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CHEMISTRY AND CHEMICAL ENGINEERING DIVISION
FIRE TECHNOLOGY DEPARTMENT
WWW.FIRE.SWRI.ORG
FAX (210) 522-3377



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**FIRE PERFORMANCE EVALUATION OF PYROTARP™ PTL
I13ACR(H)™, AN ACRYLIC FIRE RESISTIVE COATING, IN
ACCORDANCE WITH THE 2006 EDITION OF NATIONAL
FIRE PROTECTION ASSOCIATION 286, STANDARD
METHODS OF FIRE TESTS FOR EVALUATING
CONTRIBUTION OF WALL AND CEILING INTERIOR FINISH
TO ROOM FIRE GROWTH**

FINAL REPORT
Consisting of 14 Pages

SwRI Project No. 01.13544.01.222
Test Date: October 20, 2009
Report Date: November 13, 2009

Prepared for:

Bradford Industries Incorporated
1857 Middlesex Street
Lowell, MA 01851

Prepared by:

A blue ink signature of Chad Brewer, written in a cursive style.

CB
Chad Brewer
Assistant Technical Specialist
Fire Testing Services Section

Approved by:

A blue ink signature of Anthony L. Saucedo, written in a cursive style.

Anthony L. Saucedo
Group Leader
Fire Testing Services Section

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INTRODUCTION

This report presents the results of a fire performance evaluation in accordance with the 2006 edition of National Fire Protection Association (NFPA) Standard 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. Testing was conducted on October 20, 2009, by Southwest Research Institute's (SwRI) Fire Technology Department, in San Antonio, TX.

This test method is intended for the evaluation of the flammability characteristics of wall and ceiling interior finish, other than textile wall coverings, where such materials constitute the exposed interior surfaces of buildings. It determines how much a material will contribute to a fire by measuring the amount of heat and smoke released, along with the combustion products released.

NFPA 286 does not have criteria for passing or failing a product due to performance during the fire test. In general, this test is used as a tool for ranking material performance in a standard configuration. However, a major event that this test can identify is the propensity of a material to cause a standard room to flashover, which according to NFPA 286, is determined to have occurred when two of five specified conditions are attained. The material being tested may perform differently when it is placed in a room of a different size or shape, or in different environmental conditions. The test data cannot be generalized to apply to these different conditions.

The heat release rate (HRR) is measured using the oxygen consumption technique. This technique requires the measurement of gas concentrations in the exhaust duct, as well as the volumetric flow of these gases. The products of combustion and entrained air are collected in a hood and extracted through an exhaust duct by a fan. A gas sample is drawn from the exhaust duct and analyzed for oxygen, carbon dioxide, and carbon monoxide concentrations. The gas temperature and differential pressure across a bidirectional probe are measured for calculating the mass flow rate of the exhaust gases.

Smoke release rate (SRR) is determined by the measured light obscuration in the exhaust duct using a vertically-oriented white-light extinction photometer located close to the gas sampling point. Temperature measurements were recorded using thermocouples positioned according to NFPA 286. The results apply specifically to the specimens tested, in the manner tested, and not to similar materials, nor to the performance when used in combination with other materials.

NFPA 286 (2006)

Client: Bradford Industries Incorporated
Project No.: 01.13544.01.222
Material ID(s): *PYROTARP™ PTL 113ACR(h)™* – Acrylic Fire Resistive Coating
Trade Name(s): *PYROTARP™, PYROBLOK™*
Received (SwRI): August 5, 2009
Material Description: Water-Based Intumescent Fire Retardant (FR) Coating

Construction Details

The module was constructed using nominal 2 × 4-in. stud walls and nominal 2 × 4-in. ceiling joists, which were placed every 24 in. on center. Regular ½-in. thick gypsum wallboard was placed on the interior of the module and secured using 1-5/8 in. screws every 12 in. on center around the perimeter and in the field.

On October 2, 2009, SwRI staff applied the FR coating, *PYROTARP™ PTL 113ACR(h)™*, to ½-in. thick regular gypsum wallboard, by roller, at a nominal coverage rate of 100 to 120 sq ft per gal. On October 5, 2009 the FR coating and substrate were placed in conditioning. On October 20, 2009, the test specimen was removed from conditioning and was installed over the top of the existing regular ½-in. thick gypsum wallboard using 1-5/8 in. screws every 12 in. on center around the perimeter and in the field. The interior final dimensions of the test room measured 8 × 12 × 8 ft high.

Test Results

The test room and building were at approximately 71 °F and 56% relative humidity at the start of the test. A summary of the test results is presented in Table 1. Test observations can be found in Table 2. Selected photographic documentation is provided in Figures 1 through 4. The test data is presented in Appendix A.

Table 1. Summary of Test Results and Flashover Limits.

