



# ICBO Evaluation Service, Inc.

A subsidiary corporation of the International Conference of Building Officials

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## ACCEPTANCE CRITERIA FOR FOAM PLASTIC SHAPES FOR PARAPET APPLICATIONS

AC161

January 2000

(Effective February 1, 2000)

### PREFACE

Evaluation reports issued by ICBO Evaluation Service, Inc. (ICBO ES), are based upon performance features of the *Uniform Building Code*™, *ICBO Uniform Mechanical Code*™ and related codes. Section 104.2.8 of the *Uniform Building Code* is the primary charging section upon which evaluation reports are issued. Section 104.2.8 reads as follows:

The provisions of this code are not intended to prevent the use of any material, alternate design or method of construction not specifically prescribed by this code, provided any alternate has been approved and its use authorized by the building official.

The building official may approve any such alternate, provided the building official finds that the proposed design is satisfactory and complies with 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 suitability, strength, effectiveness, fire resistance, durability, safety and sanitation.

The building official shall require that sufficient evidence or proof be submitted to substantiate any claims that may be made regarding its use. The details of any action granting approval of an alternate shall be recorded and entered in the files of the code enforcement agency.

The attached acceptance criteria has been issued to provide all interested parties with guidelines on implementing performance features of the codes. The criteria was developed and adopted following public hearings conducted by the 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 a previous edition, solid vertical lines (■) in the outer margin within the criteria indicate a technical change or addition from the previous edition. Deletion indicators (◆) are provided in the outer margins where a paragraph or item has been deleted if the deletion resulted from a technical change. This criteria may be further revised as the need dictates.

ICBO ES may consider alternate criteria, provided the proponent submits valid data demonstrating that the alternate criteria are at least equivalent to the attached criteria and otherwise meet the applicable performance requirements of the codes. Notwithstanding that a material, type or method of construction, or equipment, meets the attached acceptance criteria, or that it can be demonstrated that valid alternate criteria are equivalent and otherwise meet the applicable performance requirements of the codes, if the material, product, system or equipment is such that either unusual care in its installation or use must be exercised for satisfactory performance, or malfunctioning is apt to cause unreasonable property damage or personal injury or sickness relative to the benefits to be achieved by the use thereof, ICBO ES retains the right to refuse to issue or renew an evaluation report.

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# ACCEPTANCE CRITERIA FOR FOAM PLASTIC SHAPES FOR PARAPET APPLICATIONS

## 1.0 INTRODUCTION AND SCOPE

The purpose of this criteria is to establish requirements for recognition of foam plastic formed shapes for exterior parapet applications, in ICBO Evaluation Service, Inc. (ICBO ES), evaluation reports. The foam plastic parapet system incorporates a metal insert, which is inserted into a slot provided in the foam plastic formed shape. The metal insert can be located at any location on the surface of the foam plastic. The molded foam plastic is adhered to the face of the parapet, and the metal insert on the top surface of the molded shape provides a method for attaching flashing to cover the top.

## 2.0 REFERENCE DOCUMENTS

**2.1** ICBO ES Acceptance Criteria for Test Reports and Product Sampling (AC85).

**2.2** ICBO ES Acceptance Criteria for Quality Control Manuals (AC10).

**2.3** ICBO ES Acceptance Criteria for Foam Plastic Insulation (AC12).

**2.4** 1997 *Uniform Building Code*<sup>TM</sup> (UBC).

**2.5** ASTM C 297, Standard Test Method for Tensile Strength of Flat Sandwich Constructions in Flatwise Plane.

**2.6** ASTM E 330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

**2.7** ASTM G 26, Practice for Operating Light-exposure Apparatus (Xenon-Arc Type) with/without Water for Exposure of Nonmetallic Materials.

## 3.0 BASIC INFORMATION AND REPORTS OF TESTS

**3.1** The following information must be submitted:

**3.1.1 Product Description:** Complete information, as applicable, concerning formulation, density, protective coatings and manufacturing process.

**3.1.2 Installation Instructions:** Dimensioned scale drawings and installation details noting installation limitations, foam plastic dimensions, and size and location of fasteners.

**3.1.3 Packaging and Identification:** Method of component packaging must be disclosed. Identification shall include the evaluation report number, the name or logo of the quality control agency, and notice of any product installation limitations. A copy of the installation instructions packaged with the product shall be submitted.

