



June 6, 2010

Mr. Mike O'Reardon, P.E.
ICC-ES
900 Montclair Road, Suite A
Birmingham, AL 35213

Re: Acceptance Criteria for Wood Structural Panels with Factory-Applied Fire-Retardant Coating; Subject AC405-0610-R5

Dear Mike:

This proposed AC represents a significant improvement over the previous version in 2009. The clarification of the "finished panels" throughout the document is great if Section 3.5 can be further modified as follows:

3.5 Finished Panels: Documentation shall be submitted to demonstrate that the ~~wood structural panels used in production of the finished panels~~ are in compliance ~~comply~~ with Section 2303.1.4 of the IBC ~~or and~~ Section R604 of the IRC. The documentation shall consist of either a current ICC-ES evaluation report on the ~~wood structural~~ finished panels (in cases where the factory application of the fire-retardant coating does not result in degrading the panels) or test data from an accredited testing laboratory and an inspection program that includes regrading of the ~~structural wood~~ finished panels. ~~If the processing treatment obliterates the structural wood panel markings, ink~~ Ink stamping or labels or other means shall be applied to the finished panels to indicate conformance with Sections 2303.1.4 and 2303.2.1 of the IBC and Sections R604 and R802.1.3.1 of the IRC.

Justification: The ultimate goal of this section is to ensure that the finished panels are in compliance with the code (Section 2303.1.4 of the IBC and Section R604 of the IRC). In this case, the trademark to the original untreated wood structural panels becomes insignificant when the finished panels are certified to be in compliance with the code. The proposed changes clearly clarify this point.

Thanks for your consideration.

Sincerely,

A handwritten signature in black ink, appearing to read "Borjen Yeh".

Borjen ("B.J.") Yeh, Ph.D., P.E.
Director
Technical Services Division
E-mail: borjen.yeh@apawood.org

REPRESENTING THE ENGINEERED WOOD INDUSTRY



510 4th Street North
 P.O. Box 379
 Watkins, MN 55389 USA

(320) 764.5797 tel
 (320) 764.5799 fax

An International Barrier Technology Company

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ICC Evaluation Service, Inc.
 5360 Workman Mill Road
 Whittier, CA 90601
 Attn: Mr. Michael O'Reardon and Mr. Si Farvardin

RE: Comments for consideration – Proposed AC405-0610-R5

Dear Mssrs. O'Reardon and Si Farvardin:

I have received and reviewed the Proposed Acceptance Criteria for Wood Structural Panels with Factory-Applied Fire-Retardant Coatings (AC 405) dated May 2010. Thank you for the opportunity to submit written comments on these proposed criteria. In addition to providing the comments listed below, I am planning to be in attendance at the meeting June 16 to speak to the committee directly; answer any questions; and, participate in the dialogue that will precede whatever action the committee decides to take on these important criteria.

I believe considerable progress has been made by ICC-ES staff in attempting to satisfy the needs of the current proponent of this AC as well as to respond in a substantive way to the concerns of opponents. While I am impressed with the modifications that have been made since the AC was first introduced, I am opposed to the ratification of AC 405 in its current form.

My comments are associated with the following sections in the proposed criteria:

1. Section 1.2 - Scope:

The scope of these acceptance criteria is stated to be limited to:

“...roof sheathing in buildings of Type III, IV, and V construction for a distance of 4 feet on both sides of a fire wall to provide continuity.”

Reference is made, however, both in this section and in Sections 3.3 and 3.4, to evaluation under ASTM E-119 and E-108. These references imply that the panels may also be considered for roof assembly classifications as well as fire-rated wall assemblies. In the least, this wording is confusing.

The confusion is exacerbated by the fact that the current proponent has an existing Evaluation Services Report (IAPMO ESR #0158) that allows use in both fire rated wall assemblies and fire classified roof covering assemblies.

The fact that fire rated walls and rated roof coverings are not a current part of the scope of this AC implies that ICC-ES staff has either not fully considered requirements for those uses, or staff has evaluated and determined that those applications are not appropriate. In either case, use of AC 405 to determine suitability in walls and rated roof deck assemblies should be explicitly prohibited.



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2. Section 2.1.3 – Packaging and Identification:

2.1.3.2: Manufacturers are required to label each panel with a flame-spread and smoke developed index value from “*an*” ASTM E84 test extended to 30-minute duration.

A single test should not be considered sufficient to demonstrate flame spread and smoke developed capability. The applicant should be required to perform at least three sequential 30 minute ASTM E-84 tests successfully, and the average of the indices considered the true rating of the panel product. The label should reflect this index *average*.