	Maximum Heat Release Rate (Total)	Total Heat Flux to the Floor	Maximum Average Upper Layer Temperature	Flames Exiting Doorway?	Auto-Ignition of Paper Target?
<i>PYROTARP™ PTL 113ACR(h)™</i>	230 kW	2.6 kW/m ²	339 °C	No	No
Flashover Limits per Section 1.3.11 of NFPA 286	1,000 kW	20 kW/m ²	600 °C	Not Allowed	Not Allowed

Table 2. Test Observations.

Time (min:s)	Observation
00:00	Ignition of burner. Burner set at 40 kW.
00:03	Flames from the burner are up to 2½ ft above the floor.
00:05	Flames from the burner are up to 3½ ft above the floor.
00:13	Flames from the burner are up to 4½ ft above the floor. Light discoloration between 1 ft and 2 ft above the floor in the burner corner.
00:26	Light white smoke at 7 ft above the floor. Discoloration up to 4 ft above the floor.
00:40	Charring and discoloration radius of 7 in. at 1 ft, tapering to 3 in. at 5 ft above the floor in the burner corner.
00:54	Light gray smoke down to 6 ft above the floor.
01:08	Charring and discoloration radius of 7 in. at 1 ft tapering to 3 in at 6 ft above the floor in the burner corner.
01:12	Spotty ignition of back and side walls between 1 ft and 2 ft above the floor in the burner corner.
01:27	Light gray smoke down to 5½ ft above the floor.
01:55	Charring and discoloration radius of 10 in. at 1 ft, tapering 3 in. at 6 ft above the floor in the burner corner.
02:40	Flames intermittent to 6 ft above the floor.
03:00	Charring and discoloration radius of 11 in. at 1 ft, tapering 4 in. at 6 ft above the floor in the burner corner.
03:53	Medium density smoke down to 5¼ ft above the floor. Burner corner ceiling not visible.
04:41	Spotty ignition between 1 ft and 3 ft above the floor in the burner corner. Flames intermittent to 6 ft above the floor.
05:00	Burner increased to 160 kW. Flames up to the ceiling and flashing along the back wall out to 4½ ft and along the right wall out to 5 ft.
05:42	Burner corner ceiling now visible. Charring and discoloration radius directly above the burner is approximately 18 in.
05:53	Medium to light density white gray smoke down to 5 ft above the floor.
06:00	Full 12 in. radius charring up to 6 ft above the floor (smoke limited visibility). Increase in smoke density.
06:13	Charring and discoloration radius of 24 in. on the burn corner ceiling. Flames flashing along the back wall out to 4½ ft and along the right wall out to 4 ft.
07:00	Decrease in smoke density. Ceiling visible again.
07:53	Full 12 in. radius charring up to 8 ft above the floor.
08:00	Some intumescent char peeling off between 2 ft and 3 ft above the floor in the burner corner.
08:30	Several pieces of FR coating falling to the floor within 3 ft to 4 ft of the burner.
09:45	Charring and discoloration radius of 12 in. at 1 ft, 18 in. at 4 ft, and tapering to 14 in. at 6+ ft above the floor in the burner corner. Smoke limited visibility.
13:00	No significant change.
15:00	End of Test. Burner extinguished. Fire self-extinguished.

The 2006 International Building Code (IBC) has acceptance criteria for interior wall or ceiling finishes tested in accordance with NFPA 286. The criteria as contained in the 2006 IBC, Section 803.2, is as follows:

1. During the 40-kW exposure, flames shall not spread to the ceiling.
2. During the 160-kW exposure, the interior finish shall comply with the following:
 - a. Flame shall not spread to the outer extremity of the sample on any wall or ceiling.
 - b. Flashover, as defined in NFPA 286, shall not occur.
3. The peak rate of heat release throughout the NFPA 286 test shall not exceed 800 kW.
4. The total smoke released throughout the NFPA 286 test shall not exceed 1,000 m².

CONCLUSION

Based on the test results, the material identified as *PYROTARP™ PTL 113ACR(h)™*, with a nominal coverage rate of 100 to 120 sq ft per gal, applied over ½-in. thick gypsum wallboard, did not cause the test room to flashover according to NFPA 286. The material does meet the acceptance criteria for interior wall or ceiling finishes as described in the 2006 IBC.

