ACCEPTANCE CRITERIA FOR TERMITE PHYSICAL BARRIER SYSTEMS (AC380)

1.0 INTRODUCTION

1.1 Purpose: The purpose of this acceptance criteria is to establish requirements for termite physical barrier systems to be recognized in an ICC Evaluation Service, LLC (ICC-ES), evaluation report under the 2009 and 2006 *International Building Code*® (IBC) and the 2009 and 2006 *International Residential Code*® (IRC). Bases of recognition are IBC Section 104.11 and IRC Section R104.11. Applicable code sections for locations requiring termite resistance are Section 2304.11.6 (Termite protection) and Section 2603.8 (Foam Plastic Insulation – Protection against termites) of the 2009 and 2006 IBC; Section R318.1(5) (Protection Against Subterranean Termites), Section R318.3 (Barriers), and R318.4 (Foam plastic protection) of the 2009 IRC; and Section R320.1(5) (Protection Against Subterranean Termites), R320.4 (Barriers), and R320.5 (Foam plastic protection) of the 2006 IRC.

The reason for the development of this criteria is to provide methods to evaluate a proprietary steel mesh termite physical barrier system, since the code does not provide test methods and performance requirements for physical or mechanical termite barrier systems.

1.2 Scope: A termite physical barrier systems are used to provide protection against subterranean termites. The system is installed at potential termite entry points in a building's foundation, including all construction and control joints; cavity walls below grade; retaining walls; and penetrations through slabs, blockouts in concrete, and brick/block piers.

1.3 Codes and Referenced Standards: Where standards are referenced in this criteria, these standards shall be applied consistently with the code upon which compliance is based.

1.3.1 Codes:

1.3.1.1. 2009 *International Building Code*® (IBC), International Code Council.

1.3.1.2. 2006 *International Building Code*® (IBC), International Code Council.

1.3.1.3. 2009 *International Residential Code*® (IRC), International Code Council.

1.3.1.4. 2006 *International Residential Code*® (IRC), International Code Council.

1.3.2 ASTM International Standards:

1.3.2.1. ASTM B 117-07a, Standard Practice for Operating Saltspray (Fog) Apparatus.

1.3.2.2. ASTM C 666/C666M-03 (2008), Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.

1.3.2.3. ASTM C 1519-04, Standard Practice for Evaluating Durability of Building Construction Sealants by Laboratory Accelerated Weathering Procedures.

1.3.2.4. ASTM D 1435-05, Standard Practice for Outdoor Weathering of Plastics.

1.3.2.5. ASTM D 1749-93(2007), Standard Practice for Interlaboratory Evaluation of Test Methods Used with Paper and Paper Products.

1.3.2.6. ASTM D 3345-08, Standard Test Method for Laboratory Evaluation of Wood and Other Cellulosic Materials for Resistance to Termites.

1.3.2.7. ASTM D 7234-05, Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.

1.3.3 American Wood-Protection Association (AWPA) Standards:

1.3.3.1. 2010 American Wood-Preservers' Association (AWPA) Book of Standards©.

1.3.3.2. AWPA E1-09©, Standard Method for Laboratory Evaluation to Determine Resistance to Subterranean Termites.

1.4 Definitions:

1.4.1 Termite Physical Barrier System: Termite physical barrier systems are proprietary steel mesh termite barrier systems consisting of a stainless steel mesh, stainless steel clamps, and a bonding cement or epoxy resin installed by accredited installers. The stainless steel mesh provides a physical termite barrier with mesh holes small enough to prohibit the passage of termites.

1.4.2 Protection Notice Label: The "Protection Notice Label" is a permanent label that is applied in a conspicuous location on the structure with an installed termite physical barrier system. The label shall include the name, telephone number and address of the evaluation report holder and their accredited installer. The label shall provide for a system inspection three months after completion of the installation and once every year thereafter. The label must also state that any utility installed in the building after the barrier system is installed must enter the building above the barrier system.

1.4.3 Accredited Installers: An accredited installer is one who is trained by the report holder in the installation of the termite physical barrier systems and who is knowledgeable of both code-complying building construction and termite biology.

2.0 BASIC INFORMATION

2.1 General: The following information shall be submitted:

2.1.1 Product Description: Complete information concerning material specifications for all components of the termite physical barrier system.

2.1.2 Installation Instructions: Installation instructions, details and product limitations; description of installer training and accreditation by the evaluation report holder; Facsimile of the "Protection Notice Label" that is applied in a conspicuous location on the structure with an installed termite physical barrier system.

