

November 17, 2023

TO: PARTIES INTERESTED IN GLASS FAÇADE SYSTEMS CONTAINING PHOTOVOLTAIC (PV) MODULES

SUBJECT: Proposed Acceptance Criteria for Glass Façade Systems Containing Photovoltaic (PV) Modules, Subject AC559-0224-R1(AI/EP)

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 ICC-ES Acceptance Criteria for Glass Façade Systems Containing Photovoltaic (PV) Modules (AC559), which will be discussed at the Evaluation Committee hearing noted above. The proponent is Grenzebach Envelon.

The proposed criteria is being developed to provide requirements for evaluating the capacity of façade systems comprised of laminated glass panels containing PV modules that are adhered to metal brackets, which are used to connect the façade system to an existing substructure. Evaluation of the existing substructure and attachment of the façade system to the existing substructure is outside the scope of this acceptance criteria. Evaluation of the façade systems in an ICC-ES evaluation report are restricted for use to exterior applications for buildings classified as Type V-B (IBC) and dwellings regulated by the IRC.

The proposed criteria relies upon provisions from EAD 090010-00-0404 European Assessment Document for Bonded Glazing Kits and Bonding Sealants and ETAG 002 Guideline for European Technical Approval for Bonded Glazing Kits and Bonding Sealants. The EAD contains provisions for evaluating structural adhesives used to transfer all loads from the glazing, including self-weight, to the supporting structure (noted as Type IV in the EAD document), and the ETAG contains provisions for calculating allowable capacities for the adhesive. The selected provisions from these documents encompass the following performance characteristics of the adhesive:

- Tensile bond strength
- Shear bond strength (including long-term creep performance)
- High and low temperature performance (80°C and -20°C)
- Accelerated aging (combination of UV exposure and water submersion)

- Humidity and NaCl (salt) exposure
- Humidity and SO₂ (Sulfur dioxide) exposure
- Exposure to cleaning agents
- Physical properties including:
 - o Gas inclusions
 - o Elastic recovery
 - o Shrinkage
 - o UV resistance
 - o Elastic modulus

The structural adhesive properties determined as described above are then used in combination with established glass standards (ASTM E1300 and / or AAMA CW 12-84) to determine the allowable capacities of the system based on allowable stresses within the glass and the capacity of the adhesive. Full-scale testing is then performed on the system in accordance with ASTM E330 to confirm the design methodology.

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:

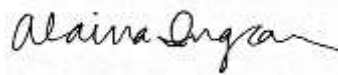
1. Regarding written comments and presentations:

- 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 5682, or Eric Polzin, P.E., Senior Staff Engineer and Manager of Environmental Programs, at extension 5270. You may also reach us by e-mail at es@icc-es.org.

Yours very truly,

A handwritten signature in black ink that reads "Alaina Ingram". The signature is fluid and cursive, with a long horizontal flourish extending to the right.

Alaina Ingram, E.I.
Evaluation Specialist

AI/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

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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 GLASS FAÇADE SYSTEMS CONTAINING PHOTOVOLTAIC (PV) MODULES

AC559

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

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PROPOSED ACCEPTANCE CRITERIA FOR GLASS FAÇADE SYSTEMS CONTAINING PHOTOVOLTAIC (PV) MODULES (AC559)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for glass façade systems containing photovoltaic (PV) modules to be evaluated in an ICC Evaluation Service, LLC (ICC-ES), evaluation report under the 2021 and 2018 *International Building Code*® (IBC) and the 2021 and 2018 *International Residential Code*® (IRC). Bases of evaluation are IBC Section 104.11 and IRC Section R104.11. The reason for the development of this criteria is that the codes do not provide guidance for glass PV façade systems.

1.2 Scope: This criteria covers exterior glass PV façade systems consisting of laminated glass panels with PV modules laminated between interlayer sheets. Metal brackets are factory-adhered to the interior side of the glass panel, and the system is connected to the existing substructure through the metal brackets using mechanical fasteners. The façade systems are installed 15 degrees or less from vertical in accordance with IBC Section 2404.1. Evaluation of the existing substructure and attachment of the façade system to the existing substructure is outside the scope of this acceptance criteria. Evaluation of the façade systems in an ICC-ES evaluation report shall be restricted for use to exterior applications for buildings classified as Type V-B (IBC) and dwellings regulated by the IRC.

1.3 Codes and Referenced Standards:

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

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

1.3.3 AAMA "Conform Wall Glass" CW-12-84, "Structural Properties of Glass," dated 1984 (reprinted 6/06), American Architectural Manufacturers Association.

