

To: ICC-ES Evaluation Committee
From: Alaina Ingram, E.I. and Eric Polzin, P.E.
Date: June 11, 2024
Subject: Proposed Acceptance Criteria for Façade and Wall Cladding
Composite Panels (AC567)

MEMO

Proposed Acceptance Criteria for Façade and Wall Cladding Composite Panels, Subject AC567-0624-R1, was outlined in our staff letter dated March 29, 2024.

During the 30-day public comment period for AC567, we received the following comments. Staff responses to each comment are as follows:

1. **Sika Corporation:** The 180°F conditioning temperature in Section 4.4.1 may bar the use of thermoplastic foams such as expanded and extruded polystyrene whose maximum long-term operating temperature is 165 to 167°F. Thermosets such as polyurethane and polyisocyanurate withstand higher temperatures. Is this the intent?

ICC-ES Staff Response: Staff has requested supporting data and/or documentation showing that the maximum long-term operating temperature for thermoplastic foams is 165 to 167°F. Since we have not received supporting data and/or documentation at this time, the conditioning temperature in Section 4.1.1 has not been modified. Please note that these conditioning requirements are similar to the requirements given in Section 4.4.1 of AC504, *Acceptance Criteria for Façade and Wall Cladding Systems with Porcelain, Ceramic or Terra Cotta Panels*.

2. **Siderise Insulation Limited:** In addition to existing sub criteria within Section 4.5, a condition of acceptance for non-combustibility should be adopted for testing to ASTM E136. Also, in Section 4.5.3, UL 723 is to be insisted over ASTM E84.

ICC-ES Staff Response: The subject core material of the criteria is preformed foam plastic insulation, which is considered combustible per IBC Section 1405. Foam plastic insulation shall meet all requirements given in IBC Section 2603.5 in order to be evaluated for use in Types I through IV construction, therefore we included all said requirements in Section 4.5 of the criteria. The requirements set forth in IBC Section 2603.5 do not include testing in accordance with ASTM E136. For flame spread and smoke development, both ASTM E84 and UL 723 are referenced as acceptable test methods in IBC Section 2603.5.4 as well as Section 4.5.3 of the criteria.

3. **APA:** Several types of foam plastic cores, including foam-in-place foam plastic, can be used to manufacture sandwich panels. It seems that this section should be more specific and should comply with AC12, *Acceptance Criteria for Foam Plastic Insulation*.

ICC-ES Staff Response: Section 3.1.1 of the criteria requires compliance with ICC-ES AC12 for expanded polystyrene (EPS) insulation. Extruded polystyrene (XPS) has been added as an option for the panel core as well. The section has been revised as follows:

“Expanded polystyrene (EPS) and extruded polystyrene (XPS) foam plastic cores shall comply with IBC Sections 2602.1 and 2603 and IRC Section R316, and the ICC-ES *Acceptance Criteria for Foam Plastic Insulation (AC12)*.”

At this time, the criteria does not address foamed-in-place plastic cores since the proponent is only proposing preformed foam plastic insulation as the panel core component, however they can be added to the criteria at a later date.

4. **APA:** If the composite panels are intended for use in a similar manner as Structural Insulated Panels (SIPs) under AC04, *Acceptance Criteria for Sandwich Panels*, it seems that the adhesive used to bond the foam plastic core and metal facing should meet the bonding strength and durability requirements similarly to AC05, *Acceptance Criteria for Sandwich Panel Adhesives*. It seems too ambiguous to allow the panel manufacturer to certify the bond durability in Section 2.4 of this AC567 without evaluation.

ICC-ES Staff Response: The panels addressed in the criteria are intended for use in a similar manner as panels under ICC-ES AC25 (Metal Composite Material, or MCM). The conditioning requirements set forth in Section 4.4.1 are more stringent than the conditioning requirements set forth in ASTM D1781, which is referenced in Section 4.5.2 of AC25 for bonded MCM (i.e., metal facers adhered to a polymeric core). Section 4.4.2.2 of the criteria also requires that the conditioned specimens withhold at least 85% of their original, pre-conditioned strength.

5. **APA:** It is unclear if the composite panels will be used to resist axial loads or wall racking. If these applications are intended to be excluded without evaluation, they should be listed in Section 6.0 of this AC567.

ICC-ES Staff Response: We agree and have included a condition of use in Section 6.0 of the criteria stating that axial and racking shear loads have not been evaluated and is outside the scope of the evaluation report.

