PREFACE

Evaluation reports issued by ICC Evaluation Service, Inc. (ICC-ES), are based upon performance features of the International family of codes and other widely adopted code families, including the Uniform Codes, the BOCA National Codes, and the SBCCI Standard Codes. 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.

Similar provisions are contained in the Uniform Codes, the National Codes, and the Standard Codes.

This acceptance criteria has been issued to provide all interested parties with guidelines for demonstrating compliance with performance features of the applicable code(s) referenced in the acceptance criteria. The criteria was developed and adopted following public hearings conducted by the ICC-ES Evaluation Committee, and is effective on the date shown above. All reports issued or reissued on or after the effective date must comply with this criteria, while reports issued prior to this date may be in compliance with this criteria or with the previous edition. If the criteria is an updated version from the previous edition, a solid vertical line (›) in the margin within the criteria indicates a technical change, addition, or deletion from the previous edition. A deletion indicator (*) is provided in the margin where a paragraph has been deleted if the deletion involved a technical change. This criteria may be further revised as the need dictates.

ICC-ES may consider alternate criteria, provided the report applicant submits valid 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. Notwithstanding that a product, material, or type or method of construction meets the requirements of the criteria set forth in this document, or that it can be demonstrated that valid alternate criteria are equivalent to the criteria 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 an evaluation report, if the product, material, or type 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 unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use of the product, material, or type or method of construction.

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1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for patio covers to be recognized in an ICC Evaluation Service, Inc. (ICC-ES), evaluation report under the 2003 International Building Code® (IBC) and the 2003 International Residential Code®. Bases of recognition are IBC Section 104.11 and IRC Section R104.11.

1.2 Scope: This acceptance criteria applies to above grade patio covers consisting of aluminum or steel components and resting on concrete slabs and/or concrete foundations or wood decks located no more than 3 feet above adjacent grade. Patio covers can be recognized under the limitations noted in IBC Appendix I and IRC Appendix H. The patio cover shall be either:

1.2.1 Attached to the dwelling unit and remain open or have enclosure walls as permitted by IBC Appendix I and IRC Appendix H; or

1.2.2 Freestanding and remain open without enclosure walls.

Patio covers with PVC plastic components are beyond the scope of this criteria and shall be evaluated based on the ICC-ES Acceptance Criteria for Patio Covers with PVC Plastic Components (AC210).

1.3 Codes and Reference Documents:


1.3.3 ASTM E 455-??, Standard Practice for Static Load Test for Shear Resistance of Framed Walls for Buildings, ASTM International.

1.3.4 SEI/ASCE 7-02, Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers.

1.4 Definitions:

1.4.1 Attached Patio Cover: A patio cover attached to an existing dwelling. The cover’s ability to withstand vertical live loads, snow loads and wind uplift loads, and lateral loads due to wind or earthquake forces, is provided by connection of the cover to the existing dwelling and to beams and columns located along one or more of the other sides.

1.4.2 Components and Cladding: Elements of the structure’s envelope that do not qualify as part of the main windforce-resisting system. Examples of components and cladding for wind uplift forces include roof panels and fasteners attaching the roof panels to supports. Examples of components and cladding for lateral wind loads include enclosure wall panels and their connections.

1.4.3 Freestanding Patio Cover: A patio cover not attached to a dwelling. The cover’s ability to withstand vertical live loads, snow loads and wind uplift loads, and lateral loads due to wind or earthquake forces, is provided by the beams and columns.

1.4.4 Main Windforce-resisting System: An assemblage of structural elements assigned to provide support and stability for the overall patio cover. Examples of elements of the MWFRS for wind uplift forces include columns, headers, structural fascias, ledgers and concrete footings. Examples of the MWFRS for lateral wind loads include the roof has a horizontal diaphragm and enclosure wall mullions.
1.4.5 Partially Enclosed Patio Cover: A patio cover with enclosure walls as permitted by IBC Appendix I and IRC Appendix H.

1.4.6 Patio Cover: As defined in IBC Appendix Sections I101.1 and I102.1 and IRC Appendix Sections AH102 and AH103.1, with the 12-foot (3657 mm) height limitation measured from the adjacent grade to the top of the highest roof element of the patio cover.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information of all components of the patio cover, including, but not limited to, aluminum alloy specification and tempering, steel yield and tensile strength, protective coatings for the steel and fastener components and manufacturing process.

2.1.2 Installation Instructions: A copy of the installation instructions as packaged with the product shall be submitted.