1.3.4 ASTM E330-14(2021), Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference, ASTM International.

1.3.5 ASTM E1300-2016, Standard Practice for Determining Load Resistance of Glass in Buildings, ASTM International.

1.3.6 EAD 090010-00-0404 (September 2018), European Assessment Document for Bonded glazing kits and bonding sealants, European Organisation for Technical Approvals (EOTA).

1.3.7 ETAG 002 (May 2012), Guideline for European Technical Approval for Structural Sealant Glazing Kits (SSGK), European Organisation for Technical Approvals (EOTA).

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information concerning material specification, thickness, size and the manufacturing process of all components in the façade systems.

2.1.2 Installation Instructions: Published installation instructions noting installation requirements and/or limitations.

2.1.3 Packaging and Identification: Product identification shall be in accordance with the ICC-ES Rules of Procedure for Evaluation Reports. A description of the method of packaging and field identification of the façade systems 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. Marking on the glass shall comply with the safety glazing requirements of Section 2406.3 of the IBC.

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.

2.4 Product Sampling: Sampling of the PV façade systems for tests under this criteria shall comply with Sections 3.2 and 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 COMPONENT MATERIAL PROPERTIES

3.1 Adhesive:

3.1.1 Tensile Strength: The adhesive shall be tested in accordance with Sections 2.2.14.3.2, 2.2.14.4, 2.2.15.1.6 and 2.2.15.1.7 of EAD 090010-00-0404, in accordance with Table 1, at the thinnest adhesive thickness to be evaluated. Materials used during testing shall be representative of the manufactured system components. The allowable tensile strength shall be determined in accordance with Annex 2 of ETAG 002.

Note: Testing in accordance with EAD 090010-00-0404 Section 2.2.15.1.7 (Effects of Materials in Contact) shall only include method A (without UV).

Conditions of Acceptance: The adhesive shall meet the requirements set forth in Table 1.

3.1.2 Shear Strength: The adhesive shall be tested in accordance with Section 2.2.14.3.3 of EAD 090010-00-0404, in accordance with Table 1, at the thinnest adhesive thickness to be evaluated. Tests shall be conducted before and after conditioning in accordance with Section 3.1.2.1. Materials used during testing shall be representative of the manufactured system components. The allowable shear strength (short term) shall be determined in accordance with Annex 2 of ETAG 002.

Note: Testing in accordance with EAD 090010-00-0404 Section 2.2.15.1.7 (Effects of Materials in Contact) shall only include method A (without UV).

3.1.2.1 Conditioning: The specimens shall be conditioned in accordance with Sections 2.2.14.3.3, 2.2.14.4, 2.2.15.1.6 and 2.2.15.1.7 of EAD 090010-00-0404.

PROPOSED ACCEPTANCE CRITERIA FOR GLASS FAÇADE SYSTEMS CONTAINING PHOTOVOLTAIC (PV) MODULES (AC559)

3.1.2.2 Conditions of Acceptance: The adhesive shall meet the initial mechanical strength requirements set forth in Table 1.

3.1.3 Effects of Materials in Contact with Ultraviolet (UV) Exposure (Peel Test): Testing shall be in accordance with EAD 090010-00-0404 Section 2.2.15.1.7 method B (with UV). Materials used during testing shall be representative of the manufactured system components.

Conditions of Acceptance: The adhesive shall meet the requirements set forth in Section 2.2.15.1.7.2 of EAD 090010-00-0404 for method B (with UV).

3.1.4 Physical Properties: The adhesive shall be tested in accordance with Sections 2.2.15.1.1 through 2.2.15.1.5 and 2.2.15.1.8 through 2.2.15.1.10 of EAD 090010-00-0404, in accordance with Table 1, at the thinnest adhesive thickness to be evaluated. Materials used during testing shall be representative of the manufactured system components. The allowable long-term (creep) strength shall be determined in accordance with Annex 2 of ETAG 002.

Conditions of Acceptance: The adhesive shall meet the requirements set forth in Table 1.

3.2 Glass Analysis: Glass shall be designed to resist wind loads in accordance with Sections 1609 and 2404.1 of the IBC. AAMA CW-12-84 and ASTM E1300 shall be used as a guideline in the engineered analysis and design. The analysis shall include verification that the glass has been designed to resist the design loads specified in this section when the allowable edge and surface stresses set forth in ASTM E1300 are applied. Composite action between glass lites, the interlayer(s) and the PV components shall not be considered; design shall be based on the thickness of the single lite of glass in contact with the adhered supports.

