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November 17, 2023

**TO:** **PARTIES INTERESTED IN SOIL-GAS-RETARDER FOR USE IN BELOW GRADE APPLICATIONS**

**SUBJECT:** Proposed Acceptance Criteria for Soil-Gas-Retarder Membrane for Use in Below Grade Applications, Subject AC563-0224-R1 (AI/AM)

**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 proposed new acceptance criteria for the evaluation of soil-gas-retarder membranes for use in below grade applications to mitigate the flow of methane gas into building spaces.

This criteria is a supplement to membranes complying with the ICC-ES Acceptance Criteria for Self-adhered, Thermoplastic, Below-Grade Dampproofing and Waterproofing Sheet Membranes (AC527) or ICC-ES Acceptance Criteria for Cold, Liquid-applied, Below-grade, Exterior Dampproofing and Waterproofing materials (AC29).

The proposed criteria relies upon the provisions of the City of Los Angles Department Building and Safety (LADBS) Department's Methane Barrier Test Criteria (AC-L137).

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 es@icc-es.org by the applicable due date.

   b. The deadline for submitting written comments is **December 14, 2023.** 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 **January 10, 2024**. 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 **January 24, 2024.** 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 **February 7, 2024**.

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 5684, or Anika Meadows. P.E., Manager of Technical Competency, at extension 5232. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,

Alex Collins, E.I.
Evaluation Specialist

AC/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***

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# PROPOSED ACCEPTANCE CRITERIA FOR SOIL-GAS-RETARDER MEMBRANES FOR USE IN BELOW GRADE APPLICATIONS

## AC563

## Proposed November 2023

# 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***

# PROPOSED ACCEPTANCE CRITERIA FOR SOIL-GAS-RETARDER MEMBRANES FOR USE IN BELOW GRADE APPLICATIONS (AC563)

## 1.0 INTRODUCTION

**1.1 Purpose:** The purpose of this acceptance criteria is to establish requirements for soil-gas-retarder membranes for use in below grade applications to be evaluated in an ICC Evaluation Service, LLC (ICC-ES), evaluation report under 2021, 2018, 2015 and 2012 *International Building Code*® (IBC) and the 2021, 2018, 2015 and 2012 *International Residential Code*® (IRC). Bases of evaluation is IBC Sections 104.11 and 202 and IRC Section R104.11.

**1.2 Scope:**

**1.2.1** This acceptance criteria is limited to soil-gas-retarder membranes used to mitigate the flow of methane gas into building spaces.

**1.2.2** This criteria is a supplement to membranes complying with the ICC-ES Acceptance Criteria for Self-adhered, Thermoplastic, Below-Grade, Dampproofing and Waterproofing Sheet Membranes (AC527) or ICC-ES Acceptance Criteria for Cold, Liquid-applied, Below-grade, Exterior Dampproofing and Waterproofing Materials (AC29).

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

**1.3.1** 2021, 2018, 2015 and 2012 *International Building Code*® (IBC), International Code Council.

**1.3.2** 2021, 2018, 2015 and 2012 *International Residential Code*® (IRC), International Code Council.

**1.3.3** ASTM D543-21 Standard Practices for Evaluating the Resistance of Plastics to Chemical Reagents, ASTM International.

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

**1.3.5** ASTM D882-18, Standard Test Method for Tensile Properties of Thin Plastic Sheeting, ASTM International.

**1.3.6** ASTM D1434-82(2015e1), Standard Test Method for Determining Gas Permeability Characteristics of Plastic Film and Sheeting, ASTM International.

**1.3.7** ASTM D1693-21, Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics, ASTM International.

**1.3.8** ASTM D4068-17(2022), Standard Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-Containment Membrane, ASTM International.

## 2.0 BASIC INFORMATION

**2.1 General:** The following information shall be submitted:

**2.1.1 Product Description:**

**2.1.1.1** A complete description of the soil-gas retarder membrane, including its properties, fasteners, sealants and other specialty items required for various types of installations proposed.

**2.1.1.2** Storage and handling procedures, including precautions to prevent damage to product.

**2.1.1.3** Description of soil-gas retarder, as applicable.

**2.1.2 Installation Instructions:** Installation instructions shall be submitted.

**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 packaging and field identification of the soil-gas-retarder 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.

**2.1.4 Field Preparation:** Description of the methods of field storing, bonding seams of the membrane, application and finishing.

**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 standards referenced by this acceptance criteria.

**2.4 Product Sampling:** Sampling of the soil-gas-retarder membranes for tests under this criteria shall comply with Section 3.2 of AC85. Witnessing of the assembly of 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 Physical Properties:** Reports of tests shall be submitted in accordance with the following requirements, which are also summarized in Table 1:

**3.2 Benchmark Tensile Properties:** Unbonded membrane samples (as manufactured) shall be tested in accordance D4068 Section 14.1 for comparison testing.