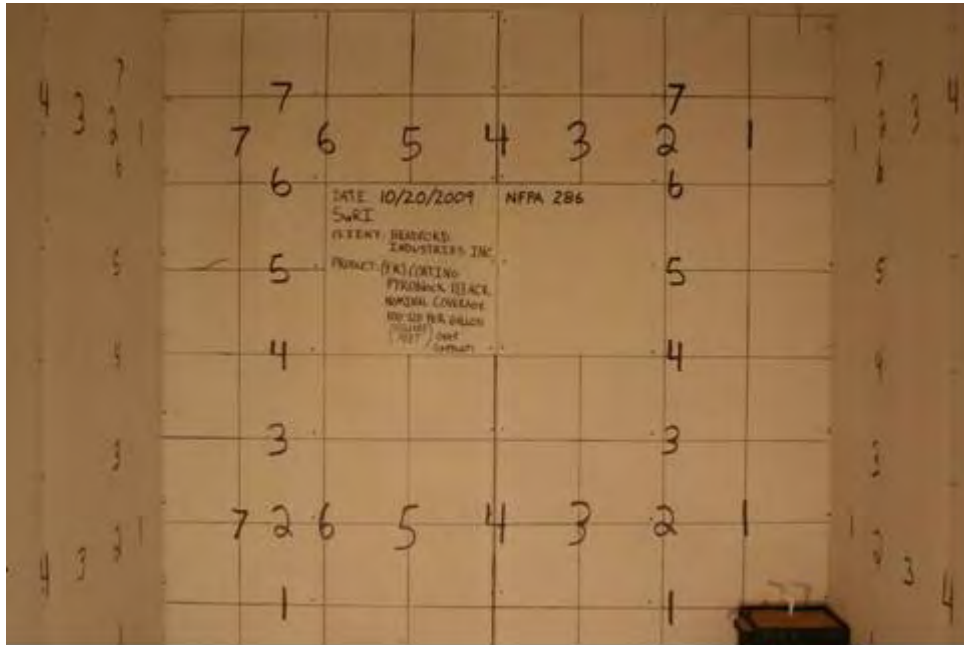


Figure 1. Pretest Setup.



Figure 2. Burner at 40 kW: 3 min 13 s into Test.



Figure 3. Burner at 160 kW: 14 min 47 s into Test.

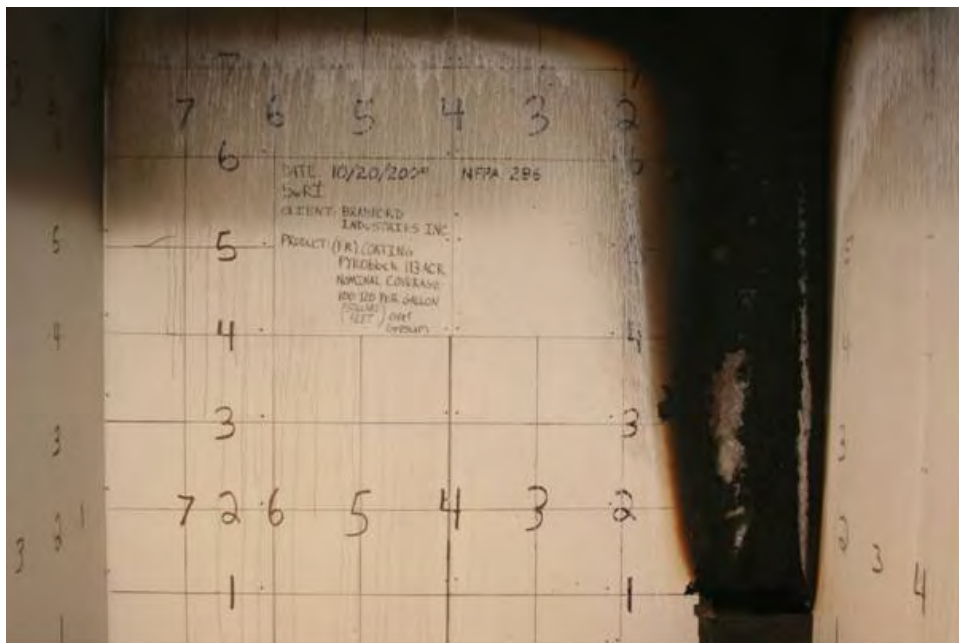


Figure 4. Post-Test Corner

APPENDIX A
TEST DATA
(Consisting of 5 Pages)

**SUMMARY OF
 TEST RESULTS**

Maximum HRR _{total}	230 kW	at 6:05
Average HRR _{total}	124 kW	
Total Heat Released	112 MJ	
Maximum HRR _{excl. Burner}	70 kW	at 6:05
Average HRR _{excl. Burner}	9 kW	
Total Heat Released (Excluding Burner)	8 MJ	
Maximum Smoke Release Rate	1.70 m ³ /s	at 15:00
Average Smoke Release Rate	0.82 m ³ /s	
Total Smoke Released	737 m ³	
Maximum Optical Density	0.417 l/m	at 15:00
Maximum Duct Flow Rate	1.78 m ³ /s	at 13:05
Average Optical Density	0.221 l/m	
Average Volumetric Duct Flow Rate	1.74 m ³ /s	
Total Heat Flux to the Floor	2.6 kW/m ²	at 14:00
Max. Average Upper Layer Temperature	339 °C	at 6:43
	642 °F	
Maximum Doorway Temperature	285 °C	at 6:48
	545 °F	