**3.1.4 Field Preparation:** Method of field-cutting, trimming or forming, and treatment of cut edges.

**3.2 Testing Laboratories:** Test laboratories shall comply with the ICBO ES Acceptance Criteria for Laboratory Accreditation (AC89).

**3.3 Test Reports:** Test reports and product sampling shall comply with the ICBO ES Acceptance Criteria for Test Reports and Product Sampling (AC85). The test report must be in sufficient detail to identify specimen properties that might affect performance as a wall covering. A qualified representative of the testing agency must witness production methods, fabrication and installation of test specimens. The testing agency must verify and report dimensions, weight, density, chemical formulation, treatment, moisture content and other relevant physical properties of the major components. The testing agency also must verify and report the manner of installation, and provide a description of fastening elements.

## 4.0 FOAM PLASTIC PARAPET SYSTEM

**4.1** The foam plastic parapet system can be recognized as a system to anchor sheet metal flashing to parapet foam shapes, and foam shapes to wall substrates.

**4.2 Durability:** Testing is required as follows:

1. Weatherometer tests as set forth in Section 6.1.
2. Freeze-thaw tests as set forth in Section 6.2.

**4.3** Locations for expansion and control joints must be determined and specified by the manufacturer. All expansion and control joint materials must be corrosion-resistant. Expansion and control joints must be a part of the test specimens for durability and structural tests.

**4.4 Structural Considerations:** Structural tests are required to determine allowable vertical load and negative wind pressures that may be imposed on the system. Testing requirements are set forth in Sections 6.3 and 6.4. The test program should incorporate the following:

1. Test specimens must be based on the minimum conditions of installation. For vertical load capacity, the smallest section will be tested as well as the largest section. If only one section is tested, the corresponding limitation based on this test will be placed in the evaluation report.
2. No deflection limit shall be imposed, since the system is used in uninhabitable locations.

**4.5** Plans, details and specifications concerning proper installation of the foam plastic system, applicable to the specific building under consideration, must be part of the plans submitted to the building official for approval.

**4.6** Typical installation details for the foam plastic parapet system at typical areas of termination (such as parapets, intersection with other materials, expansion and control joints, and roofing) shall be submitted. Details must be of camera-ready quality, for inclusion in evaluation reports, and must be consistent with recommended application instructions.

**4.7** Application of the foam plastic shapes is limited to exterior walls of Type V construction as set forth in Section 606 of the UBC.

**4.8** Installation must be by a contractor recognized by the proponent as being qualified to perform such installations. A list containing the names and addresses of recognized contractors must be maintained by the proponent, and must be available to the building official or ICBO ES upon request.

An installation card confirming compliance with the evaluation report must be completed by the contractor, and presented to the building official at the completion of each project.

## 5.0 DEFINITIONS

**5.1 Foam Plastic Formed Shapes:** A specific profile cut or formed from expanded polystyrene (EPS) or extruded polystyrene (XPS) foam plastic. The foam plastic is covered with a weather-resistive protective coating. Dimensions shall comply with applicable requirements in the ICBO ES Acceptance Criteria for Foam Plastic Insulation (AC12).

**5.2 Expanded Polystyrene (EPS) Foam:** Expanded polystyrene foam plastic manufactured by the expansion of raw beads, and block-molded and cut to final dimensions. All EPS products must comply with AC12.

**5.3 Extruded Polystyrene (XEPS) Foam:** Polystyrene raw materials formed by extrusion to the final shape. All XEPS products must comply with AC12.

**5.4 Adhesive:** An adhesive or base coat that adheres the foamed shapes to a substrate.

**5.5 Substrate:** Any surface to which the foamed shape is adhered. Substrates can be plywood, oriented strand board (OSB), plaster brown coat, concrete or masonry.