**3.3 Bond Seam Strength Tests:** Seams shall be bonded using processes and materials per the manufacture's installation instruction. Testing of the membrane shall be done for each method of field installation. The test report shall include additional information to specify the test seam, including the length of the overlap, the rate of dispersion of the bonding agent and curing timed used to produce the test samples. A minimum of 10 specimens shall be tested.

**3.3.1 Unreinforced Material:** When tested in accordance with ASTM D882, specimens shall be 1 inch (25 mm) wide. The grip separation shall be 4 inches (102 mm) in addition to the width of the seam. The seam shall be centered between the clamps and oriented perpendicular to the length of the specimen. The rate of the grip separation shall be 20 inches per minute (508 mm per minute). The rate of grip separation for high density polyethylene sheet membranes shall be 2 inches per minute (51 mm per minute).

**3.3.2 Reinforced Material:** When tested in accordance with the Grab Test method of ASTM D751, specimens shall be 4 inches (102 mm) in width and not less than 9 inches (229 mm) in addition to the width of the seam in length. See Figure 1 for general dimensions of test specimens. Specimens shall be positioned such that the clamps are 3 inches (76 mm) from the closest edge of the seam at the start of the test. The rate of loading shall be at the rate of 12 inches per minute (305 mm per minute).

**3.3.3 Sample Conditioning:** Samples shall be conditioned at 74° ± 4°F (23°±2°C) for a minimum of 24 hours.

**3.3.4 Condition of Acceptance:** Failure shall occur in the membrane and not the bonded overlapping portion (seam) for all test samples tested.

**3.4 Methane Permeability:** When tested in accordance with ASTM D1434, testing shall be performed at a temperature of 74° ± 4°F (23°±2°C). A minimum of 3 specimens shall be tested unless the lower test value varies more than 10% from the highest value. If the lower test value varies more than 10% then two additional samples shall be tested. The average value of the methane gas transmission rate shall be reported.

**3.4.1 Condition of Acceptance:** The barrier shall exhibit an average methane gas transmission rate not exceeding 40.0 ml/day·$m^2$·atm.

**3.5 Microorganism Resistance (Soil Burial):**

**3.5.1** Microorganism Resistance (Soil Burial) shall be tested in accordance with Annex 1 of ASTM D4068, except T-peel specimens are not required.

Soil and microbiological activity shall be prepared in accordance with Section A1.1 of ASTM D4068.

Test specimens used to determine weight change shall be preconditioned per Section A1.3.1 and conditioned per Section A1.3.2. All other test specimens shall be conditioned only in accordance with Section A1.3.2.

All specimens are then buried in the soil in accordance with ASTM D4068 Section A1.4 and then post-conditioned in accordance with ASTM D4068 Section A1.3.3.

**3.5.2 Weight Change**: A set of six 2-inch (50.8 mm) diameter specimens shall be prepared in accordance with Section 3.5.1 and weighed. A set of six unconditioned 2-inch (50.8 mm) diameter specimens shall also be weighed.

- **Condition of Acceptance**: The average value of weight change between each set shall be within 5%.

**3.5.3 Tensile Strength**: Six specimens shall be prepared in accordance with Section 3.5.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of tensile strength shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.5.4 Tensile Stress**: Six specimens shall be prepared in accordance with Section 3.5.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of tensile stress at 100% elongation shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.5.5 Elongation**: Six specimens shall be prepared in accordance with Section 3.5.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of elongation change shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.5.6 Bonded Seam Strength**: Five test specimens prepared and tested per Section 3.3 of this acceptance criteria.

- **Condition of Acceptance**: Seams shall not show failure in the seam areas when tested in accordance with Section 3.3 of this acceptance criteria.

**3.5.7 Methane Permeability**: Three test specimens prepared and test per Section 3.4 of this acceptance criteria.

- **Condition of Acceptance**: Methane Permeability shall neither increase beyond the values obtained from Section 3.4, nor shall they exceed 40.0 ml/day·$m^2$·atm

**3.6 Oil Resistance Test:** Oil Resistance shall be tested in accordance with ASTM D543.

**3.6.1** When tested in accordance with ASTM D543, the test shall be completed for 28 days and at a temperature of 74° ± 4°F (23°±2°C). Standard 30 weight non detergent motor oil shall be used as the reagent.

**3.6.2 Weight Change:** A set of six 3 inch (76.2 mm) in length by 1 inch (25.4 mm) in width by the thickness of the membrane shall be prepared in accordance with Section 3.6.1. A set of six unconditioned 3 inch (76.2 mm) in length by 1 inch (25.4 mm) in width by the thickness of the membrane shall also be weighed.

