

CLIENT: **Bautex Systems, LLC**
101 Thermal Drive, Ste. 10
San Marcos, TX 78666

Attn: David Sterne

Test Report No: RJ-1822-3	Date: May 24, 2012
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SUBJECT: Flammability Testing to NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth – 2006 Edition.

REFERENCE: Signed Work Order by David Sterne of Bautex Systems."

SAMPLE ID: Client refers to samples received as **"Bautex Block without Interior Finish (Drywall)"**. The samples were entered into our receiving system on 3/15/12 in good condition.

TEST REQUESTED: Flammability Testing to NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth – 2011 Edition. The referenced procedure was used to generate this report and data obtained from the test. Installation of the sample was specified as by the manufacturer's instructions. No revisions of this report will be allowed after 90 days of the original report issue.

TEST DATE: 5/04/12

RESULTS: Results can be found on the following pages.

CONCLUSION: Currently, there are no acceptance criteria listed in NFPA 286. The material complies with NFPA 101; Life Safety Code, 2009 Edition, Section 10.2.3.7.2.

CERTIFICATION: The tests reported here were conducted under the continuous direct supervision of QAI Laboratories Inc., Tulsa, OK.

**SIGNED FOR AND ON BEHALF OF
QAI LABORATORIES, INC.**



Greg Ertel
Test Technician



J. Brian McDonald
Operations Manager



Test Sample Description:

QAI Laboratories, Inc. conducted testing for Bautex Systems, LLC. "Bautex Block" to evaluate heat release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with NFPA 286, 2011 Edition. This testing was performed on May 4, 2012.

The Bautex team constructed the test room for the NFPA 286 Room Corner Burn test at the QAI laboratory in Tulsa, OK. The interior dimensions of the constructed room were 12' x 8' with an 8' wall height. The interior dimension required for the test was first laid out on the concrete in the test area and checked for square then the interior wall guidelines were laid on the floor using a chalk line. The construction began at one corner, opposite the doorway into the room. The corner pieces for the entire construction were fabricated by cutting with an electric chainsaw. These corner pieces were all cut from standard blocks. The first course was laid working out from the first corner. Care was taken to level and plumb the first course using spray foam adhesive and wooden shims when required. Spray foam adhesive was lightly applied at all joints between blocks to help hold the assembly in place. Each subsequent course was laid in a similar manner to the first course while checking room dimensions and plumb and level. Upon reaching 8' in height, another chalk line was used around the perimeter of the top of the wall. This chalk line was used as a guide and the wall was trimmed to exact height required for the test using an electric chainsaw. A light wood frame was also constructed to hold the interior sheetrock ceiling. This was then installed on top of the constructed assembly using sheetrock screws. The perimeter of the joint between the wall and ceiling was then also taped and floated. The exterior of the room to wall connection was sealed for testing with heat resistant tape and caulk. The sheetrock for the ceiling was allowed to cure overnight prior to testing. This test was conducted on bare sample without drywall on the interior walls.

The temperature of the test chamber prior to test was 74°F (23°C) and the relative humidity was 56%.

Ignition Source:

The ignition source for the test is a gas burner with a nominal 12 by 12 inch orifice, filled with a minimum 4 inch layer of Ottawa sand. The top surface of the burner through which the gas is applied is positioned 12 inches above the floor. The burner enclosure was placed as per NFPA 286 from the side wall and back wall in the test corner, opposite the door.

Burner Gas Flow:

CP Grade Propane was used for burner supply gas. A calibrated mass flow meter (Asset A300110, due for calibration 2/23/13) was used to meter flow to the burner. The 40 kW 5 minute exposure flowed 27 l/min Propane. These numbers were based upon the following constant: 1.485 kW min/l.

Compartment Geometry:

The interior dimensions of the floor of the fire test room, when the specimens are in place, measures 8 by 12 feet. The finished ceiling is 8 feet +/- 0.5 inches above the floor. The four walls are right angles defining the compartment. The compartment contains a 30 +/- 0.25 by 80 +/- 0.25 inch doorway in the center of one of the 8 by 8 foot walls. No other openings were present to provide ventilation.

