICC-ES staff and discussed in open session with the Evaluation Committee during a scheduled meeting, except as permitted in Section 4.0 of these rules.

5.2.2 Proposed acceptance criteria shall be available to interested parties at least 30 days before discussion at the committee meeting.

5.2.3 The committee shall be informed of all pertinent written communications received by ICC-ES.

5.2.4 Attendees at Evaluation Committee meetings shall have the opportunity to speak on acceptance criteria listed on the meeting agenda, to provide information to committee members. In the interest of fairness, each speaker requesting to testify on a proposed acceptance criteria or proposed changes to an existing acceptance criteria will be given the same amount of time, as follows:

- a. A 10-minute time limit applies to speakers giving their first testimony on any item, which applies to both verbal testimony and/or visual presentations.
- b. A 5-minute time limit applies to speakers returning to the microphone to offer additional testimony and/or to rebut testimony given by others.
- c. A 2-minute time limit applies to speakers offering testimony on the staff recommendation to criteria.

Should a company have multiple speakers, the speaker time limits above apply the company, in that multiple speakers from the same company shall share the testimony time, i.e., multiple speakers from the same company shall not each get their own testimony times. Time limits do not include time needed to answer questions from the staff and/or committee members. The chairman–moderator shall have limited authority to modify time limitations on testimony. The chairman–moderator shall also have the authority to adjust time limits as necessary in order to get through the hearing agenda.

An automatic timing device shall keep time for testimony and shall provide the time remaining to the speaker testifying. Interruptions during testimony will not be tolerated. It is the responsibility of the chairman–moderator to maintain decorum and order during all testimony.

5.3 Approval of any action on an acceptance criteria shall be as specified in Section 3.3 of these rules. Possible actions made by the Evaluation Committee include: Approval; Approval with Revisions; Disapproval; or Further

Study. The Evaluation Committee must give the reason(s) for any Disapproval or Further Study actions with specific recommendations.

5.4 Actions of the Evaluation Committee may be appealed in accordance with the ICC-ES Rules of Procedure for Appeal of Acceptance Criteria or the ICC-ES Rules of Procedure for Appeals of Evaluation Committee Technical Decisions.

6.0 COMMITTEE BALLOTING FOR ACCEPTANCE CRITERIA

6.1 Acceptance criteria may be revised without a public hearing following a 30-day public comment period and a majority vote for approval by the Evaluation Committee (i.e., alternative criteria development process), when at the discretion of the ICC-ES executive staff, the subject is a revision that requires formal action by the Evaluation Committee.

6.2 Negative votes must be based upon one or more of the following, for the ballots to be considered valid and require resolution:

- a. Lack of clarity: There is insufficient explanation of the scope of the acceptance criteria or insufficient description of the intended use of the product or system; or the acceptance criteria is so unclear as to be unacceptable. (The areas where greater clarity is required must be specifically identified.)
- b. *Insufficiency*: The criteria is insufficient for proper evaluation of the product or system. (The provisions of the criteria that are in question must be specifically identified.)
- c. The subject of the acceptance criteria is not within the scope of the applicable codes: A report issued by ICC-ES is intended to provide a basis for approval under the codes. If the subject of the acceptance criteria is not regulated by the codes, there is no basis for issuing a report, or a criteria. (Specifics must be provided concerning the inapplicability of the code.)
- d. The subject of the acceptance criteria needs to be discussed in public hearings. The committee member requests additional input from other committee members, staff or industry.

6.3 An Evaluation Committee member, in voting on an acceptance criteria, may only cast the following ballots:

- Approved
- Approved with Comments
- Negative: Do Not Proceed

7.0 COMMITTEE COMMUNICATION

Direct communication between committee members, and between committee members and an applicant or concerned party, with regard to the processing of a particular acceptance criteria or evaluation report, shall take place only in a public hearing of the Evaluation Committee. Accordingly:

7.1 Committee members receiving an electronic ballot should respond only to the sender (ICC-ES staff). Committee members who wish to discuss a particular matter with other committee members, before reaching a

decision, should ballot accordingly and bring the matter to the attention of ICC-ES staff, so the issue can be placed on the agenda of a future committee meeting.