2.1.3 Packaging and Identification: A description of the method of packaging and field identification of the termite physical barrier system. Identification provisions shall include the evaluation report number and, if applicable, the name or logo of the inspection agency.

2.1.4 Field Preparation: A description of the field-cutting of steel mesh.

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 termite physical barrier system for tests under this criteria shall comply with Section 3.2 of AC85.

3.0 TEST AND PERFORMANCE REQUIREMENTS

The performance characteristics of the termite physical barrier system as indicated in Sections 3.1 to 3.4 shall be documented by testing. Testing shall be in accordance with ASTM standards or described methodology and shall demonstrate resistance of the system to subterranean termites as well as the durability of the individual components.

3.1 Termite Resistance: Wood samples protected by the barrier system shall be tested in laboratory and field conditions to document resistance to termites. The test methods are noted in Sections 4.2 and 4.3.

3.2 Integrity of the Barrier System: The integrity of the barrier system and its components shall be determined in accordance with Sections 3.2.1 through 3.2.4.

3.2.1 Adhesion: Adhesion of render to the termite physical barrier material shall be determined in accordance with Section 4.4.1.

3.2.2 Freeze-thaw Resistance: Freeze-thaw resistance of the barrier system and each element of the system shall be determined in accordance with Section 4.4.2.

3.2.3 Corrosion Resistance: Corrosion resistance of the mechanical barrier system in isolation and in contact with common building materials shall be determined in accordance with Section 4.4.3.

3.2.4 Durability: The durability of the barrier system and each element of the system shall be determined in accordance with Section 4.4.4.

4.0 TEST METHODS

4.1 General: The testing required in this section shall be performed on the termite physical barrier system and shall demonstrate that the individual components of the system do not degrade or fail in such a way as to render the system ineffective. Assembly of test specimens shall be in accordance with Section 3.3 of AC85.

4.2 Termite Resistance Testing: Wood samples protected by the recommended application method of the termite physical barrier system shall be subjected to laboratory and field tests in accordance with Sections 4.2., 4.2.2 and 4.2.3, and shall demonstrate resistance to subterranean termites.

4.2.1 Laboratory Testing: Laboratory testing of the termite physical barrier system and individual component testing for termite resistance must be supplemented by field testing in accordance with Section 4.2.2. Laboratory testing for termite resistance is only considered valid if the termite physical barrier system is challenged by an active colony of termites. Laboratory testing shall be in accordance with AWPA E1 or ASTM D 3345. The AWPA E 1 and ASTM D 3345 test procedures shall be modified by preparing test samples of the termite physical barrier that include untreated wood samples protected by the system. The test sample assembly shall be described in detail and documented in the test report with a diagram and photographs.

Conditions of Acceptance: Assessment of test samples shall be in accordance with the applicable test standard. The product shall demonstrate resistance to subterranean termites. The testing shall consider Formosan termites unless this variety is excluded in the evaluation report.

4.2.2 Field Testing: Field testing shall be conducted at multiple sites across the United States or the continent of application. Records must be kept of the plots at the sites, detailing pH, clay content, silt content, sand content, average rainfall and termite species present.

Suitable sites are, for example:

- Santa Rita Experimental Range, Pima County, Arizona
- Harrison Experimental Forest, Harrison County, Mississippi
- Chipola Experiment Station, Calhoun County, Florida
- Calhoun Experimental Forest, Union County, South Carolina
- Midway Island
- Tropical Australia

An 18-inch-long (457 mm), nominally 2-inch-by-4-inch (51 mm by 102 mm) pine board is fitted at one end and approximately 15 inches (381 mm) up its length with the termite physical barrier using the recommended application method, including metal shield protrusions that simulate barrier terminations between the foundation and wooden structure. The length and slope of the metal shields shall be representative of building construction. The “protected” end is inserted vertically into termite-infested soil about 9 inches (229 mm) deep.

Plots shall be monitored annually up to five years if results warrant (i.e., no failure prior to five years). Boards and stakes that become severely decayed will be replaced during post-treatment evaluations.

At least 20 replicates with two controls (unprotected boards) shall be used at each site.

Conditions of Acceptance: In all treatments, the response variable shall be “wood attacked” or “wood not attacked,” as is evidenced by the condition of the board or stake fitted with the termite physical barrier system.