## 6.0 TESTING

### 6.1 Accelerated Weathering Test (Weatherometer):

1. For each substrate for which approval is sought (plywood, plaster, OSB or other substrates), five specimens of the coated foam plastic shapes, adhered to the substrate, shall be prepared. Five additional specimens are prepared as control.
2. ASTM G 26, Operating Light and Water Exposure Apparatus (Xenon Type) for Exposure of Nonmetallic Materials, shall be used. Model D or DH, with the operating schedule set forth under Method 1, Section 5, of the referenced ASTM procedure shall be used.
3. The test shall be for 2,000 hours.
4. Failure is defined as surface changes, as viewed by minimum 5X magnification, that reveal cracking, checking, crazing, erosion, or other characteristics that might affect performance of the product.
5. Tensile bond tests shall be conducted on control specimens and specimens completing weatherometer exposure. The test results are analyzed to determine whether a significant loss of bond strength occurs after weatherometer exposure. The test method is ASTM C 297.

### 6.2 Freeze-thaw Tests:

1. For each substrate for which recognition is sought (plywood, plaster, OSB or other substrates), five 6-inch-square (152 mm square) samples of the coated foam plastic shapes, adhered to the substrate, shall be prepared.
2. Samples are subjected to 10 freeze-thaw cycles. Each cycle consists of air drying at 120°F (49°C) for a minimum of eight hours, followed by total immersion in water at 70°F to 80°F (21.1°C to 26.7°C) for eight hours, and exposure to 20°F (-28.9°C) for 16 hours.
3. Failure is defined as surface changes, as viewed by minimum 5X magnification, that reveal cracking, checking, crazing, erosion or other characteristics that may affect performance as an enclosure.
4. Delamination, or indication of same between components, is also defined as failure.

**Exception:** Freeze-thaw tests are not required if the system is installed in areas where the annual rainfall does not exceed 20 inches (508 mm), and the average of the daily lows for any month is at least 30°F (-1.1°C).

### 6.3 Structural Performance Tests (Foamed Shape to Parapet Surface):

1. Testing shall determine the vertical load capacity of the foam plastic parapet system. Specimens shall be prepared in accordance with the manufacturer's recommendations, on the surfaces for which recognition is sought. The EPS or XEPS foam shape will be adhesively attached to each substrate intended for recognition, using the adhesive/base coat recommended by the manufacturer. Specimens shall be a minimum of 8 feet (2438 mm) long, and the width of the foam shape, and shall include any features such as scored joints, vertical control joints and other architectural features, if these features are to be recognized in the evaluation report. Three specimens are required.
2. Specimens shall be loaded vertically or horizontally, at the discretion of the testing laboratory. The load shall be applied to a steel plates 8 inches (203 mm) wide and 12 inches (305 mm) long. The steel plate edge is located

1/4 inch (6.4 mm) from the front edge of the assembly, and the load is applied at the geometric center of the steel loading plate. Figure 1 illustrates the test specimens. The application of load to ultimate shall consist of at least six increments, with a 10-second load duration for each increment. The duration may be increased, if necessary, to ensure that the load stabilizes.

3. For end conditions, the 8-inch (203 mm) edge of the steel loading plate is flush with the end of the assembly. For interior conditions, the steel loading plate is at the midspan of the assembly.
4. Conditions of acceptance will be based on the following:
  - Allowable load will be based on a factor of safety of 5.0, applied to the average uniform load, if all of the following are satisfied:
    - (a) No single test result may vary by more than 15 percent from the average of the three test results. Variations exceeding this limit require larger safety factors.
    - (b) Indentation of the surface shall be considered when determining the final allowable load.

### 6.4 Metal Insert to Foam Plastic:

1. The insert will be located at the minimum edge distance specified by the manufacturer, and at a location where the edge distance does not influence the final result.
2. Each specimen is a minimum of 48 inches (1219 mm) long and 12 inches (305 mm) wide. A self-drilling screw is installed in the insert, 1 inch (25.4 mm) from the end. The screw is pulled in tension until failure occurs. The insert must be tested for minimum edge and end conditions; otherwise the limitation will be based on the tests conducted.
3. A minimum of three tension tests shall be conducted for each condition.
4. Conditions of acceptance will be based on the following:
  - Allowable load will be based on a factor of safety of 5.0, applied to the average uniform load, if all of the following are satisfied:
    - (a) No single test result may vary by more than 15 percent from the average of the three test results. Variations exceeding this limit require larger safety factors.
    - (b) Indentation of the surface shall be considered when determining the final allowable load.