Heat Release Rate Information:

All Heat Release Rate information obtained during this test utilized oxygen consumption calorimetry. The equation used for calculation is as follows:

$$\dot{q} = E * 1.10 * C \sqrt{\left[\frac{\Delta p}{T_s} \right]} * \left[\frac{(X_{O_2}^{A_s} - X_{O_2}^A)}{1 + \phi + (\alpha - 1)} \right]$$

Thermocouple Placement:

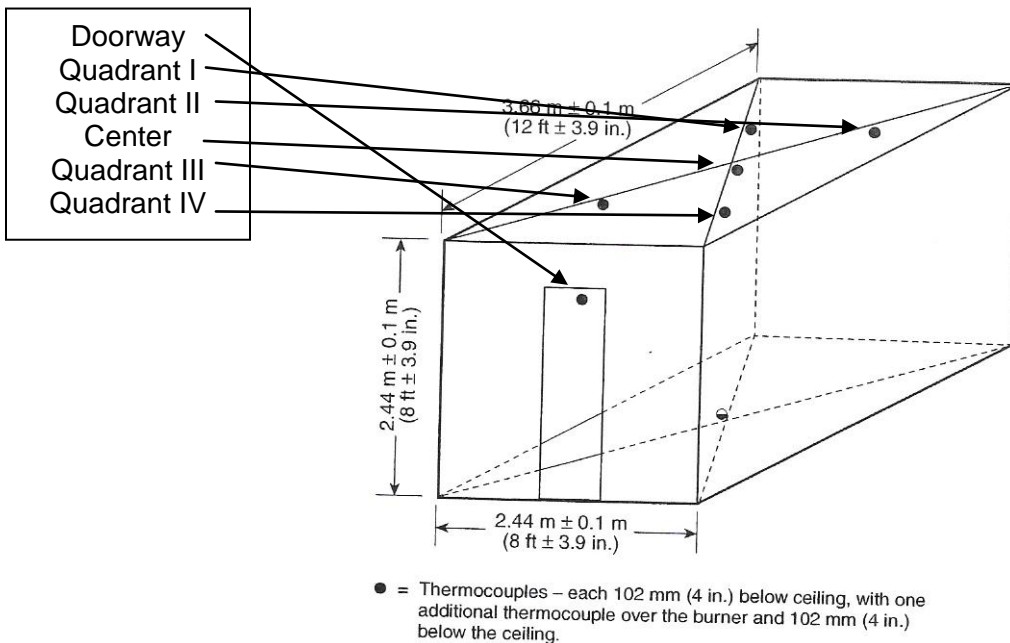


FIGURE 1. Thermocouple Locations



VISUAL OBSERVATIONS and DISCUSSIONS OF PERFORMANCE:

- 0:00:00 – Sand diffusion burner lit to 40 kW flame
- 0:01:00 – Very light clear smoke present, no charring on wall around burner noted
- 0:03:00 – Light smoke layer starting to form at ceiling level, no propagation of flame along the sample
- 0:04:00 – Flame level steady, no propagation noted
- 0:05:00 – Burner increased to 160 kW
- 0:06:00 – Only slight increase in smoke production, still very light smoke noted
- 0:08:00 – Smoke level has remained steady, still very clear
- 0:13:00 – Little change in overall conditions, no propagation of flame along sample noted
- 0:15:00 – Overall test concluded, no flames were noticed on the sample after burner extinguishment

Flame Spread and Charring Measurement Discussion: (See video)

There was no flame spread noted on the face of the sample throughout the test. There was very little, if any, visual damage to the test sample under the drywall as well. Only very slight discoloration appeared where direct flame was applied.

Smoke Density:

A peak duct smoke obscuration value of 83% (17 % blocked) and a Smoke Release Rate was 0.1 m²/sec was measured 7 minutes 00 seconds after ignition. The total Smoke Released at the end of the test was 11.9 m².

The smoke obscuration reading was taken in the center of a 16 inch diameter duct.

Heat Flux Information:

The Gardon Type heat flux gauge registered a peak Heat Flux of 0.45 kW/m² at 12:31 min into test.