- **Condition of Acceptance:** The average value of weight change between each set shall be within 10%.

**3.6.3 Tensile Strength**: Six specimens shall be prepared in accordance with Section 3.6.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of tensile strength shall be within 10% of the average values for the benchmark testing

completed in accordance with Section 3.2 of this criteria.

**3.6.4 Tensile Stress**: Six specimens shall be prepared in accordance with Section 3.6.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of tensile stress at 100% elongation shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.6.5 Elongation**: Six specimens shall be prepared in accordance with Section 3.6.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of elongation change shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.6.6 Bonded Seam Strength:** Seams shall not show failure in the seam areas when tested in accordance with Section 3.3 of this acceptance criteria.

- **Condition of Acceptance:** Seams shall not show failure in the seam areas when tested in accordance with Section 3.3 of this acceptance criteria.

**3.7 Heat Aging:**

**3.7.1** Specimens shall be exposed to 158°F ± 4°F (70°±2°C) for 24 hours. After exposure, specimens must be conditioned a minimum of 24 hours at 74° ± 4°F (23°±2°C) and 50 % relative humidity prior to testing.

Liquid-applied membranes shall use specimens representative of the field report method recommended by the manufacturer for the samples.

**3.7.2 Tensile Strength**: Six specimens shall be prepared in accordance with Section 3.7.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of tensile strength shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.7.3 Tensile Stress**: Six specimens shall be prepared in accordance with Section 3.7.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of tensile stress at 100% elongation shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.7.4 Elongation**: Six specimens shall be prepared in accordance with Section 3.7.1 and tested in accordance with Section 14.1 of ASTM D4068.

- **Condition of Acceptance**: The average value of elongation change shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.

**3.7.5 Bonded Seam Strength**: Five test specimens prepared and tested per Section 3.2 of this acceptance criteria.

- **Condition of Acceptance**: Seams shall not show failure in the seam areas when tested in accordance with Section 3.3 of this acceptance criteria.

**3.8 Dead Load Seam Strength:**

**3.8.1 Unreinforced Material:** The specimen shall be 1-inch (25-mm) width of the seam joint and 8-inches (203-mm) for the length. A minimum of 5 specimens shall be tested.

**3.8.2 Reinforced Material:** The specimen shall be 4-inches (102-mm) width of the seam joint and 12-inches (305-mm) for the length. A minimum of 5 specimens shall be tested.

**3.8.3 Procedure:** A clamping mechanism shall grip a 1 inch (25 mm) wide section, while centered above and below the width of the test specimen. The clamps shall not grip any portion of the overlap area of the seam joint. A load equivalent to 50% of the specimen's value for tensile stress at 100% elongation shall be applied at the seam joint. The load shall be maintained for 4 hours at a temperature of 72°± 4°F (22°±2°C). Excessive elongation may require clamp adjustment to maintain consistent loading. When elongation reaches 50% of the original jaw separation, no additional adjustments need to be made. Existing load must be retained for balance of the test results shall be reported by including the designated load. Temperature, time duration of the test, length of the overlap seam and if the test "pass" or "fail". A failure will be determined when the seam joint separates entirely.

**3.8.4 Condition of Acceptance:** All specimens shall withstand stress under load at 72° ± 4°F (22°±2°C) and none of the five samples show failure.

**3.9 Environmental Stress-Cracking:** When tested in accordance with Condition B of ASTM D1693, the final product shall be tested regardless of the thickness. The notch depth shall be as stated in Condition B (0.012 to 0.15) for all sheet thickness. Five specimens shall be cut with the length parallel to the roll direction (MD) and five specimens with the length parallel to the cross roll direction (TD). An aqueous solution containing 10% igepal by volume shall be used.

**Condition of Acceptance:** The barrier shall be acceptable when failure exceeds 500 hours.

**4.0 QUALITY CONTROL**

**4.1** The products shall be manufactured under an approved quality control program with inspections by ICC-ES or by a properly accredited inspection agency that has a contractual relationship with ICC-ES.

**4.2** Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted. 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** Inspections shall be conducted at each manufacturing facility in accordance with AC304.