PROPOSED ACCEPTANCE CRITERIA FOR FAÇADE AND WALL CLADDING COMPOSITE PANELS

AC567

Proposed March 2024

Revised June 2024

PREFACE

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PROPOSED ACCEPTANCE CRITERIA FOR FAÇADE AND WALL CLADDING COMPOSITE PANELS (AC567)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for façade and wall cladding systems consisting of composite panels as specified in Section 1.2, to be evaluated in an ICC Evaluation Service, LLC (ICC-ES), evaluation report under the 2024, 2021 and 2018 *International Building Code*® (IBC) and the 2024, 2021 and 2018 *International Residential Code*® (IRC). Bases of evaluation are 2024 IBC Section 104.2.3 (2021 and 2018 IBC Section 104.11) and 2024 IRC Section R104.2.2 (2021 and 2018 IRC Section R104.11).

1.2 Scope: This criteria is applicable to façade and wall composite cladding panels, comprised of a pre-formed foam plastic core factory-adhered to dimension stone facing on the exterior side and a corrosion resistant metal skin on the interior side. The panels are manufactured with or without integrated metal clips attached to the interior metal skin to form a system that is used as an exterior wall cladding or interior wall finish. The panels are mechanically connected to the substructure. Installation is limited to Type V-B construction, unless compliance with Section 4.5 of this criteria is shown.

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

1.3.2 2024, 2021 and 2018 *International Residential Code*® (IRC), International Code Council.

1.3.3 ANSI/FM 4880-2017 (-2015), American National Standard for Evaluating the Fire Performance Insulated Building Panel Assemblies and Interior Finish Materials, FM Approvals.

1.3.4 ASTM C271-16(2022), Standard Test Method for Density of Sandwich Core Materials, ASTM International.

1.3.5 ASTM C297-16, Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions, ASTM International.

1.3.6 ASTM C365-22, Standard Test Method for Flatwise Compressive Properties of Sandwich Cores, ASTM International.

1.3.7 ASTM C880-23, Standard Test Method for Flexural Strength of Dimension Stone, ASTM International.

1.3.8 ASTM C1354-22, Standard Test Methods for Strength of Individual Stone Anchorages in Dimension Stone, ASTM International.

1.3.9 ASTM E72-22, Standard Test Methods of Constructing Strength Tests of Panels for Building Construction, ASTM International.

1.3.10 ASTM E84-21a (-2018B, -16), Standard Test Methods for Surface Burning Characteristics of Building Materials.

1.3.11 ASTM E119-20 (-2018B, -16), Standard Test Methods for Fire Resistance of Building Construction and Materials.

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

1.3.13 ICC-ES *Acceptance Criteria for Foam Plastic Insulation* (AC12), International Code Council.

1.3.14 ISO 21930-2017 Sustainability in Buildings and Civil Engineering Works - Core Rules for Environmental Product Declarations of Construction Products and Services, International Organization for Standardization (ISO).

1.3.15 NFPA 259-23 (-18), Standard Test Method for Potential Heat of Building Materials, National Fire Protection Association.

1.3.16 NFPA 268-22 (-19, -17), Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source, National Fire Protection Association.

1.3.17 NFPA 285-23 (-19, -12), Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components, National Fire Protection Association.

1.3.18 NFPA 286-23 (-15), Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth, National Fire Protection Association.

1.3.19 UL 263-2011 with revisions through August 2021 (-2011 with revisions through March 2018, -2011 with revisions through June 2015), Standard Fire Tests of Building Construction and Materials, UL LLC.

1.3.20 UL 723-2018 (-2008), Test Methods for Surface Burning Characteristics of Building Materials, UL LLC.

1.3.21 UL 1040-1996 with revisions through April 2017 (-96 with revisions through October 2012), Fire Test of Insulated Wall Construction, UL LLC.

1.3.22 UL 1715-1997 with revisions through April 2017 (-97 with revisions through January 2013), Fire Test of Interior Finish Material, UL LLC.

2.0 BASIC INFORMATION

The applicant for an evaluation report shall submit the following:

2.1 General:

2.1.1 Product Description: Complete information concerning material specifications, thickness, size and the manufacturing process of all components of the façade or wall cladding system.

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

2.1.3 Packaging and Identification: The method of packaging and field identification of the façade or wall cladding system components shall be specified. A label on the panels and packaging of the substructure components

PROPOSED ACCEPTANCE CRITERIA FOR FAÇADE AND WALL CLADDING COMPOSITE PANELS (AC567)

shall bear the manufacturer's name, the product name, the manufacturing location and the ICC-ES evaluation report number. Product identification shall be in accordance with the product identification provisions of the ICC-ES Rules of Procedure for Evaluation Reports.