FLASHOVER POTENTIAL:

In Section 1.3.1 of NFPA 286, the definition of flashover is an event where any two of the following conditions have been attained:

- Heat Release Rate exceeds 1 MW
- Heat Flux at the floor exceeds 20 kW/m²
- Average upper layer temperature exceeds 600°C (1112°F)
- Flames exit doorway

For purposes these test results, the following compares the standard's definition of flashover with actual test results for comparison purposes:

- Peak Heat Release Rate of 178 kW
- Heat Flux at floor – Peak of 0.45 kW/m²
- Average upper average temperature – 209 °C (409 °F)
- Flames did not exit doorway



RESULTS:

Temperature vs. Time Chart:

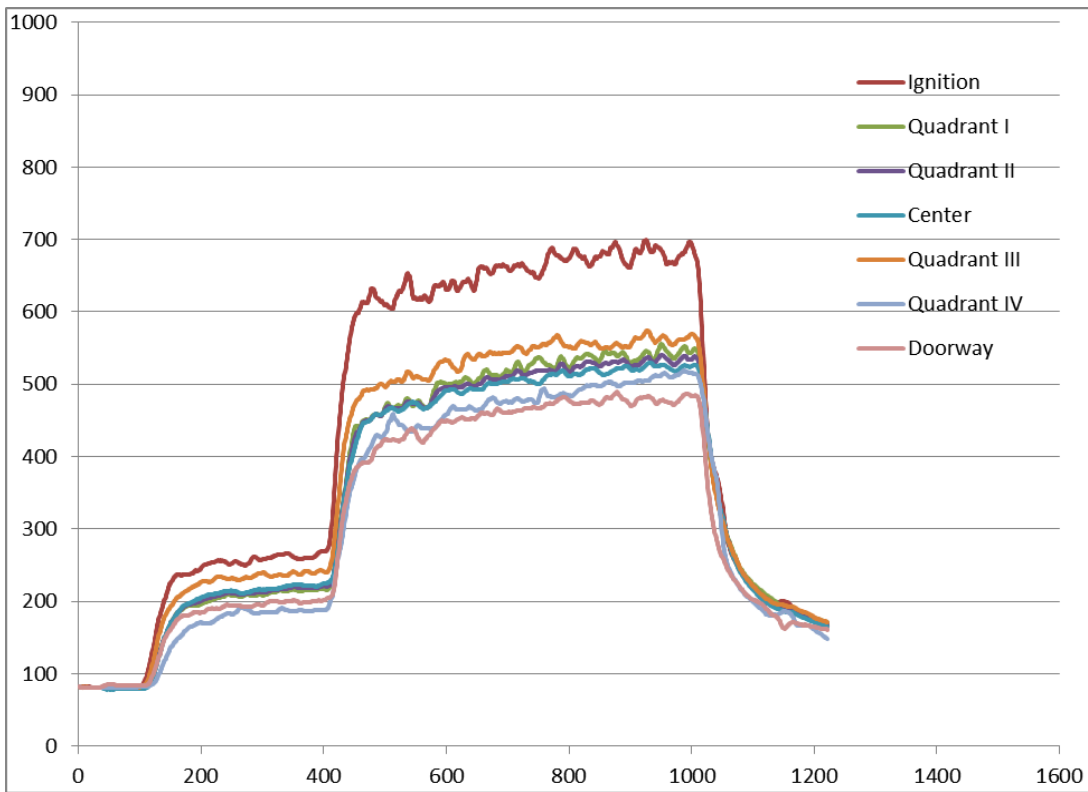


FIGURE 2. Temperature vs. Time

Maximum Peak Temperatures:

Doorway	489°F (254°C)
Center	530°F (276°C)
Quadrant I	555°F (291°C)
Quadrant II	541°F (283°C)
Ignition	699°F (371°C)
Quadrant III	530°F (301°C)
Quadrant IV	518°F (270°C)

AVERAGE UPPER LAYER TEMP – 409°F (209 °C)



Heat Release Rate vs. Time Chart:

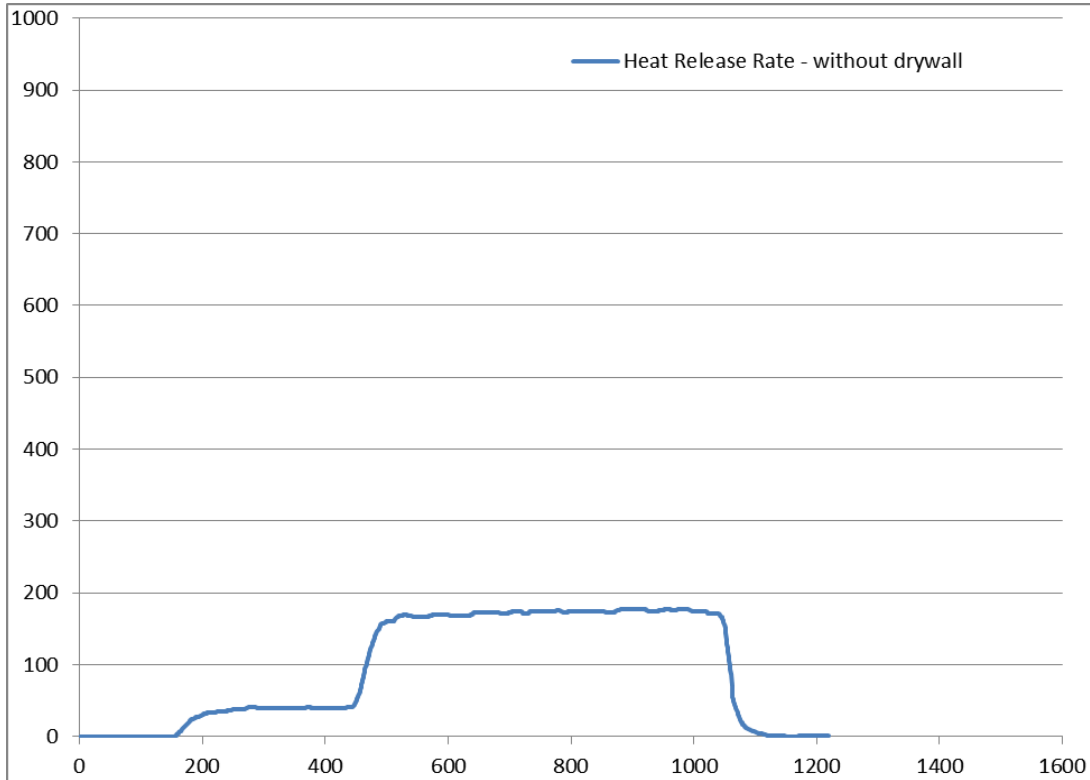


FIGURE 3. Heat Release Rate vs. Time

Numerical Values:

0-5 min average	40
5-15 min average	172
Peak Heat Release Rate	178 kW @ 12:08
Total Heat Released During 15 min Test	113.4