7.2 Committee members who are contacted by an applicant or concerned party on a particular matter that will be brought to the committee will refrain from private communication and will encourage the applicant or concerned party to forward their concerns through the ICC-

ES staff in writing, and/or make their concerns known by addressing the committee at a public hearing, so that their concerns can receive the attention of all committee members.■

Revised November 2023



PROPOSED ACCEPTANCE CRITERIA FOR BENTONITE CLAY BELOW-GRADE, DAMPPROOFING AND/OR WATERPROOFING SHEET MEMBRANES

AC561

Proposed February 2024

PREFACE

Evaluation reports issued by ICC Evaluation Service, LLC (ICC-ES), are based upon performance features of the International family of codes. (Some reports may also reference older code families such as the BOCA National Codes, the Standard Codes, and the Uniform Codes, or other codes as designated by the ICC-ES president.) Section 104.11 of the *International Building Code*[®] reads as follows:

The provisions of this code are not intended to prevent the installation of any materials or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

ICC-ES may consider alternate criteria for report approval, provided the report applicant submits data demonstrating that the alternate criteria are at least equivalent to the criteria set forth in this document, and otherwise demonstrate compliance with the performance features of the codes. ICC-ES retains the right to refuse to issue or renew any evaluation report, if the applicable product, material, or method of construction is such that either unusual care with its installation or use must be exercised for satisfactory performance, or if malfunctioning is apt to cause injury or unreasonable damage.

Acceptance criteria are developed for use solely by ICC-ES for purposes of issuing ICC-ES evaluation reports

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PROPOSED ACCEPTANCE CRITERIA FOR BENTONITE CLAY BELOW-GRADE, DAMPPROOFING AND/OR WATERPROOFING SHEET MEMBRANES (AC561)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for bentonite clay below-grade, dampproofing and/or waterproofing sheet membranes to be evaluated in an ICC Evaluation Service, LLC (ICC-ES), evaluation report under the 2021, 2018 and 2015 *International Building Code*[®] (IBC) and the 2021, 2018 and 2015 *International Residential Code*[®] (IRC). Bases of evaluation is IBC Section 104.11 and IRC Section R104.11.

1.2 Scope: This acceptance criteria is limited to belowgrade dampproofing and/or waterproofing sheet membranes consisting of a layer of bentonite clay encapsulated between two needle-punched geotextile layers. The membranes are used in below-grade vertical and horizontal dampproofing and/or waterproofing applications in accordance with IBC Sections 1805.2 and 1805.3 and IRC Sections R406.1 and R406.2. The minimum mass of bentonite per unit area of the membrane shall be 0.76 psf (3700 g/m²) in accordance with GRI-GCL3.

Where evaluation of shotcrete applied over the waterproofing product is sought, compliance with Section 3.3 of this criteria is required.

1.3 Codes and Referenced Standards: Where standards are referenced in this criteria, the standards shall be applied consistent with the requirements of the applicable code.

1.3.1 2024, 2021, 2018 and 2015 *International Building Code*[®] (IBC), International Code Council.

1.3.2 2024, 2021, 2018 and 2015 International Residential Code[®] (IRC), International Code Council.

1.3.3 ASTM D412-16(2021), Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension, ASTM International.

1.3.4 ASTM D751-19, Standard Test Method for Coated Fabrics, ASTM International.

1.3.5 ASTM D903-98(2017), Standard Test Method for Peel or Stripping Strength of Adhesive Bonds, ASTM International.

1.3.6 ASTM D2523-13(2019)e1, Standard Practice for Testing Load-Strain Properties of Roofing Membranes, ASTM International.

1.3.7 ASTM D5084-16a, Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter, ASTM International.

1.3.8 ASTM E154-08a(2019), Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover, ASTM International.

1.3.9 GRI-GCL3 (November 21, 2019), Test Methods, Required Properties and Testing Frequencies of Geosynthetic Clay Liners, Geosynthetic Institute.

1.4 Definitions:

1.4.1 Dampproofing: Treatment of a surface or structure located below grade to resist the passage of water vapor and restrict the flow of water in liquid form under conditions of no hydrostatic pressure.

1.4.2 Waterproofing: Treatment of a surface or structure located below grade to resist the passage of water in vapor or liquid form under conditions of hydrostatic pressure.

1.4.3 Hydrostatic Pressure: Pressure exerted by water at rest.

1.4.4 Substrate: The material onto which the dampproofing/waterproofing material is applied.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description:

A complete description of the dampproofing/waterproofing membrane, including its properties, fasteners, sealants, and other specialty items required for various types of installations proposed.