2.2 Panel Cores:

2.2.1 Foam plastic specifications are to include the density, thickness, foam manufacturer and the type, catalog number, etc.

2.2.2 When the core material does not completely fill the portion between panel facings, voids shall be detailed or properly described. The method used to maintain voids during foaming or bonding shall be described.

2.3 Metal Facers: Information on metal skin facers shall include tensile and yield strengths, thickness, and finishes (if applicable).

2.4 Adhesives: The panel or system manufacturer shall certify the core's adhesive bond durability based on satisfactory field performance.

2.5 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.

2.6 Test Reports: Test reports shall comply with AC85.

2.7 Product Sampling: Test specimens must be truly representative of standard manufactured product. The test specimens of the components of the façade or wall cladding system must be sampled in accordance with Section 3.1 of AC85 unless noted otherwise.

2.8 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 REQUIREMENTS

3.1 Panel Cores:

3.1.1 Expanded polystyrene (EPS) and extruded polystyrene (XPS) foam plastic cores shall comply with IBC Sections 2602.1 and 2603 and IRC Section R316, and the ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12).

3.1.2 Thermoplastic polymer (TEP) foam plastic cores shall be subjected to the following tests:

3.1.2.1 Density – ASTM C271

3.1.2.2 Tensile – ASTM C297

3.1.2.3 Compressive – ASTM C365

3.1.2.4 Conditions of Acceptance: The average density, tensile strength and compressive strength shall be within 10 percent of the manufacturer's specifications.

3.1.3 Surface-burning Characteristics:

3.1.3.1 Flame Spread Index: Except as noted in Section 4.5.4 of this criteria, foam plastic cores shall exhibit a flame spread index of 75 or less when tested at the maximum thickness intended for use in accordance with ASTM E84 or UL 723.

3.1.3.2 Smoke Developed Index: Foam plastic cores shall exhibit a smoke-developed index of 450 or less when tested at the maximum thickness intended for use in accordance with ASTM E84 or UL 723.

4.0 TEST AND PERFORMANCE REQUIREMENTS

4.1 Transverse Load Tests:

4.1.1 Allowable transverse loads of panels shall be determined in accordance with Section 4.1.2. Allowable transverse loads of systems (i.e., the wall cladding panel and its anchoring system) shall be determined in accordance with Section 4.1.3.

4.1.2 Panels:

4.1.2.1 Test Specimens: At least three positive and three negative load tests of the panel or system shall be conducted. If multiple facing thicknesses are desired, testing shall include at least the minimum and maximum facing thicknesses intended for evaluation.

4.1.2.2 All wall panels shall be loaded in increments to failure with deflections taken to obtain deflection and set characteristics. Application of load and duration of load application shall be in accordance with Sections 4.2 and 4.3 of ASTM E72. Specimens shall be tested at the maximum panel width intended for evaluation. Specimens shall be installed in the test frame as a single span condition. Where preloading is applied, the loading, deflection and recovery shall be noted. The amount of preloading shall not exceed 10 percent of the final allowable load unless permitted by the ICC-ES.

4.1.2.3 Deflection readings are to be taken at mid-span and at supports.

4.1.2.4 Conditions of Acceptance:

Allowable loading shall be based on a factor of safety of 3.0 applied to the average maximum sustained load or pressure, as applicable, if all of the following are satisfied:

- a. If any of the individual test results vary by more than 15% of the average, the lowest test result shall be used as the maximum sustained load. Otherwise, the average of the test results may be used as the maximum sustained load.
- b. **Exterior Walls:** With the design load imposed, exterior wall panel deflections shall not exceed the deflection limits of L/240. Positive and negative pressure conditions shall be considered. Wall panels with different facing materials on opposite faces shall be tested for loads acting both inwardly and outwardly where there is a question of the most critical direction.
- c. **Interior Walls and Partitions:** With a minimum 5-pound-per-square-foot (239 Pa) horizontal loading imposed, interior wall panel deflections shall not exceed the deflection limits of L/240.

4.1.3 Systems:

4.1.3.1 Test Specimens: At least three positive and three negative load tests of the panel or system shall be conducted. If multiple facing thicknesses are desired, testing shall include at least the minimum and maximum facing thicknesses intended for evaluation.

4.1.3.2 Transverse load tests of the façade or wall cladding system shall be tested in accordance with ASTM E330 Procedure B with the pressure applied to the façade or wall cladding panels. Testing shall represent the critical conditions of installation. Critical conditions of installation are to include the maximum spacing of framing and maximum panel attachment spacing to be included in the

PROPOSED ACCEPTANCE CRITERIA FOR FAÇADE AND WALL CLADDING COMPOSITE PANELS (AC567)

evaluation report. Application of load to ultimate shall consist of at least six increments, with a 10-second load duration for each increment. For negative load direction tests, the plastic film is to be applied to the inner face of the panels. For positive load direction tests, the plastic film is to be applied to the outer face of the panels.