4.0 USE AS A FAÇADE

For each system configuration (i.e., number of brackets, bracket spacing and edge distance, glass lite dimensions, etc.) three specimens shall be tested in accordance with the procedures of ASTM E330 for uniform positive and negative wind loads. System support and mounting shall be representative of field installation, and materials used during testing shall be representative of the manufactured system components. The ultimate positive and negative wind loads shall be reported.

The allowable wind loads shall be the average ultimate positive and negative loads divided by a safety factor of 2.5 if all of the following are satisfied:

1. No single test result varies by more than 15 percent from the average of three tests. Otherwise, the lowest individual test result shall be used in lieu of the average ultimate load.

2. Allowable wind load does not exceed the allowable tensile capacity for the adhesive as established in Section 3.1.1 of this criteria.
3. The weight of the system does not exceed the allowable long term creep shear capacity as established in Section 3.1.4 of this criteria (Section 2.2.15.1.10 of EAD 090010-00-0404).

5.0 QUALITY CONTROL

5.1 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.

5.2 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).

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

6.0 EVALUATION REPORT

6.1 The evaluation report shall include the following:

6.1.1 Allowable wind load capacities of the façade system.

6.1.2 Recognition of maximum and minimum façade sizes based on testing in accordance with Section 4.0 of this criteria.

6.1.3 A statement indicating that a water-resistive barrier must be installed behind the exterior wall cladding.

6.1.4 A statement indicating that installation of the façade system must be done by installers approved by the evaluation report holder.

6.1.5 The following conditions of use:

6.1.5.1 Evaluation of the existing substructure is outside the scope of the report.

6.1.5.2 Attachment of the PV façade system to the existing substructure must be designed by a registered design professional and is outside the scope of the report.

6.1.5.3 The panels shall meet the requirements set forth for photovoltaic panels in Section 3111.3 of the IBC or Section R324.3 of the IRC, as applicable.

7.0 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: CONDITIONS OF ACCEPTANCE FOR ADHESIVE WHEN TESTED IN ACCORDANCE WITH EAD 090010-00-0404

EAD Section	Description	Conditions of Acceptance
Tensile Strength		
2.2.14.3.2	Initial Strength	$(X_{\text{mean}} \text{ at } -20^{\circ}\text{C}) \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ $(X_{\text{mean}} \text{ at } +80^{\circ}\text{C}) \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C})$
2.2.14.4.1	Immersion in Hot Water	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.14.4.2	Humidity and NaCl	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.14.4.3	Humidity and SO ₂	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.15.1.6	Façade Cleaning Products	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.15.1.7	Effects of Materials in Contact, method A (without UV)	No discoloration occurs; $R_{u,5}$ after conditioning $> 0.85 R_{u,5}$ initial; Rupture: 90% cohesive
Shear Strength		
2.2.14.3.3	Initial Strength	$(X_{\text{mean}} \text{ at } -20^{\circ}\text{C}) \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ $(X_{\text{mean}} \text{ at } +80^{\circ}\text{C}) \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C})$
2.2.14.4.1	Immersion in Hot Water	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.14.4.2	Humidity and NaCl	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.14.4.3	Humidity and SO ₂	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.15.1.6	Façade Cleaning Products	$X_{\text{mean}} \geq 0.75 \cdot (X_{\text{mean}} \text{ at } +23^{\circ}\text{C});$ Rupture $\geq 90\%$ Cohesive
2.2.15.1.7	Effects of Materials in Contact, method A (without UV)	No discoloration occurs; $R_{u,5}$ after conditioning $> 0.85 R_{u,5}$ initial; Rupture: 90% cohesive
Physical Properties		
2.2.15.1.1	Gas Inclusions	The application of the bonding sealant shall not present gas bubbles visible with normal corrected vision.
2.2.15.1.2	Elastic Recovery	One hour after unloading, the elongation shall be $\leq 10\%$ of the initial elongation.
2.2.15.1.3	Shrinkage	Shrinkage $< 10\%$
2.2.15.1.4	UV Resistance of the Sealant	$\Delta X_{\text{mean}} \geq 0.75$ for elongation and breaking stress
2.2.15.1.5	Elastic Modulus of the Bonding Sealant	As reported
2.2.15.1.8	Resistance to Tearing	$\Delta X_{\text{mean}} \geq 0.50$
2.2.15.1.9	Mechanical Fatigue	$\Delta X_{\text{mean}} \geq 0.75;$ Rupture $\geq 90\%$ Cohesive
2.2.15.1.10	Creep under Long-term Shear and Cyclic Tensile Loading	See Section 2.2.15.1.10.2 of EAD.