2.1.2 Installation Instructions: The installation instructions shall include the following:

1) Method of attachment of wall dampproofing/waterproofing material to specific substrates, including overlap, fasteners, sealant application, and handling. Application procedures shall be specific as to the substrates on which evaluation is sought. Conditions necessary for proper application shall be included, such as ambient temperature, age of substrate, substrate temperature, site condition (wet or muddy) and the material temperature.

2) Substrate preparation, including removal of deleterious materials that may affect performance and treatment of excessively rough areas.

3) Maximum spacing, method of installation and other information on expansion and control joints.

4) Details and instructions for termination/flashing of dampproofing/waterproofing system.

5) Installation details and limitations, including type, location and installation procedures for all flashing, counterflashing, caulking and other special treatments.

6) Conditions necessary for proper application of protective barriers, if applicable.

7) Storage and handling procedures, including precautions to prevent damage to product.

2.1.3 Packaging and Identification: Product identification shall be in accordance with the product identification provisions of the ICC-ES Rules of Procedure for Evaluation Reports. A description of the method of

PROPOSED ACCEPTANCE CRITERIA FOR BENTONITE CLAY BELOW-GRADE, DAMPPROOFING AND/OR WATERPROOFING SHEET MEMBRANES (AC561)

packaging and field identification of the dampproofing/waterproofing membrane shall be submitted to ICC-ES. The ICC-ES mark of conformity, electronic labeling, and/or the evaluation report number (ICC-ES ESR-XXXX) along with the name, registered trademark, or registered logo of the report holder [and/or listee] must be included in the product label.

2.2 Testing Laboratories: Testing laboratories shall comply with Section 2.0 of the ICC-ES Acceptance Criteria for Test Reports (AC85) and Section 4.2 of the ICC-ES Rules of Procedure for Evaluation Reports.

2.3 Test Reports: Test reports shall comply with AC85. Test reports shall include test specimen description, details of the test method, manner of testing, test results, calculated results, and photographs, when necessary. The test reports shall also include information required by the applicable ASTM standard of this acceptance criteria.

2.4 Product Sampling: Sampling of the dampproofing/waterproofing membrane for tests under this criteria shall comply with Section 3.2 of AC85. Witnessing of the assembly of the test specimens shall comply with Section 3.3 of AC85.

2.5 Qualification Test Plan: A qualification test plan shall be submitted to and approved by ICC-ES staff prior to any testing being conducted.

3.0 TEST AND PERFORMANCE REQUIREMENTS

3.1 General: The bentonite clay dampproofing/ waterproofing membrane shall comply with the properties and test methods indicated in Table 1 of this acceptance criteria. Testing of the membrane shall be done for each substrate material type for which evaluation is sought. Soil conditioning of test specimens shall be in accordance with Section 3.2.

3.2 Preparation of Test Specimens (Soil Conditioning): Test specimens for the resistance of decay testing to dampproofing and waterproofing products, shall be prepared as follows: The soil is prepared in accordance with the applicable portions of Section 13 of ASTM E154. Three specimens for each test are buried in the soil and incubated in accordance with Section 13.5. The incubation period is determined in accordance with Section 13.6. After the conditioning period, the specimens are removed from the soil and washed clean of all soil prior to testing.

3.3 Waterproofing Products in Shotcrete Applications (Optional): Where evaluation of waterproofing products installed over lagging (lumber or plywood), drainboard or insulation boards, in which shotcrete is applied over the waterproofing product, hydrostatic pressure tests on specimens fabricated under this section must be conducted.

3.3.1 Test Specimens: Wall assemblies including the lagging, drainboard or insulation board must be fabricated followed by the application of the waterproofing product. A minimum of three replicate wall assemblies shall be fabricated for each installation method. The following steps must be considered when fabricating test specimens:

1) If the waterproofing product will be used without the drainage board installed between the lagging and the waterproofing product, then the wall assemblies must have nail heads protruding ¼-inch (6.4 mm) from the surface of the lagging.

2) Shotcrete applied over the wall assemblies must use a coarse aggregate of ³/₄-inch (19 mm) diameter with-minimum 6000 psi (41 MPa) shotcrete strength and must be applied by an ACI certified nozzle-man.

3) A 6 mil thick polyethylene sheet must be applied on the waterproofing membrane surface prior to shotcrete application and to allow core sampling.

4) Shotcrete must be applied over critical locations of the wall assemblies. For example, locations with protruding nail heads or locations occurring over seams or away from seams. The location must be agreed upon by the manufacturer and ICC-ES.