The test assemblies shall have a minimum height and width that is a minimum of two times the height of the largest panel to be evaluated but not less than 4 feet (1219 mm). Additionally, the test assemblies shall have a minimum height (for systems with vertically spaced substructure) or width (for systems with horizontally spaced substructure) that is two times the maximum spacing of the substructure framing used for panel attachment. Relative movement between the façade or cladding panels and any part of the test assembly or test apparatus shall not be restricted during testing. Substructure spacing shall be located at the maximum spacing at which evaluation is desired. ICC-ES shall approve any variations from the spacing requirements prior to commencement of tests. For cantilevered conditions, the movement of the cantilevered end of the panels shall not be restricted during testing.

4.1.3.3 Load deflection readings at the midpoint of panel spans and cantilevered ends shall be reported.

4.1.3.4 Conditions of Acceptance:

1. Allowable loading shall be based on a factor of safety of 3.0 applied to the average maximum sustained load or pressure, as applicable, if all of the following are satisfied:

- a. If any of the individual test results vary by more than 15% of the average, the lowest test result shall be used as the maximum sustained load. Otherwise, the average of the test results may be used as the maximum sustained load.
- b. Allowable load does not exceed the allowable values for anchors established in accordance with Section 4.4.
- c. Allowable load does not exceed the allowable values for the panels established in accordance with Section 4.1.1.

2. Other factors of safety can be considered based on unique conditions of installation or material used.

4.2 Flexural Testing: Testing to determine the flexural strength of the façade or wall cladding panels shall be performed in accordance with ASTM C880. Each panel thickness must be tested. The number of test specimens for each thickness shall meet the criteria of the standards referenced with the following exceptions:

4.2.1 The tested results of no one sample may vary from the average tested value by more than 15%. If a tested value from one individual sample varies by more than 15% from the average tested value, additional samples will be tested until no individual sample varies by more than 15% from the average or six additional samples are tested with no tested results varying by more than 15% from the average tested value. The average flexural breaking strength shall be used to 'fingerprint' the panels for quality control documentation as indicated in Section 5.3.

4.3 Individual Anchor Tests: Five specimens shall be tested of each configuration of anchor and panel with worst-case configuration of anchor and panel. The

individual anchor to panel connection strengths shall be determined in accordance with ASTM C1354. The average connection strength, for each type test described in Section 4.5.1 and 4.5.2, must be reduced by a safety factor of 4 to determine the maximum allowable connection strength. No individual test result shall vary from the average of all individual test results by more than 15%. If one individual test result varies from the average by more than 15%, the lowest tested value may be used or additional tests may be performed until no individual test result varies from the average by no more than 15%.

4.3.1 Gravity Load Test: Test loads shall be applied in the gravity load direction, parallel to the exterior surface of the tile, as described in ASTM C1354 Sections 7.3 and 9.

4.3.2 Transverse Wind Load Test: Test loads shall be applied in the negative direction (outward from the exterior surface of the panel), as described in ASTM C1354 Sections 7.2.2 and 9.

4.4 Temperature Cycling:

4.4.1 Procedure: Five test panels shall be subjected to 25 consecutive cycles. The panels shall be installed vertically and attached to a corrosion resistant frame with anchors in a manner representative of end-use. Each cycle shall consist of one hour of water exposure at room temperature, followed by six hours at minus 40°F (4.4°C), followed by two hours at 70°F (21.1°C), followed by 14 hours at 180°F (82.2°C), followed by 1 hour at 70°F (21.1°C). Between cycles, such as on weekends and holidays, the samples shall be maintained at an ambient temperature of 70°F (21.1°C). A ±5°F tolerance is allowed on the specified temperatures. Spray nozzles for the water exposure shall be located approximately 7 feet (2.13 m) away from the panels and shall deliver 6 inches (152 mm) of water per hour at a water temperature of 40°F (4.4°C) to 60°F (15.6°C).

4.4.2 Conditions of Acceptance:

4.4.2.1 After exposure there shall be no delamination, cracking, checking, crazing, erosion or other characteristic that might affect performance as an exterior wall covering of any panel specimen when viewed under 5x magnification. Additionally, there shall be no sign of failure or distress at anchor locations.

