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# Code Compliance Research Report

**Subject:** Alternative Assembly to Thermal Barrier Requirement

**Date:** September 19, 2014

**Materials:**
1. NCFI Polyurethanes InsulStar® Closed-Cell Spray Polyurethane Foam (SPF)
2. International Fireproof Technology DC 315 Fireproof Paint

**Test Standard:** NPFA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

**Summary:**

Based on the test data submitted and the reference documents, NCFI InsulStar spray polyurethane foam at a maximum thickness of 8.25 inches on vertical surfaces and/or 10.25 inches on horizontal or overhead surfaces, coated with a minimum application of 18 wet mils (or 12 dry mils) of DC 315 coating qualifies under 2006, 2009, 2012 and 2015 versions of the IBC and IRC as an alternative assembly to covering the foam plastic with a thermal barrier.

**Labeling Requirements:**

R-component for InsulStar insulation must be identified with the manufacturer's name (NCFI Polyurethanes), address and telephone number; the name of the insulation product (InsulStar); the flame spread and smoke developed indices; and the name of the third-party inspection agency.

**Discussion:**

Note: Reference to building code sections in this report are based on the 2015 IBC and IRC. Earlier code versions have equivalent language/requirements but section numbers may vary. Table 1 at the conclusion of this report correlates the various code sections to the 2015 editions.

The 2015 IBC and IRC (and earlier editions) require that unless otherwise allowed, "foam plastic shall be separated from the interior of a building by an *approved* thermal barrier of not less than 1/2 inch (12.7 mm) gypsum wallboard, 23/32-inch (18.2 mm) wood structural panel or a material that is tested in accordance with and meets the acceptance criteria of both the Temperature Transmission Fire Test and the Integrity Fire Test of NFPA 275." [Quoted here from 2015 IRC, Section R316.4.]

The building codes permit alternative assemblies to the above quoted thermal barrier requirements under 2015 IBC Section 2603.9 Special Approval and 2015 IRC Section R316.6 Specific Approval. In essence, these sections permit approval based on the NFPA 286 test (and others) related to actual end-use configurations. Since NFPA 286 does not provide a pass/fail acceptance criteria, the code specifically provides that the test must pass in accordance with the acceptance criteria in 2015 IBC

Section 803.1.2.1 or 2015 IRC Section R302.9.4. (Note: 2015 IBC actually references the NFPA 286 acceptance criteria in Section 803.2, but this is a typographical error due to section renumbering of the 2006 IBC; 803.1.2.1 is the intended section.)

2015 IBC 803.1.2.1 reads as follows:

> **803.1.2.1 Acceptance criteria for NFPA 286.** The interior finish shall comply with the following:
>
> 1. During the 40 kW exposure, flames shall not spread to the ceiling.
> 2. The flame shall not spread to the outer extremity of the sample on any wall or ceiling.
> 3. Flashover, as defined in NFPA 286, shall not occur.
> 4. The peak heat release rate throughout the test shall not exceed 800 kW.
> 5. The total smoke released throughout the test shall not exceed 1,000 $m^2$.

2015 IRC R302.9.4 provides for the same NFPA 286 acceptance criteria.

The referenced materials were tested as a system in accordance with NFPA 286 at Intertek and reported in the report listed in the Reference Documents. The following table compares the results of that testing with the NFPA 286 acceptance criterial of 2015 IBC Section 803.1.2.1:

| Criteria | Test Result | Pass/Fail |
|---|---|---|
| During the 40kW exposure, flames shall not spread to the ceiling. | Negative | Pass |
| During the 160 kW exposure, flame shall not spread to the outer extremity of the sample on any wall or ceiling. | Negative | Pass |
| During the 160 kW exposure, flashover, as defined in NFPA 286, shall not occur | Negative | Pass |
| The peak rate of heat release throughout the NFPA 286 test shall not exceed 800 kW. | ~270 kW | Pass |
| The total smoke released throughout the NFPA 286 test shall not exceed 1,000 $m^2$ | ~140 $m^2$ | Pass |

**Conclusions:**

NCFI's InsulStar closed-cell at a maximum thickness of 8.25 inches on vertical surfaces and/or 10.25 inches on horizontal or overhead surfaces, SPF coated with a minimum of 18 mils wet film thickness or 12 mils dry film thickness of International Fireproof Technology DC 315 Fireproof Paint **qualifies** under the 2006, 2009, 2012 and 2015 International Building Code and the 2006, 2009, 2012 and 2015 International Residential Code as an alternative assembly to those requiring a thermal barrier as provided under 2015 IBC 2603.9 Special Approval and 2015 IRC R316.6 Specific Approval.

Respectfully submitted,
Deer Ridge Consulting, Inc.

Roger V. Morrison, PE, RRC
President

**Reference Documents:**

1. 2006, 2009, 2012 and 2015 editions International Building Code.
2. 2006, 2009, 2012 and 2015 editions International Residential Code.
3. Intertek Test Report No. 101656706SAT-003B_rev1, September 18, 2014.
4. NPFA 286 Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

Table 1: Code Section Correlation

| Building Code Edition | Special / Specific Approval Section | NFPA 286 Acceptance Criteria Section |
|---|---|---|
| 2006 IBC | 2603.9 | 803.2.1 |
| 2009 IBC | 2603.9 | 803.1.2.1 |
| 2012 IBC | 2603.10 | 803.1.2.1 |
| 2015 IBC | 2603.9 | 803.1.2.1 |
| 2006 IRC | R314.6 | R315.4 |
| 2009 IRC | R316.6 | R302.9.4 |
| 2012 IRC | R316.6 | R302.9.4 |
| 2015 IRC | R316.6 | R302.9.4 |