4.2.2.1. Formosan Termite Resistance Evaluation: Field testing shall be carried out in the United States. The testing shall simulate installation of the barrier system bonded to concrete, and assess the effectiveness of the barrier to termites. The test shall assess the method of fixing the termite physical barrier system to concrete and assess protection of penetrations through a concrete foundation or slab-on-grade, such as service piping.

For the purpose of this test, the barrier system is simulated by forming a cylinder from the components of the physical barrier around Douglas fir boards, and by

bonding a concrete member to one end and a capped PVC pipe to the other. The simulated system shall be prepared in accordance with the manufacturer's recommended methods.

The cavity of the cylinder shall contain 25 Douglas fir boards approximately 9.5 inches by 3 inches by ¾ inch thick (241 mm by 76 mm by 19 mm). At one end of the cylinder, the piece of concrete no smaller that 7 inches by 3.5 inches thick (178 mm by 89 mm) is bonded to the barrier system mesh using the manufacturer's recommended methods. At the other end of the cylinder, a 4-inch-diameter (102 mm) PVC pipe is bonded to the barrier system mesh using the manufacturer's recommended methods. A PVC cap is placed firmly on the outer open end of the PVC pipe. Both ends of the cylinder and the lap of mesh along the length of the cylinder shall be sealed to prevent movement of termites into the cavity of the cylinder containing the wood.

The assembled cylinder containing the wood is placed into a 5-gallon (19 L) metal can filled with suitable wood, with the base cut out and the top covered with a sheet metal lid.

Plots shall be monitored annually up to five years if results warrant (i.e., no failure prior to five years). At least nine replicates with one control (unprotected boards) shall be used at each site.

Active feeding on the excess wood in the metal can by Coptotermes formosanus shall be observed at the time of assessment and throughout the test.

Conditions of Acceptance: In all treatments, the response variable will be either "wood attacked inside the cylinder" or "wood not attacked inside the cylinder."

4.3 Termite Resistance of Adhesive, Tape, Sealants or Fixing Method: Field testing shall be carried out in the United States, tropical Australia or a similar termite-active site.

Three sets of five units are prepared for each variation, and tested at suitable test sites such as those listed in Section 4.2.2.

The termite physical barrier is fixed to the edge of a concrete slab measuring a nominal 12 inches by 12 inches by 1¼ inches (305 mm by 305 mm by 32 mm), using the recommended application method to encase two pieces of highly termite-susceptible bait wood, such as pinus radiata, measuring 9 inches by 4 inches by 2 inches (229 mm by 102 mm by 51 mm). The only potential entry points should be through the fixing method.

Conditions of Acceptance: Testing shall demonstrate no signs of damage or failure of the parging material after nine months of exposure to active termites.

4.4 Integrity of the Barrier System:

4.4.1 Adhesion of Render to the Termite Physical Barrier Material: Laboratory testing shall be conducted to determine the adhesion strength of external render to any part of the termite physical barrier that subsequently becomes or could become covered in render as part of normal construction. This testing is to ensure that the termite physical barrier does not interfere with the efficacy of external rendering systems.

Brick couplets are formed with termite physical barrier embedded in a mortar joint between the bricks and protruding approximately 2 inches (51 mm) from the joint. After allowing six days for the mortar to cure, the termite physical barrier is folded against the face of the bricks and fixed in place using the recommended application method. Conventional render is applied 24 hours after the termite physical barrier is fixed in place. After a further six days of cure, the render adhesion is assessed by a "pull-off test" in accordance with ASTM D7234.

At least four replicates shall be done on each configuration.

Conditions of Acceptance: The testing shall demonstrate that the render adhesion to the termite physical barrier is equal or greater than that to the unprotected substrate.

4.4.2 Freeze-thaw Resistance of the Termite Physical Barrier Material: Freeze-thaw resistance testing shall be conducted on all components of the barrier system in accordance with the following method:

The test apparatus and freeze-thaw cycles must comply with Sections 4 (Method A) and 5 of ASTM C 666/666M.

Three specimens of the termite physical barrier, each measuring 8 inches by 2 inches (200 mm by 50 mm), are adhered to a concrete block measuring 10 inches by 6 inches by 1 inch (250 mm by 150 mm by 25 mm), using the termite barrier adhesive system. The effective adhesion area is 2 inches by 2 inches (50 mm by 50 mm) for each specimen as shown in Figure 1 of this criteria.