PHOTOS: BEFORE TEST



Ignition Corner

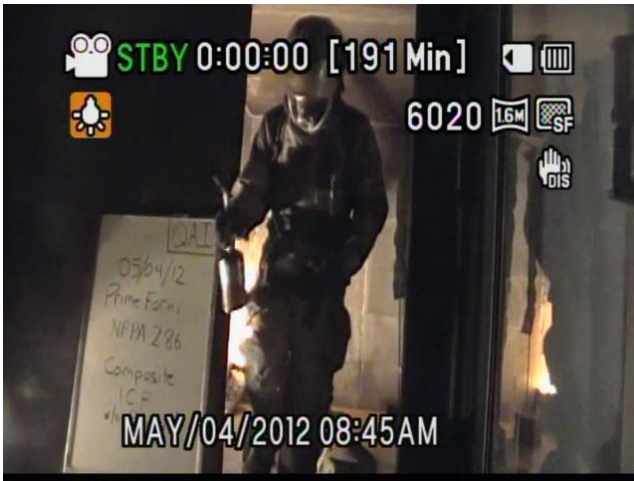


Opposite Corner

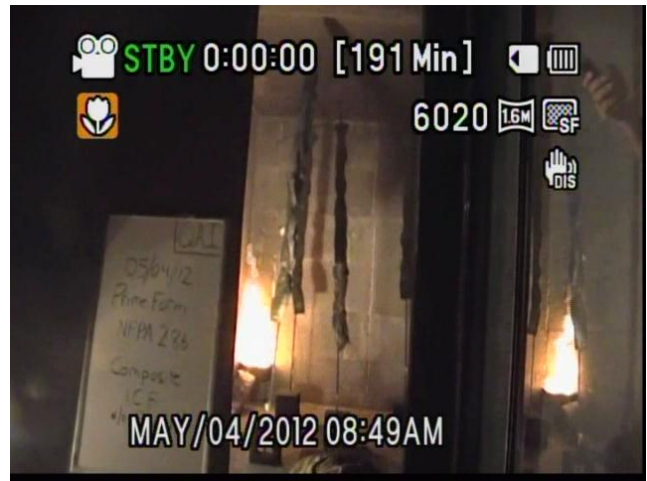


Overall

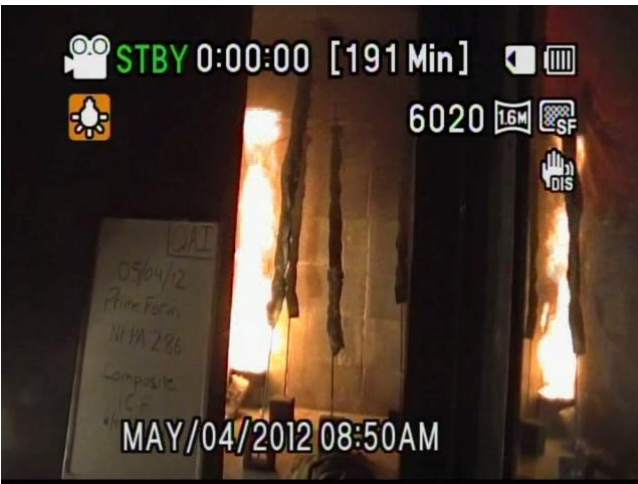
PHOTOS: DURING TEST



At Test Start



4 Minutes into Test

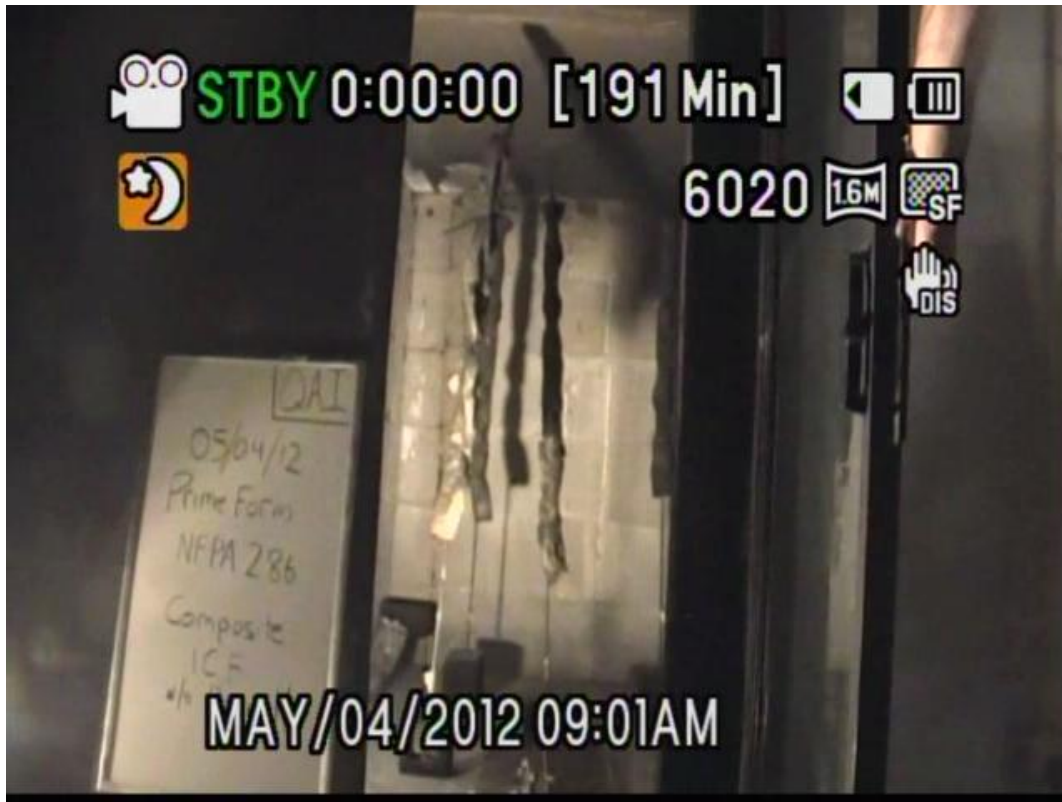


5 Minutes into Test



10 Minutes into Test

PHOTO: AFTER



Immediately After Test

End of Report

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