### 6.5 Metal Flashing Attachment to Metal Inserts:

1. This test is conducted in accordance with applicable sections of ASTM E 330. The purpose of the test is to determine the negative transverse load capacity of the metal flashing covering when attached to the foam plastic parapet system. The system consists of the metal insert, located at a specific location in the EPS or XEPS foam. A series of 2-inch (51 mm) metal strips is laid transversely between the inserts, and spaced at 24 inches (610 mm) on center. The metal flashing is formed to fit over the system, and is attached to the system by fasteners.
2. Air bag(s) shall be placed between the metal flashing and the EPS surface. Air is introduced into the air bag and the resulting positive pressure is controlled with a water manometer or other suitable measuring device. Dial indicators are placed at each strip/clip location and at the midpoint. The system is loaded at increments of 1-inch (25 mm) water column, with the load released after 3 inches (76 mm) and 6 inches (152 mm) water column, loading. The load is maintained at each increment for a minimum of 10 seconds or until each dial indicator indicates no movement.

3. Three test specimens per configuration are required.
4. Condition of acceptance for allowable load is a safety factor of 3.0, applied to the lowest ultimate test load of the three specimens.

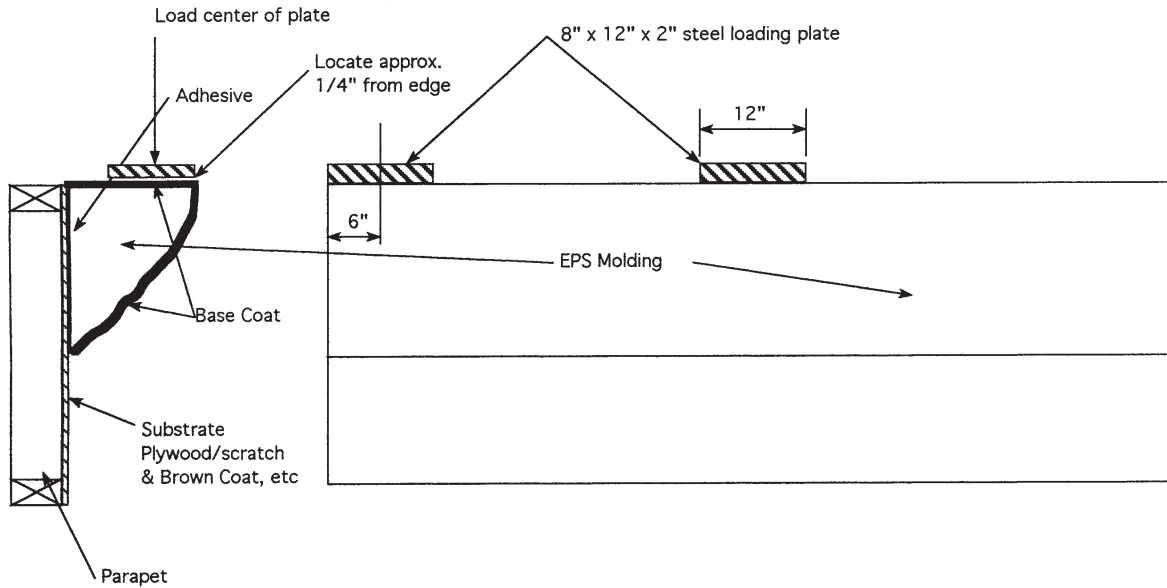
**6.6 Other Substrates:** Results of tests conducted over substrates as specified in Section 6.3 can be extended to foam shapes adhered to other substrates (e.g., wood-based sheathing, cementitious backer units and gypsum board) under the following conditions:

1. The foam shape is adhered to all sheathing in question (e.g., plywood, particleboard, waferboard and OSB; gypsum panels; and cementitious backer units).

2. Tensile bond tests are conducted in accordance with ASTM C 297.
3. Tensile bond test results average a minimum of 15 psi (103 kPa).

**7.0 QUALITY CONTROL**

The foam plastic parapet systems shall be produced under a quality control program administered by an inspection agency currently accredited by ICBO Evaluation Service, Inc. A quality control manual, developed in consultation with an accredited quality control agency responsible for follow-up inspection, must be submitted. Quality control manual requirements are noted in the ICBO ES Acceptance Criteria for Quality Control Manuals (AC10).



For SI: 1 inch = 25.4 mm.

**FIGURE 1—TYPICAL DETAILS FOR CONCENTRATED LOAD TEST ON THE SYSTEM**