2.1.3.7: Labeling all panels with the phrase: “...*this side shall face the interior of the building*,” may be misleading if the panel is ever used in a rated wall or roof deck assembly where the fire exposure side is the exterior of the building, as allowed for in IAPMO ESR 0158.

If an IAPMO application reference is to be made on the same panel, and allowed uses to extend to applications beyond the scope of ICC-ES, how will that dual labeling be reconciled and easily understood by field inspectors and builders?

3. Section 2.1.4 – Field Preparation:

“...all field repairs should be done in accordance with the manufacturer’s application manual.”

To date, AC 405 has been explicitly considered to be criteria used to evaluate performance of fire retardant coatings applied in a factory. The implication in this section is that the manufacturer has a free reign to develop non-sanctioned techniques of field application of fire retardant coatings simply by calling it “*field repair*.”

The result is that tacit approval is being given by ICC-ES for field application of fire retardant coatings, unrestricted. There is no doubt that methods and techniques of field repair will be necessary. Their development, acceptance and implementation, however, should have no less scrutiny by ICC-ES than what is now being given to factory applied coatings.

Specific interest and focus must be applied to appropriate edge treatment techniques for panel edges that have been trimmed or otherwise damaged in transit. Also, actual field performance of the applicant’s product has demonstrated that intumescent coatings may flake off if inadvertently exposed to weather. Who will (and how will they) make the determination for such issues as: should the flaking material be removed before new coating is applied; or in the case that the flaking panels have been installed in a roof deck facing an attic, how





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will the determination be made whether an appropriate thickness build has been achieved when gravity is working to pull the coating off of the substrate panel (drips) and migrate in a down slope direction.

4. Section 3.3 - Fire Classified Roof Covering Assemblies:

As mentioned previously, the existence of this section implies that ICC AC 405 was developed in such a way that ICC staff has explicitly considered and developed evaluation criteria for using coated panels in rated roof covering assemblies. The fact that ASTM E108 test protocol is being used only to further qualify use as an exception to the vertical continuity requirement of a fire wall needs to be made much more explicit.

5. Section 4.1 – Surface-burning Characteristics and Stability:

The requirement for panel edge treatment is not overtly referenced in either AC 405, or in the manufacturer's handling instructions. If the panels were tested with treated edges, than they must retain that coating throughout the manufacturing, transportation, distribution, and installation phases of their use.

I was witness to one particular ASTM E84 test where both edges of the parallel joint running the length of the tunnel were coated, as well as the "backer board" which had been used to mount the test sample panels and hold them in position. This treatment process had the effect of tripling the amount of coating along that panel edge. The point here is that however the panels are treated prior to testing is how they must be required to be treated for field use as well.

A preconditioning protocol is introduced in this section. It appears to be a slight modification of ASTM 5516 which was established as a conditioning regimen for determining strength loss of FRT plywood. The conditioning regimen suggested, however, does not adequately reflect the extremes the subject panel will experience in use, either in temperature or humidity, nor does it adequately reflect the dynamics or cyclicity of temperature and humidity changes in an attic space.

There is sufficient empirical evidence being demonstrated on jobsites currently to suggest that existing conditioning protocols have not been extreme enough to show how intumescent coatings may be negatively impacted by normal environmental conditions; either during construction or over the life of the building.





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The conditioning protocols should require the use of temperatures and humidities that will cycle through highs and lows in both temperature and humidity. Preconditioning temperatures for roof deck applications should cycle from at least 0 to 185 degrees Fahrenheit along with humidities ranging from 35 to 100 percent. The most appropriate place to develop this conditioning protocol is at ASTM.

I agree that the conditions of acceptance should reflect a flame spread index not exceeding 25 and a smoke-developed index not exceeding 450 (after being exposed to the agreed upon conditioning protocol). The indices for the subject panel, however, should be determined by averaging the results of **three sequential, successfully run ASTM E84 tests**, extended to 30 minutes. A single test is not proof positive that the product will meet this standard consistently.

6. Section 4.2.2 and 4.2.3 – Adhesion and Abrasion Testing:

Testing for adhesion and abrasion should be completed after a “needs-to-be-determined” exposure to elevated temperatures and humidity. Some coating formulations have been shown to have a tendency to soften up after such exposure. Testing finished panels that have been protected from such normal exposure will not adequately determine if adhesion or abrasion is a problem or not under normal field conditions.