2.1.3 Plans: Plans, prepared and sealed by a licensed design professional, shall be submitted and shall include: dimensioned, scaled drawings, detailed load/span or spacing tables for the structural components (e.g. structural headers, roof panels, columns and concrete footings), installation details, noting installation limitations and the thicknesses, sizes, locations of fasteners, and notice of any product installation limitations. The plans shall also include recommended installation details of the patio cover system at typical areas of termination, such as walls, intersection with other materials, expansion and control joints, column to foundation, and beam to column. The plans shall be of camera-ready quality for inclusion in the evaluation report, and shall be consistent with the recommended installation instructions.

2.1.3 Packaging and Identification: Method of packaging (bundles, cartons, etc) and identifying components shall be noted. Identification shall include the ICC-ES evaluation report number and notice of any product installation limitations. Patio cover installations that include sandwich panels shall be labeled as required by the ICC-ES Acceptance Criteria for Sandwich Panels (AC04).

2.1.4 Field Preparation: A description of the methods of field-cutting, trimming or forming, and treatment of cut edges shall be included in the installation instructions.

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 Procedures for Evaluation Reports.

2.3 Test Reports: Test reports shall comply with AC85. Each test report shall be in sufficient detail to identify specimen properties that might affect performance. In addition, the test reports shall include the following:

2.3.1 Preparation of test specimens and complete information on items such as component shapes (beam, column, lattice, etc.) to be considered, connection methods and connector spacing.

2.3.2 Description of test procedures.

2.3.3 Test observations, including description of test specimens after completion of tests.
2.3.4 Statement of passing or failing, where applicable.
2.3.5 A photographic record of tests, where applicable.

2.4 **Product Sampling:** Sampling of the patio cover components, except sandwich panels, for tests under this criteria shall comply with Section 3.2 of AC85. Sampling of sandwich panels for tests conducted in accordance with this criteria or AC04 shall comply with Section 3.1 of AC85.

3.0 **TEST AND PERFORMANCE REQUIREMENTS**

3.1 **Patio Cover Structural Design**

3.1.1 **General:** Patio covers shall be designed to resist dead, live and snow loads, in addition to wind and seismic forces.

3.1.2 **Load Combinations:** The engineering analysis shall consider the design load combinations cited in IBC Section 1605 and IRC Section 301.2.

3.1.3 **Vertical Load Analysis:**

3.1.3.1 **Minimum Roof Live Load:** Patio covers shall be designed and constructed to sustain, within the stress limits of the material used in the fabrication of the structural elements, all applicable dead loads plus a minimum vertical roof live load of 10 pounds per square foot (0.48 kN/m²) in accordance with IBC Appendix I Section I104.1 or IRC Appendix H Section AH104.1. Snow loads shall be used where such snow loads exceed the minimum roof live load.

3.1.3.2 **Snow Loads for Patio Covers:** For evaluation reports to include patio covers subject to snow loads, the patio covers shall be designed for roof snow loads. Roof snow loads shall be considered acting as uniform loads over the entire roof area of the patio cover. Since the patio cover will be designed for roof snow loads, Section 5 requires that evidence, through structural calculations, be shown to the building official that the allowable roof snow loads cited in the evaluation report, and accompanying plans, exceed the site-specific design ground snow loads, adjusted in accordance with Section 1608 of the IBC.

3.1.4 **Wind Uplift and Lateral Load Analysis:** The determination of wind uplift and lateral loads used in the design of patio covers shall be based on either the patio cover being attached to an existing structure or freestanding.

3.1.4.1 **Wind Uplift Loads for Attached Patio Covers With or Without Enclosure Walls:** The structural analysis for determining wind uplift loads on patio covers attached to buildings and installed with or without enclosure walls shall consider the cover to be an extension of the building’s roof overhang. The analysis shall consider the following two wind uplift loading conditions on the patio cover (*Note: the following wind uplift loading conditions are based on Method 2 of ASCE 7-02, with the patio cover attached to a low-rise, enclosed or partially-enclosed building)*:
3.1.4.1.1 Main Windforce-resisting System (MWFRS): The design wind uplift loads on the MWFRS for attached patio covers shall be determined in accordance with Section 6.5.12.2.2 of ASCE 7, using values of $C_p$ from Section 6.5.11.4.1 and the following criteria:

$$ p = q_h[(GC_{pf}) - GC_p] \text{ (lb/ft}^2\text{)} \text{ (N/m}^2\text{)} $$

where:

$p =$ Design wind pressure for the patio cover’s MWFRS with the design wind pressure applied to the entire roof area of the patio cover.