4.4.2.2 In addition, specimens shall be cut from the panels after exposure and tested in accordance with Sections 4.2 and 4.3. The average flexural and anchor strength values shall be at least 85% of the average flexural and anchor strength values of the control specimens determined in Sections 4.2 and 4.3. If either of the average values fall below 85%, then the allowable loads determined in 4.1 shall be linearly adjusted based on the greatest reduction of average values.

4.5 Types I, II, III and IV Construction (Optional): When evaluation is sought for use on exterior walls of any height in Types I through IV construction, the panel shall meet the requirements set forth in IBC Section 2603.5 and this section.

4.5.1 Fire-resistance-rated Walls: Where the panel is required to have a fire-resistance rating, data based on testing in accordance with ASTM E119 or UL 723 shall be

PROPOSED ACCEPTANCE CRITERIA FOR FAÇADE AND WALL CLADDING COMPOSITE PANELS (AC567)

submitted to substantiate that the fire-resistance rating is maintained.

4.5.2 Potential Heat: Except as noted in IBC Section 2603.5.3, the potential heat of the foam plastic insulation shall be determined by tests conducted in accordance with NFPA 259 and shall be expressed in Btu per square feet (mJ/m^2). The potential heat of foam plastic insulation in any portion of the panel shall not exceed the potential heat of the insulation contained in the wall assembly testing in accordance with Section 4.6.5.

4.5.3 Flame Spread and Smoke-developed Indices: Except as noted in IBC Section 2603.5.4, the panel core and facing shall be tested separately in the thickness intended for use, but not to exceed 4 inches (102 mm), and shall each exhibit a flame spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance with ASTM E84 or UL 723.

4.5.4 Vertical and Lateral Fire Propagation: Except as noted in IBC Section 2603.5.5, the exterior wall assembly shall be tested in accordance with and comply with the acceptance criteria of NFPA 285.

4.5.5 Ignition: Except as noted in IBC Section 2603.5.7, the panel shall not exhibit sustained flaming where tested in accordance with NFPA 268. Where a material is intended to be installed in more than one thickness, tests of the minimum and maximum thickness intended for use shall be performed. Incident radiant heat flux exposure and associated fire separation distances shall be in accordance with Section 1405.1.1.1 of the IBC.

4.6 Use Without a Code-prescribed Thermal Barrier (Optional): When evaluation is sought for interior without a code-prescribed thermal barrier, the panel shall be tested in accordance with NFPA 286 (with the acceptance criteria given in IBC Section 803.1.1.1), FM 4880, UL 1040, or UL 1715. Panels shall be tested in the manner intended for use.

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. Each evaluated manufacturing facility shall be inspected annually in accordance with AC304.

5.2 Quality documentation complying with the ICC-ES Acceptance Criteria for Quality Documentation (AC10) shall be submitted.

5.3 The average flexural breaking strength described in Section 4.2 shall be used to 'fingerprint' the panels for quality control documentation.

6.0 EVALUATION REPORT REQUIREMENTS

6.1 The following statements shall appear in the Conditions of Use section of the evaluation report:

- If compliance with Section 4.1.3 of this criteria is not shown, the report shall state that the design and capacity of the panels attached the building framing and attachment accessories shall be submitted to and approved by the code official for each project.

- If compliance with Section 4.5 of this criteria is not shown, the report shall include a statement that installation of the panel is limited to Type V-B construction.

- If compliance with Section 4.5 of this criteria is shown, the report shall indicate the applicable fire separation distance(s) for use in Types I-IV construction. The report shall also indicate that when required by Section 1405.1.3 of the IBC, fireblocking in concealed spaces shall be provided, as applicable.

- If compliance with Section 4.6 of this criteria is not shown, the report shall include a statement that the foam plastic insulation shall be separated from the interior of a building by a thermal barrier complying with the applicable building code.

- For exterior walls, a water-resistive barrier complying with the applicable building code is required.

- In areas where the probability of termite infestation is "very heavy" in accordance with IBC Figure 2603.8 and 2024 IRC Figure R305.4 (2021 and 2018 IRC Section R318.4), the panels shall meet the requirements set forth in IBC Section 2603.8 or 2024 IRC Section R305.4 (2021 and 2018 IRC Section R318.4), as applicable.

- Allowable axial and racking shear loads have not been evaluated and are outside the scope of the evaluation report.

6.2 The report shall indicate the allowable transverse loads for the panel or system and individual anchor attachments, as applicable. For systems, a statement indicating the allowable deflection of the framing supporting the panels.

For systems, an accurate description, including figures, of the components used in the substructure and its attachment to panels shall be included in the evaluation report.

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. ■