7. Section 4.3, 4.3.1, and 4.3.2 – Fire Classified Roof Covering Assemblies:

As mentioned previously, the existence of these sections is confusing in their implication that AC 405 was developed to adequately address the specific use of factory applied fire retardant coatings in fire classified roof covering assemblies. The exception to vertical continuity of a fire wall was originally developed for purposes of containing a fire within an existing building unit, not for fire exposure from an outside source. The addition of a fire testing protocol that contains an exterior fire exposure for use in determining the adequacy of a product to contain a fire from an interior exposure seems superfluous and confusing to me.

8. Section 4.4 – Roof Sheathing Fire Wall Continuity Fire Testing:

In this section, the use of ASTM E-119 is introduced for the first time as an appropriate protocol for examining the appropriateness of a roof deck material to contain fire and stop it from spreading to the unexposed side of a fire wall.





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Prior to this, the passing of an extended ASTM E84 test was considered satisfactory proof, from a fire containment standpoint, that a material was appropriate to use in this application.

I am a supporter of adding a horizontal ASTM E 119 test to all of the acceptance criteria used for this intended application, including: FRT plywood (AC 66) and inert, inorganic laminates (AC 264). I do not agree, however, that a relative testing protocol (coatings versus FRT plywood) has any bearing on the adequacy of performance in this application. All products should be examined independently and held to the same performance criteria. A thermal barrier index of 20 minutes as determined by ASTM E 119, for example, may be appropriate for all products being evaluated for this use.

9. Section 5.2 – Quality Control

In general I believe that there have been some significant improvements in the QC related sections of this proposed AC. Appropriate emphasis has been placed on QC program requirements and process control. I do not believe, however, that there are sufficient procedures and or control mechanisms described to enable an independent, third-party Quality Assurance agency to put a suitable program in place.

In Section 5.2.2.1, for instance, the AC states that
“...critical operating parameters for the coating process shall be monitored and the limiting tolerances of these critical parameters shall be as noted in the quality documentation.”

Exactly what those critical procedures are, however, is not described. Apparently, that decision is being left up to the selected third-party agency. My concern is that not all third-party agencies are equipped to handle both a coating process as well as a chemical batching/mixing operation. Furthermore, can a third party agency responsible for follow-up services on a coating operation also be expected to monitor chemical verification (Section 5.2.3) of alternate materials in formulation.

Intumescent coating formulations involve not only selections of inorganic intumescent compounds, it also involves the selection of organic binders and additives that can change the performance characteristics of the coating dramatically. Additionally, the percent solids in the batch will impact residual dry-mil thickness relative to wet-mil treatment thickness. Some organic binders, within the same general “family” of chemicals, will hold up better in moist conditions than others.





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Third party verification must assure that the specific intumescent compounds, chemicals and materials, amounts, and batching strategy that was used in the development of the qualification test samples are identical in name and source to those that are used to produce the coatings to be used in manufacturing operations.

The AC needs to be modified to explicitly require follow-up service procedures performed by a certified third party agency to examine coating formulation and batching techniques where the coatings are produced. A second and independent program would monitor the coating process in every plant where the coating is applied.

10. Section 6.4 – Use in unvented attics

Use in unvented attics in accordance with Section R806.4 of the 2009 IRC is permitted. I do not understand why this would be allowed. In my experience unvented attic spaces are places where moisture and humidity can build up to levels that would be harmful to materials susceptible to condensation.

11. Section 6.8 – Special Inspection

“...Special inspection is required for field repaired panels and panels exposed to [precipitation during storage or installation].”

Since these panels are being installed in a roof deck over fire walls, getting wet, especially in certain geographic zones, will be a common occurrence. I agree that a special inspection should be required to insure that the coating remains intact, but what mechanism is to be put in place to insure that a special inspector is called and what procedures are to be employed by that inspector so that they understand what to look for during the inspection.

Conclusion:

Significant improvements have been made to this version of AC 405, the *Proposed Acceptance Criteria for Wood Structural Panels with Factory-Applied Fire-Retardant Coatings*. There are many items, however, some of them represented in the paragraphs above, that require further discussion and deliberation before a completed draft of AC 405 can be ratified.

Intumescent coatings have already shown susceptibility to peeling and cracking in job-site environments. While chemical formulations can be modified and developed into versions that are more resilient to periodic wetting, either by precipitation or by condensation within a water-tight





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package, not enough work has been completed to date to record these formulation modifications and their impact on performance.

Coating formulation technology must be better understood and advanced before these materials are allowed to be used in environments where they could easily fail.

Thank you again for the opportunity to comment on these important criteria.

Sincerely,

Michael D. Huddy, PhD
President and CEO
Barrier Technology Corporation
(800) 683-4570

MDH/mm
100708

Cc: Mr. Michael Beaton