$q_h =$ velocity pressure determined in accordance with ASCE 7 Section 6.5.10 and evaluated at a mean roof height of 12 feet (3657 mm) using the exposure category defined in ASCE 7 Section 6.5.6.4.

$(GC_{pf}) =$ external pressure coefficient equal to -1.07 from ASCE 7 Figure 6-10, Building Surface Zone 2E.

$G = 0.85,$ Assumed maximum gust effect factor from ASCE 7 Section 6.5.8.1.

$C_p = 0.8,$ External pressure coefficient factor cited in ASCE 7 Section 6.5.11.4.1.

The velocity pressure, $q_h$, evaluated in accordance with the provisions cited in ASCE 7 Section 6.5.10 for a mean roof height of 12 feet (3657 mm), shall be determined as:

$$ q_h = 0.00256K_hK_{ht}K_dV^2I \text{ (lb/ft}^2\text{)} \text{ or} $$

$$ q_h = 0.613 \ K_hK_{ht}K_dV^2I \text{ (N/m}^2\text{)} \text{ For SI} $$

where:
Kh = velocity pressure exposure coefficient evaluated at a mean roof height of 12 feet (3657 mm) and defined in ASCE 7 Section 6.5.6.6 for MWFRS utilizing Case 1 of Table 6-3.

Kht = Topographic factor defined in ASCE 7 Section 6.5.7.2. When the patio cover analysis and design assumes Kht = 1, the evaluation report shall indicate that the patio covers are not permitted in the geographical areas cited in Section 6.5.7.1 of ASCE 7.

Kd = 0.85, wind directionality factor defined in ASCE 7 Section 6.5.4.4.

V = basic wind speed, mph or m/s, corresponding to a 3-second gust at 33 feet (10 m) above ground in Exposure Category C.

I = 0.87 or 0.77, Importance factor for structures classified as Category I or in hurricane-prone areas, respectively, in accordance with IBC Table 1604.5.

3.1.4.1.2 Components and Cladding: The design wind uplift loads on the components and cladding for attached patio covers shall be determined using Cp values from ASCE 7 Section 6.5.11.4.2 and the following criteria:

\[ p = q_h(GC_p) \ (\text{lb/ft}^2) \ (\text{N/m}^2) \]

where:

p = Design wind pressure applied to a single roof panel and the corresponding fasteners.

q_h = velocity pressure as cited in Section 3.1.4.1.1.

GC_p = external pressure coefficient from ASCE 7 Section 6.5.11.4.2 and the OVERHANG graph cited in Figure 6-11C.

Selection of the GC_p factor from OVERHANG graph cited in Figure 6-11C shall be based on the anticipated worst-case location for patio covers installed along the longitudinal or transverse walls of the existing building.
Patio covers not designed for the higher wind loads occurring at the corners of the existing building as cited in ASCE 7 Figure 6-11C will be limited to installations along the transverse or longitudinal wall lengths of the existing building away from its corners a distance equal to 10 percent of the building’s least horizontal dimension or 0.4 times the mean roof height of the existing building, whichever is smaller, but not less than either 4% of the building’s least horizontal dimension or 3 feet (0.9 m). A statement citing this limitation will be included in the evaluation report.

3.1.4.2 Horizontal Wind Loads for Attached Patio Covers With or Without Enclosure Walls: The structural analysis for determining horizontal wind loads on patio covers attached to buildings with or without enclosure walls shall consider the patio cover an integral element of the existing building, requiring the patio cover’s vertical exposed surface area to be subjected to the same wind-loading conditions applied to the wall structural components of the existing building. The analysis shall consider two wind loading conditions: 1) the cover’s main windforce-resisting system (MWFRS) and 2) the cover’s structural components and cladding. The analysis shall consider the combined effects of wind uplift and horizontal loading on the patio cover’s ability to support the design wind loads.