3.3.2 Test Requirements: Following application of the shotcrete over the wall assembly, a core sample from each critical location of the wall assembly must be visually inspected for puncture and evaluated for hydrostatic pressure in accordance with the flow box method described in Table 1.

3.3.3 Condition of Acceptance: There shall be no signs of membrane puncture for any of the tested samples. The hydraulic conductivity shall be reported.

4.0 QUALITY CONTROL

4.1 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted for each facility manufacturing or labeling products that are evaluated in this ICC-ES evaluation report.

4.2 A qualifying inspection shall be conducted at each manufacturing facility when required by the ICC-ES Acceptance Criteria for Inspections and Inspection Agencies (AC304).

4.3 Follow-up inspections shall be conducted at each manufacturing facility when required in accordance with AC304.

5.0 EVALUATION REPORT REQUIREMENTS

The evaluation report shall include the basic information required by Section 2.1, including product description, installation procedures and identification information.

The following information shall be included, but not be limited to the following in the evaluation report:

5.1 The maximum hydrostatic pressure from testing for waterproofing membranes.

5.2 Condition of Use: The evaluation report shall include the following as conditions of use:

5.2.1 For evaluation of dampproofing membranes, a subsurface soil investigation of the level of groundwater at the construction site must be performed to verify the nonexistence of hydrostatic pressure.

5.2.2 The design and installation of the foundation drainage system is outside the scope of this report. The foundation drainage system must be installed in accordance with IBC Section 1805.4 or IRC Section R405, as applicable.

5.2.3 The backfill of the foundation must be clean soil free of rocks or any other deleterious materials and placed

PROPOSED ACCEPTANCE CRITERIA FOR BENTONITE CLAY BELOW-GRADE, DAMPPROOFING AND/OR WATERPROOFING SHEET MEMBRANES (AC561)

so as not to damage the foundation or membrane system. For jurisdictions adopting the IBC, the backfill must be placed in lifts and compacted. For jurisdictions adopting the IRC, local backfilling requirements must be followed. The design and construction of the foundation is outside the scope of this report.

5.2.4 A registered design professional shall establish the design hydrostatic pressure from the reported hydrostatic pressure value.

5.2.5 When compliance with Section 3.3 of this criteria is established, the evaluation report should include

a statement indicating that the waterproofing product may be used in shotcrete applications.

6.0 ENVIRONMENTAL PRODUCT DECLARATION (Optional):

Environmental impacts shall be assessed via an Environmental Product Declaration (EPD) based on a Life Cycle Assessment (LCA). The LCA and EPD shall be conducted in accordance with ISO 21930 and the appropriate Product Category Rule(s) for the product type.

PROPERTIES	TEST METHOD	REQUIREMENTS
Required for both dampproofing and waterproofing products		
Tensile Strength and Elongation at 23°C [73°F]	ASTM D412 (Die C) or ASTM D2523	Report tensile strength value
		Minimum 25% Elongation
Puncture resistance	ASTM E154, Section 10	Minimum 80 lbs
Resistance to Soil Decay ¹ - Weight Loss - Hydraulic Conductivity	ASTM E154, Section 13	Maximum 10%
	ASTM D5084	Maximum 10% change following conditioning in accordance with ASTM E154 Section 13
Adhesion Strength	ASTM D903	Minimum 5 lbs
Hydraulic Conductivity	ASTM D5084	Report hydraulic conductivity
Additional requirements for waterproofing products only		
Hydrostatic Pressure Resistance	ASTM D751	Report head of water, feet
Measurement of Hydraulic Properties of Geosynthetic Clay Liners using a Flow Box (Flow Box/Overlap Testing	Hydraulic Conductivity using a Flow Box ³	Report hydraulic conductivity through upper and lower liner material and through overlap per flow box method
Additional requirements for waterproofing products subject to shotcrete applications (optional)		

TABLE 1—TESTING

For SI: 1 inch = 25.4 mm, 1 mil = 0.0254 mm, 1 perm = 5.745 x 10-11 kg/pas*m2

¹Test specimens shall be prepared in accordance with Section 13 of ASTM E154.

²The test temperature is recorded by the manufacturer. The test temperature must be included in the test report and the evaluation report.

³Hydraulic conductivity using a flow box method is described in "Measurement of Hydraulic Properties of Geosynthetic Clay Liners Using a Flow Box" by D.E. Daniel, J. J. Bowers, and R.B. Gilbert published in the Testing and Acceptance Criteria for Geosynthetic Clay Liners- ASTM STP 1308 dated January 1997.