

CLIENT: **WANESSA-SUE, INC**
PO Box 3758
Kingman, AZ 86402
Attn: Wanessa Pence

Test Report No:	TJ1237	Date:	May 7, 2013
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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 – 2011 Edition.

PRODUCT EVALUATED: Client refers to samples received as “**AIRLIGHT Building Panels**”. This project was entered into our receiving system on 4/05/13 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* and 2006 IBC Section 803.2.1 / 2009 IBC Section 803.1.2 / NFPA 101, and *Life Safety Code*, 2009 Edition, Section 10.2.3.7.2, and 2009 IRC 316.6. The referenced procedure was used to generate this report and data obtained from the test.

SAMPLING DETAIL: On April 11, 2013, QAI Inspector Jason Freidrich witnessed production of test samples. The client then sent the samples directly to the lab prior to testing. The details of this random sampling can be referenced in the Sampling Report RJ2510.

TEST DATE: April 25, 2013

CONCLUSION: Currently, there are no acceptance criteria listed in NFPA 286. Based on the test results herein, the tested assembly as described in this report **COMPLIES** with NFPA 101; Life Safety Code, 2009 Edition, Section 10.2.3.7.2., 2009 IBC Section 803.1.2, and 2009 IRC 316.6.

CERTIFICATION: The tests reported here were conducted under the continuous direct supervision of QAI Laboratories Inc., Tulsa, OK. No revisions of this report will be allowed after 90 days of the original report issue.

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



David Bauchmoyer
Test Technician



J. Brian McDonald
Operations Manager



Test Sample Description:

QAI Laboratories, Inc. conducted testing Wanessa-Sue, Inc on "AIRLIGHT Building Panels" 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 April 25, 2013.

The product was described as a thermal brake, pre-engineered, pre-insulated steel framed building panels. The panels were 24 gauge metal framing embedded on the front and back of a 5 ½" thick molded EPS block.

The foam test samples were randomly selected by a QAI representative at the client's manufacturing facility located at 5456 Inez Road in Kingman, AZ 86409. QAI documented the materials and manufacturing procedures in accordance with ICC-ES AC85, Section 3.1. The test panels arrived on April 24, 2013.

The test room was built by QAI Laboratories staff in accordance with the recommended practices specified by Wanessa-Sue, Inc. ½" gypsum board was installed onto the walls and ceiling of the test chamber utilizing normal zinc galvanized screws into the metal studs of the wall panel. Metal tape was installed at the joints in lieu of mud and tape. The final interior dimensions were 8 feet high, 8 feet wide and 12 feet deep.

The temperature of the test chamber prior to test was 69°F (18°C) and the relative humidity was 49%.

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 1 inch away from each 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 3/28/14) was used to meter flow to the burner. The 40 kW 5 minute exposure flowed 27 l/min Propane and the 160 kW exposure flowed 108 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:

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

Thermocouple Placement:

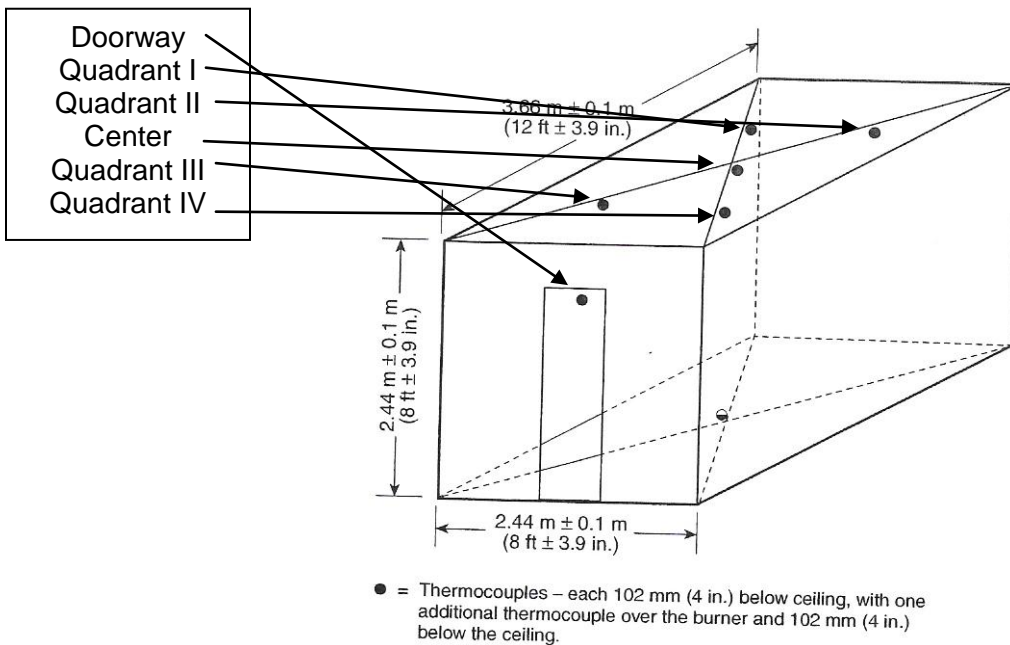


FIGURE 1. Thermocouple Locations



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, some charring on wall directly behind burner
- 0:02:00 – Some small flaming noted in ignition corner and smoke density at steady level
- 0:03:00 – Flame travel up corner of ignition mostly from burner, does not reach ceiling, area of origin charred
- 0:04:00 – Flame level steady, no significant contribution from test assembly noted, light smoke
- 0:05:00 – Sand diffusion burner increased to 160 kW flame
- 0:06:00 – Slight increase in smoke density, smoke light grey in color
- 0:08:00 – No significant flame contribution from the test assembly noted
- 0:10:00 – Smoke is decreasing in density
- 0:13:00 – Little change in above conditions
- 0:15:00 – NFPA 286 test complete, flames immediately self-extinguish after gas shut off

Flame Spread and Discussion: *(video record on file)*

Flame spread of the sample was only minimal and was noted around flame plume of ignition burner. Flames did not reach the ceiling during the first 5 minutes nor did it reach the extremities of the test module and flashover, as defined in the specified test designation, did not occur.

Smoke Density:

A peak duct smoke obscuration value of 79% (21 % blocked) and a Peak Smoke Release Rate was 0.172 m²/s 7 minutes and 42 seconds after ignition.

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

Heat Flux Information:

The heat flux gauge registered a peak Heat Flux of 4.4 kW/m² at 8:39 min into test.

CHARRING MEASUREMENT:

All charring as a result of testing this assembly was limited to the corner of the burner placement up the side walls and to the ceiling. Approximately two feet in both directions of the corner of burner placement showed charring up the walls and began to taper out at about 7 feet from the ceiling. The corner of the ceiling at approximately 3 foot radius showed evidence of charring as well. The test of the ceiling showed only dark discoloration due to soot deposition and evidence of slight decomposition of wall surface.



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
- Autoignition of a paper target on the floor occurs

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 213 kW
- Heat Flux at floor – Peak of 4.4 kW/m²
- Average upper average temperature – 406°F (208°C)
- Flames did not exit doorway
- Both paper targets undamaged during test

LIFE SAFETY CODE:

From NFPA 101, Section 10.2.3.7.2, and 2009 IBC 803.1.2.1, the following conditions shall be met when using the test protocol of NFPA 286, Standard Methods of Fire Tests for Evaluating Contribution Wall and Ceiling Interior Finish to Room Fire Growth:

- Flames shall not spread to the ceiling during the 40 kW flame exposure.
- During the 160 kW flame exposure, the following criteria shall be met:
 - Flames shall not spread to the outer extremities of the sample of the 8 ft x 12 ft wall
 - Flashover shall not occur
- The peak heat release rate throughout the test shall not exceed 800 kW.
- For new installations, the total smoke released shall not exceed 1000 m²



RESULTS:

Temperature vs. Time Chart:

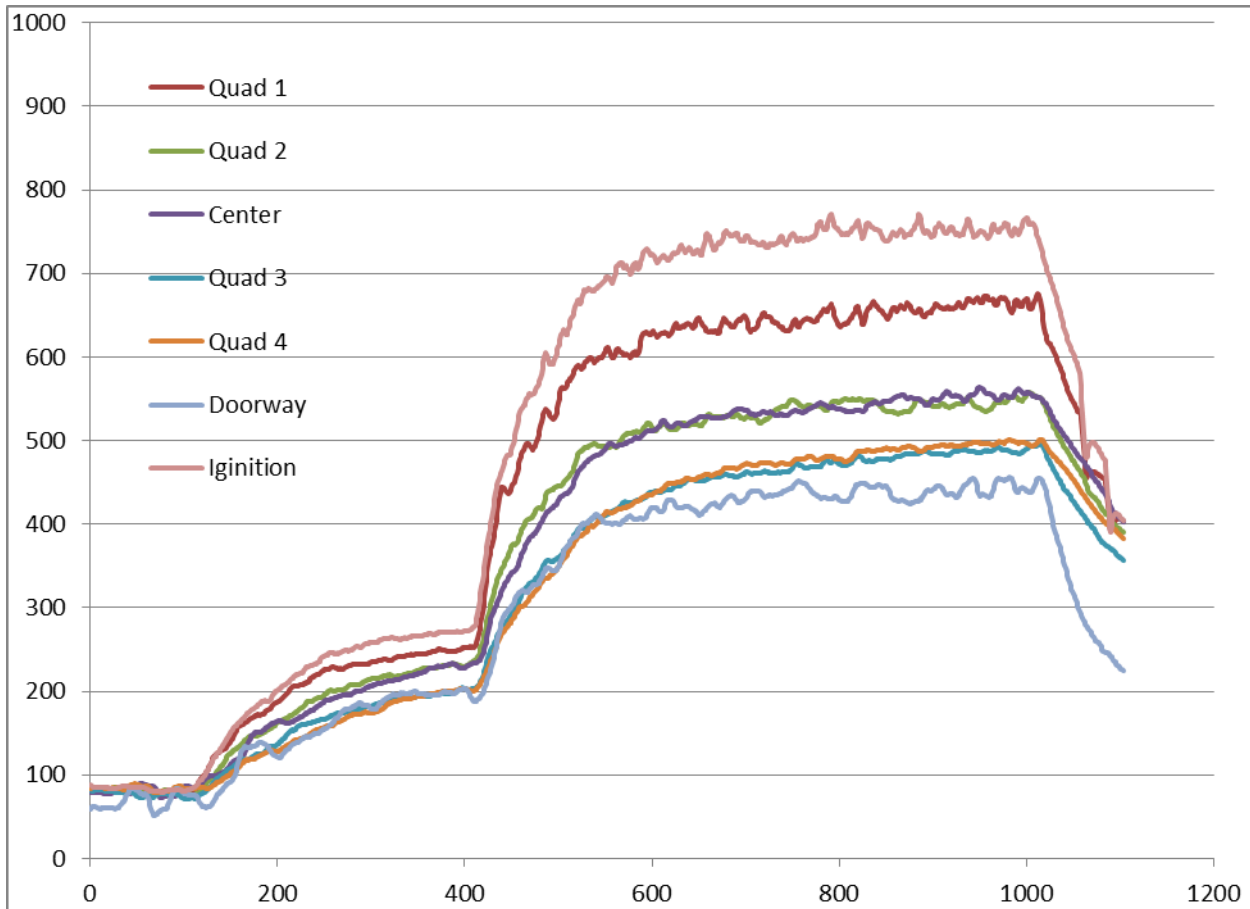


FIGURE 2. Temperature vs. Time

Maximum Peak Temperatures:

Doorway	456°F (236°C)
Center	464°F (296°C)
Quadrant I	675°F (357°C)
Quadrant II	578°F (303°C)
Ignition	772°F (411°C)
Quadrant III	497°F (258°C)
Quadrant IV	502°F (261°C)

AVERAGE UPPER LAYER TEMP – 406°F (208°C)



Heat Release Rate vs. Time Chart:

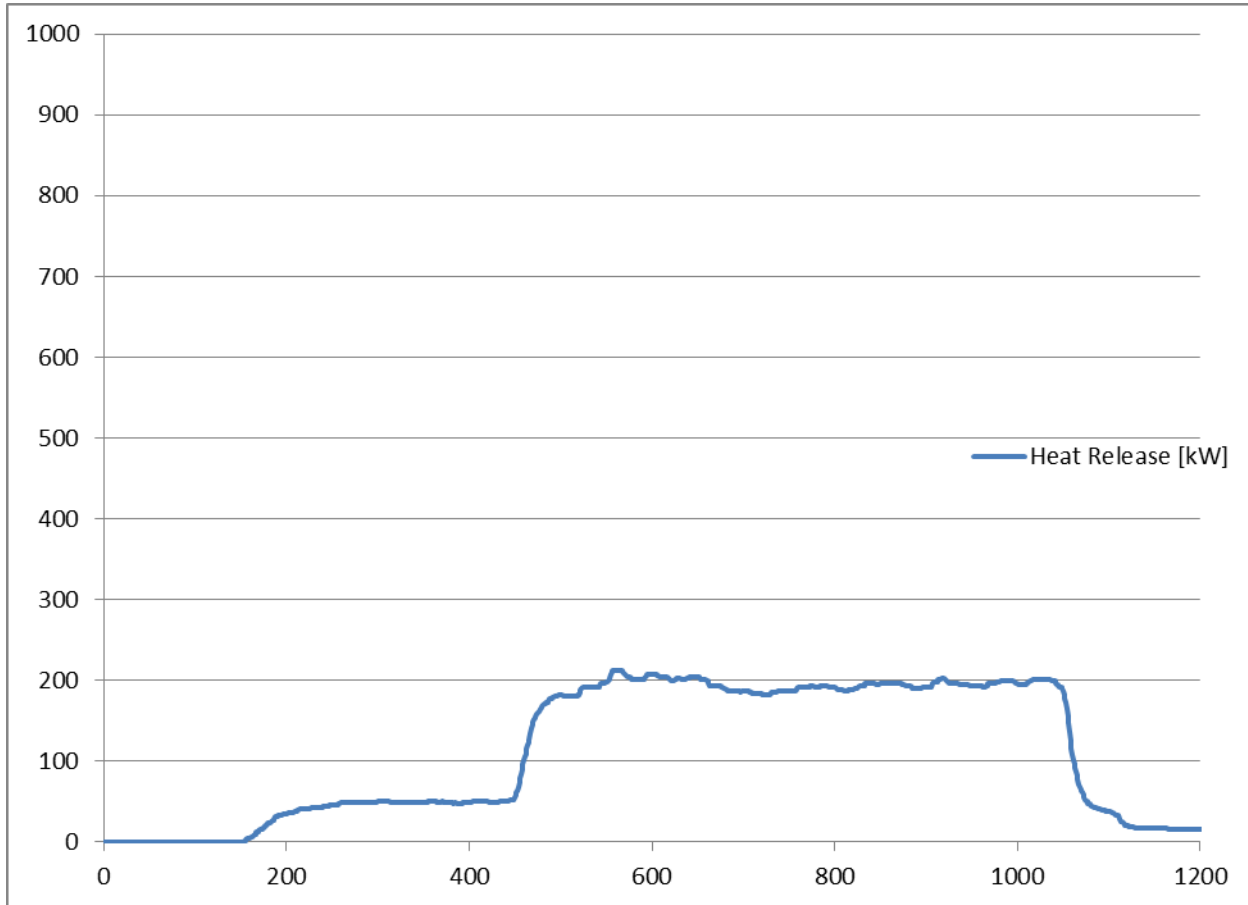


FIGURE 3. Heat Release Rate vs. Time

Numerical Values:

0-5 min average (kW)	47.3
5-15 min average (kW)	192.3
Peak Heat Release Rate	213 kW @ 6:58
Total Heat Released During 15 min Test	124.7



Smoke Obscuration and Smoke Release Rate:

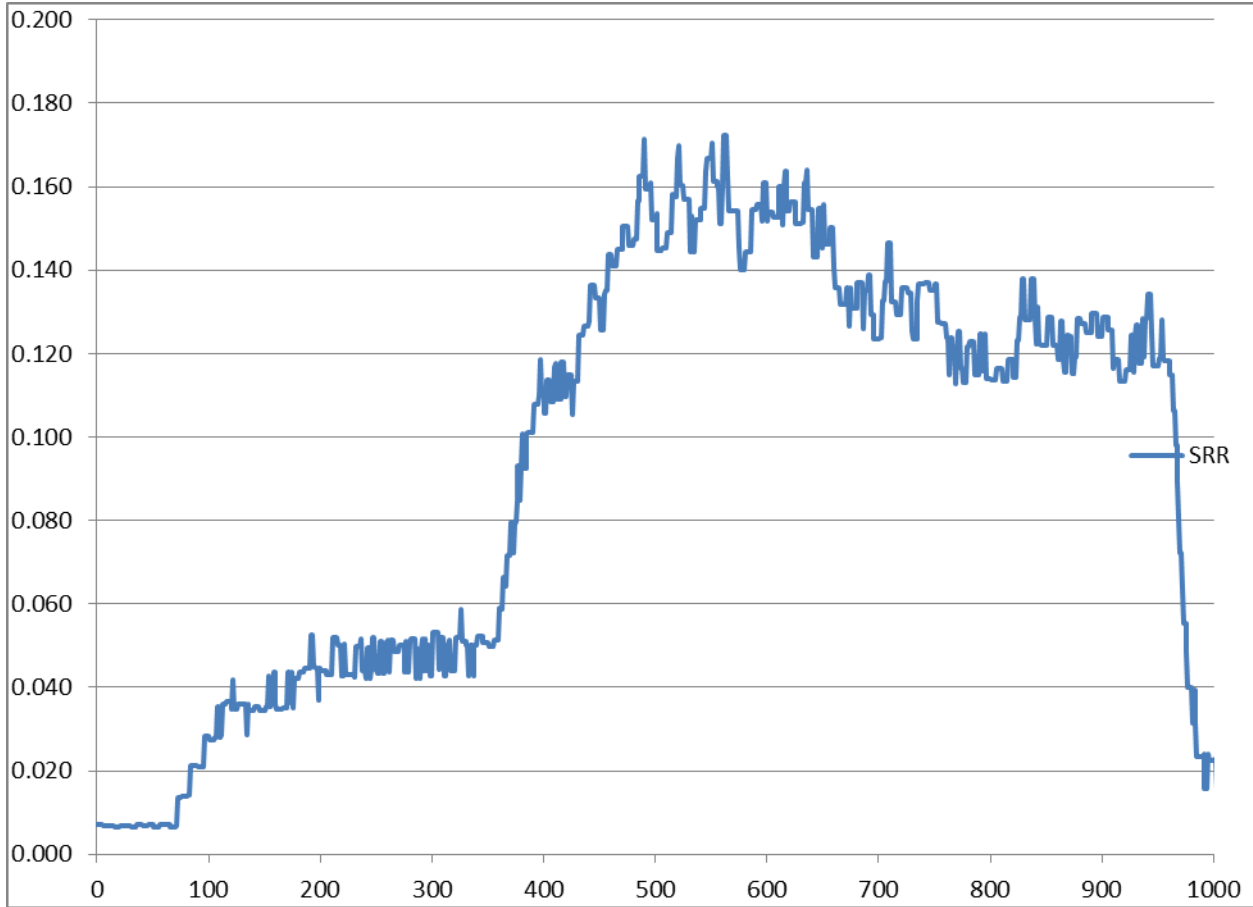
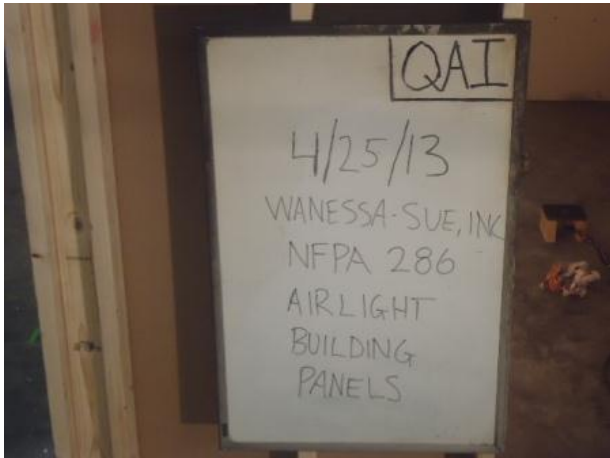


FIGURE 4. Smoke Release Rate vs. Time

Numerical Values:

0-5 min average (m ² /s)	0.05
5-15 min average (m ² /s)	0.13
Peak Smoke Release Rate	0.172 m ² /s @ 7:42
Total Smoke Released	81.7
Peak Obscuration	21%

PHOTO: BEFORE TEST



Sign



Before Gypsum Board



Opposite Corner



Ignition Corner

PHOTOS: DURING TEST



Test Start



2 Minutes In



3 Minutes In



At 5 minutes

PHOTO: DURING TEST (Cont.)



6 Minutes In



9 Minutes In



13 Minutes In

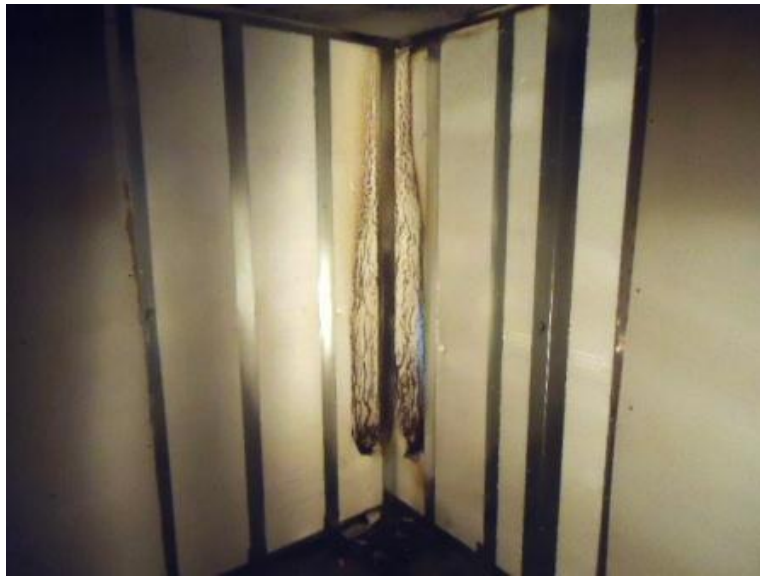


15 Minutes In

PHOTO: AFTER TEST



Photos Immediately After Test



Sample Behind Gypsum Board

END OF REPORT