3.1.4.2.1 Main Windforce-resisting System: The design horizontal wind loads on the MWFRS for attached patio covers with or without enclosure walls shall be determined in accordance with ASCE 7 Section 6.5.12.2.2 and using the following criteria:

\[ p = q_h[(G_{C_{pf}}) - (G_{C_{pi}})] \text{ (lb/ft}^2\text{) (N/m}^2\text{)} \]

where:

- \( p \) = Design wind pressure for the patio cover’s MWFRS.
- \( q_h \) = velocity pressure cited in Section 3.1.4.1.1.
- \( (G_{C_{pf}}) \) = external pressure coefficient from ASCE 7 Figure 6-10.
- \( (G_{C_{pi}}) \) = internal pressure coefficient from ASCE 7 Figure 6-5.
Since the length, width and height of the existing building to which the patio cover is to be attached is unknown, the patio cover’s maximum projection from the existing building shall be used in the analysis as the distance “2a” described in Figure 6-10 of ASCE 7. Also, since the roof slope of the existing building is unknown, the external pressure coefficient on the windward vertical projected area shall be equal to 0.80 (Surface 1E as described in ASCE 7 Figure 6-10). The external pressure coefficient on the leeward vertical projected area of the cover shall be equal to -0.64 (Surface 4E as cited in ASCE 7 Figure 6-10).

3.1.4.2.2 Components and Cladding: The design wind horizontal load on the components and cladding for attached patio covers with or without enclosure walls shall be determined in accordance with ASCE 7 Section 6.5.12.4.1 and using the following criteria:

\[ p = q_h [(G C_p) - (G C_{pi})] \text{ (lb/ft}^2\text{) (N/m}^2\text{)} \]

where:

- \( p \) = Design wind pressure for the patio cover’s components and cladding.
- \( q_h \) = velocity pressure as determined in accordance with Section 3.1.4.1.1.
- \( (G C_p) \) = external pressure coefficient from ASCE 7 Figures 6-11 through 6-16.
- \( (G C_{pi}) \) = internal pressure coefficient from ASCE 7 Figure 6-5 for partially enclosed buildings.

Since the length, width and height of the existing building to which the patio cover is to be attached is unknown, the patio cover’s maximum projection from the existing building shall be used in the analysis as the distance “a” described in Figure 6-11A of ASCE 7. The external pressure coefficient on the windward vertical projected area may vary from a maximum equal to 1.0 to a minimum equal to 0.7 (Surface 5 as described in ASCE 7 Figure 6-11A). The external pressure coefficient on the leeward vertical projected area of the cover may vary from a maximum equal to -1.4 to a minimum equal to -
3.1.4.3 Wind Uplift and Horizontal Loads for Freestanding Patio Covers: The structural analysis for determining wind uplift and horizontal loads on freestanding patio cover’s MWFRS and components and cladding shall consider the provisions of ASCE 7 Section 6.5.13, except Equation 6-25 noted in this section shall be modified as noted below:

\[ p = q_h(GC_f) \text{ (lb/ft}^2\text{)} \text{ (N/m}^2\text{)} \]

where:

- \( p \) = Design wind pressure applied perpendicular (normal) to the patio cover's MWFRS and components and cladding (roof structural elements and columns).
- \( q_h \) = velocity pressure noted in Section 3.1.4.1.1.
- \( G = 0.85 \), Assumed maximum gust effect factor from ASCE 7 Section 6.5.8.1 for flexible structures defined in ASCE 7 Section 6.2.
- \( C_f \) = Force coefficient factor cited in ASCE 7 Figure 6-18 and using the table in this figure associated with the L/B ratio.

3.1.4.4 Minimum Wind Loads: Attached and freestanding patio covers shall be designed to resist the minimum design wind loads cited in IBC Section 1609.1.2.

3.2 Lateral Load Analysis: If the patio cover’s horizontal roof framing members and/or roof panels are utilized to distribute earthquake and wind lateral forces to other members of the lateral force-resisting system, or to the existing building to which the patio cover is attached, creating a complete load path for distribution of the lateral forces, lateral load tests on the patio cover’s lateral load-resisting system, assembled from beams, panels and connections, shall be conducted in accordance with ASTM E 455. Three test specimens, dependent on the most critical roof panel span(s), roof framing members’ spacing, fastener type and spacing and roof panel type and thickness, shall be evaluated (Coefficient of Variation??). Based on the test results, a structural analysis, sealed by a
registered design professional, is required to compare design procedures with full-scale tests. Design properties for the patio cover’s lateral load-resisting system shall be based on the following deflection limit:

- diaphragm span/180

The analysis shall determine allowable lateral wind and seismic loads that may be imposed on the patio cover for the load combinations set forth in IBC Section 1605.3. A minimum factor of safety of 2.5 shall be maintained between the allowable loads determined from the design properties and minimum ultimate test values achieved in the full-scale tests.