The test block will be tested after minimum of 60 freeze-thaw cycles. A control block (with three specimens of physical barrier adhered) must be kept between 70°F and 75°F (21°C and 24°C) for the duration of the freeze-thaw test. All blocks with attached specimens must be held between 70°F and 75°F (21°C and 24°C) for seven days before being subject to freeze-thaw cycling.

After a minimum of 60 cycles of freeze-thaw, the three freeze-thaw condition specimens on the block are tested without drying. During the same testing session, three specimens on the control block are tested, but after saturation in water for 24 hours.

The specimens are tested by restraining the concrete block in the bottom crosshead of a universal testing machine and applying force parallel to the surface of the substrate (away from the bottom crosshead) to the end of the termite physical barrier held via a clamp suspended from the top crosshead. Using a forcing deflection at a rate of 0.25 inch/minute (6.4 mm/minute), the ultimate load is recorded and the mode of failure observed.

Conditions of Acceptance: After a minimum 60 freeze-thaw cycles, the adhesion strength of the termite physical barrier fixing system must not have been reduced by more than 10 percent when compared to the adhesion strength of the control specimens. The adhesion strength is the average ultimate load of three specimens as measured above.

4.4.3 Corrosion Resistance: Where the termite physical barrier has metallic components, corrosion resistance shall be tested in accordance with ASTM B 117 for a period of at least 1000 hours at 95°F (35°C).

Conditions of Acceptance: The testing shall demonstrate no visible corrosion, particularly pitting or crevice corrosion. It is noted that "tea staining, brown surface discoloration" is a normal and acceptable characteristic of stainless steel in this aggressive environment and should not be assessed as corrosion.

4.4.4 Weatherability: Where the termite physical barrier system has weatherable components, the durability of the barrier shall be tested in accordance with ASTM C 1519 or ASTM D 1435, demonstrating durability of the termite physical barrier for the life of the building.

Conditions of Acceptance: The testing shall show no detrimental signs of degradation. The testing shall demonstrate a suitability of the product for claimed application life.

5.0 QUALITY CONTROL

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

5.2 Third-party follow-up inspections are not required under this acceptance criteria.

5.3 Installation shall be by installers trained and accredited by the manufacturer.

6.0 EVALUATION REPORT RECOGNITION

The evaluation report on the termite physical barrier system shall include the following:

6.1 Typical installation details and typical installation instructions.

6.2 Description and material specifications for all system components.

6.3 Description of procedures for accreditation of installers, renewal of accreditation and term of accreditation.

6.4 The evaluation report shall include the following conditions of use:

6.4.1 The barrier system must only be installed by installers, trained and accredited by [name of the report holder/manufacturer].

6.4.2 On the exterior of the building, the barrier system must be located 3 inches (75 mm) or more from the ground, concrete steps, porch slabs, patio slabs and similar horizontal surfaces exposed to the weather.

6.4.3 The steel mesh must not be installed in contact with reinforcing steel or any dissimilar metals that will produce an electrolytic reaction.

6.4.4 The steel mesh must not be penetrated except by accredited installers.

6.4.5 When required by the applicable code, protection of wood and wood-based products against decay must be provided in accordance with the applicable code.

6.4.6 A [name of report holder/manufacturers] Protection Notice Label must be located in a conspicuous location on the structure, e.g., the meter box or electrical circuit breaker box. The label must include the telephone number and address for [name of the report holder/manufacturer] and [the name of the accredited installer]. The label must provide the following instructions:

- The [trade name of barrier system] must be inspected three months after completion of the installation and once a year every year thereafter.
- Any utility installed in the building after the [trade name of barrier system] is installed must enter the building above the barrier. ■

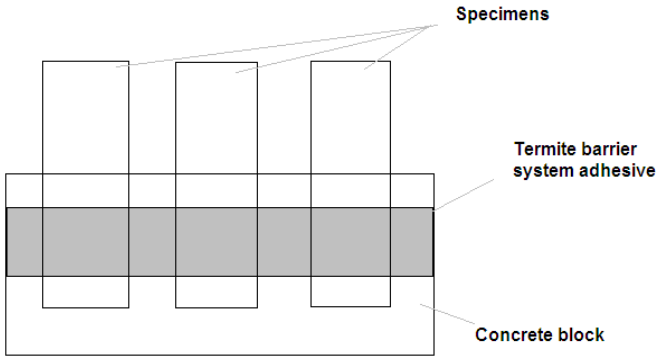

FIGURE 1