**5.0 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.
■

**Table 1-Testing**

| Properties | Test Method | Requirements |
|---|---|---|
| Benchmark Tensile Properties | D4068 Section 14.1 (AC563 Section 3.2)<br>▪ Tensile Strength<br>▪ Tensile Stress<br>▪ Elongation | As recorded |
| Bonded Seam Strength | Unreinforced materials: ASTM D882 (AC563 Section 3.3.1) | No failure within the bonded overlapping portion (seam) of the test samples |
| | Reinforced materials: Grab Test method of ASTM D751 (AC563 Section 3.3.2) | |
| Methane Permeability | ASTM D1434 (AC563 Section 3.4) | Max. 40.0 ml/day·m$^2$·atm |
| Microorganism Resistance | Weight Change (conditioned): Annex A of ASTM D4068 (AC563 Section 3.5.2) | Within 5% average value of weight change |
| | Tensile Properties (conditioned): ASTM D4068<br>▪ Tensile Strength (AC563 Section 3.5.3)<br>▪ Tensile Stress (AC563 Section 3.5.4)<br>▪ Elongation (AC563 Section 3.5.5) | ▪ The average value of tensile strength shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.<br>▪ The average value of tensile stress at 100% elongation shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.<br>▪ The average value of elongation change shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria. |
| | Bonded Seam Strength (conditioned)<br>▪ Unreinforced materials: ASTM D882 (AC563 Section 3.3.1)<br>▪ Reinforced materials: Grab Test method of ASTM D751 (AC563 Section 3.3.2) | No failure within the bonded overlapping portion (seam) of the test samples |
| | Methane Permeability (conditioned) (AC563 Section 3.4) | Max. 40.0 ml/day·m$^2$·atm |

**Table 1-Testing (continued)**

| Properties | Test Method | Requirements |
|---|---|---|
| Oil Resistance | Weight Change (conditioned): ASTM D543 (AC563 Section 3.6.2) | Within 10% average value of weight change |
| | Tensile Properties (conditioned): ASTM D4068<br>▪ Tensile Strength (AC563 Section 3.6.3)<br>▪ Tensile Stress (AC563 Section 3.6.4)<br>▪ Elongation (AC563 Section 3.6.5) | ▪ The average value of tensile strength shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.<br>▪ The average value of tensile stress at 100% elongation shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.<br>▪ The average value of elongation change shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria. |
| | Bonded Seam Strength (conditioned)<br>▪ Unreinforced materials: ASTM D882 (AC563 Section 3.3.1)<br>▪ Reinforced materials: Grab Test method of ASTM D751 (AC563 Section 3.3.2) | No failure within the bonded overlapping portion (seam) of the test samples |
| Heat Aging | Tensile Properties (conditioned):<br>▪ Tensile Strength<br>▪ (AC563 Section 3.7.2)<br>▪ Tensile Stress<br>▪ (AC563 Section 3.7.3)<br>▪ Elongation (AC563 Section 3.7.4) | ▪ The average value of tensile strength shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.<br>▪ The average value of tensile stress at 100% elongation shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria.<br>▪ The average value of elongation change shall be within 10% of the average values for the benchmark testing completed in accordance with Section 3.2 of this criteria. |
| | Bonded Seam Strength (conditioned)<br>▪ Unreinforced materials: ASTM D882 (AC563 Section 3.3.1)<br>▪ Reinforced materials: Grab Test method of ASTM D751 (AC563 Section 3.3.2) | No failure within the bonded overlapping portion (seam) of the test samples |
| Dead Load Seam Strength | AC563 Section 3.8 | All specimens withstand stress under load at 72° ± 4°F (22°±2°C) without signs of failure |
| Environmental Stress-Cracking | Condition B of ASTM D1693 AC563 Section 3.9 | Failure exceeds 500 hours for all specimens |

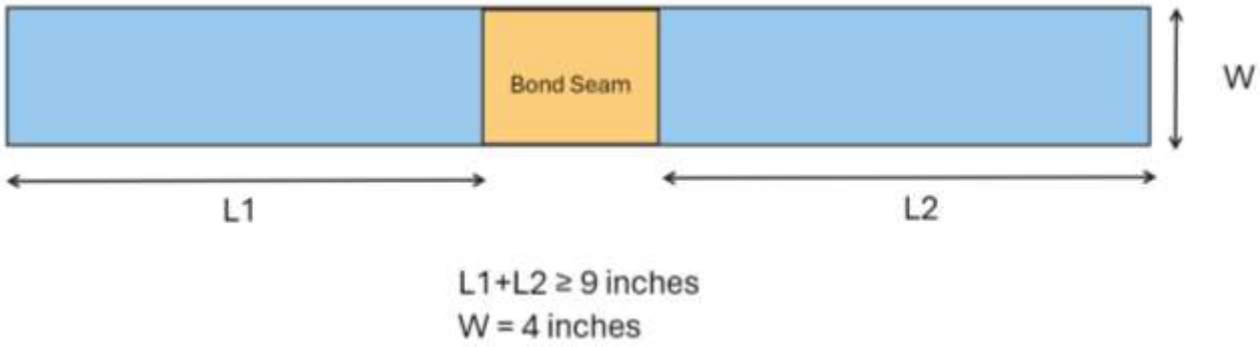


**Figure 1**