3.3 Plans containing details and specifications of components and proper installation of the patio cover shall be submitted to ICC-ES for inclusion in the evaluation report. The plans shall be camera-ready quality for inclusion in the evaluation report.

3.4 Roof and Wall Sandwich Panels:

3.4.1 Sandwich panels used as roof and wall panels of patio covers shall comply with ICC-ES Acceptance Criteria for Sandwich Panels (AC04), except for the following:

For patio cover roof panels limited to recognition under IBC Appendix Chapter I or IRC Appendix Chapter H and consisting of metal facings and foam plastic cores, either factory-adhered or foamed-in-place, the following factors of safety are applicable to uniform transverse loads:

F.S. = 2.0, ultimate load determined by bending (facing buckling) failure for allowable live loads up to 20 psf (958 Pa) and wind loads.

F.S. = 2.5, ultimate load determined by bending (facing buckling) failure for allowable snow loads.

F.S. = 2.5, ultimate reaction at failure for all loading conditions.

F.S. = 3.0, ultimate load at shear failure for all loading conditions.

3.4.2 Sandwich panels with foam plastic cores used as roof and wall panels of patio covers shall comply with ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12) and the following:

3.4.2.1 Thermal Barriers: Except as permitted under Section 3.8.2 of AC12, the sandwich panels shall be installed with a thermal barrier complying with this criteria and the applicable code, or the panels shall be subjected to a room corner fire test complying with Sections 4.5.2, 4.5.4.1.2, and 4.5.4.2 of AC12.

The panels used in the room corner fire tests shall have the maximum foam plastic thickness for which recognition is sought. Test assemblies of roof panels shall include a longitudinal seam
between adjacent roof panels located as close to the centerline of the wood crib as permitted by the evaluation report applicant’s published installation instructions. If the roof panel longitudinal seam in the test assembly is not directly over the centerline of the wood crib, the distance from the seam to the interior face of the wall parallel to the seam shall be specified in the evaluation report as a minimum distance. Superimposed design loads do not need to be exerted on the room corner fire test assembly, provided the panels’ use is limited Type V construction, and the panels are not required to be fire resistance rated. Sealants shall not be applied to the interior face of the panel joints fire test assembly, unless the durability of the sealants is demonstrated with submitted independent data.

3.4.2.2 Roof Classification: For recognition under the IBC, compliance with IBC Section 2603.6 needs to be demonstrated by testing in accordance with ASTM E 108 or UL790. For recognition under the IRC, roof classification tests are not required, provided recognition is limited to installations permitting a nonclassified roof covering under IRC Section R902.1.

4.0 QUALITY CONTROL

4.1 A quality control manual complying with ICC-ES Acceptance Criteria For Quality Control Manuals (AC10) shall be submitted. The quality control program shall verify dimensions, weight, chemical formulation, treatment and other relevant physical properties of the patio cover components.

4.2 Roof and wall sandwich panels shall be manufactured under an approved quality control program with inspections by an inspection agency accredited by the International Accreditation Service (IAS) or as otherwise acceptable to ICC-ES.

5.0 EVALUATION REPORT RECOGNITION

The evaluation report shall include the following:

1. Basic information required by Section 2.1, including product description, installation procedures, packaging and identification.

2. Statements noting the structures are used as patio covers only, subject to limitations described in Section 1.2.

3. Allowable loads, and dimensions for the components and the overall structure, shall be described based on information specified in Section 3.0. Wind loads shall be reported in terms of basic wind speeds, exposures and heights. Earthquake loads may be reported in terms of seismic design categories.

4. Plans, details and specifications, concerning proper installation of the patio cover, that are
applicable to the specific building under consideration, shall be part of the plans submitted to the building official for approval.

5. For patio covers with snow loads, a statement shall be placed on the first page of the plans indicating that calculations prepared by a registered design professional shall be submitted to the building official demonstrating that the design snow loads do not exceed the allowable roof snow loads specified on the plans; and that calculations shall address the snow load provisions of IBC Section 1608, including, but not limited to, rain-on-snow surcharge load, unbalanced snow and snow drift. This statement shall be clearly identified, legible, located in an area of the plans not cluttered with other information, and in text twice the size of other text placed on the first page of the submitted plans.

6. Patio covers designed and installed in accordance with the International Building Code shall be protected with an automatic sprinkler system as cited in IBC Section 903.3.1.2.1.