

CLIENT: **AK Athletic Equipment**
8015 Howe Industrial Parkway
Canal Winchester, Ohio 43110

Test Report No: TJ6798	Date: November 5, 2019
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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 – 2015 Edition.

PRODUCT EVALUATED: Client refers to samples received as “**AK Athletic Equipment – FSA-26LU Wall Panels**”. This project was activated on October 4, 2019.


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 – 2019 Edition* and 2006 IBC Section 803.2.1 / 2009 IBC Section 803.1.2 / NFPA 101, and *Life Safety Code*, 2019 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.

AUTHORIZATION: Proposal 19DN091802 approved on September 27th, 2019


SAMPLING DETAIL: Test samples were submitted to the laboratory directly by the client. No sampling was observed by QAI Laboratories staff. The samples used for testing were manufactured under the batch/invoice # 33132.

TEST DATE: October 24, 2019

CONCLUSION: Based on the test results documented in this report, the tested assembly described in this report **COMPLIES** with the acceptance criteria specified in Annex C of NFPA 286-2019. Furthermore, based on these test results, the tested assembly **COMPLIES** with the requirements for such assemblies as prescribed in the following regulatory codes: NFPA 101, *Life Safety Code*, 2019 Edition, Section 10.2.3.7.2; 2009 IBC Section 803.1.2; and 2009 IRC 316.6


Daniel Barnett
Project Engineer

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


J. Brian McDonald
Operations Manager



Test Sample Description:

QAI Laboratories, Inc. conducted testing for AK Athletic Equipment on "FSA-26LU Wall Panels" to evaluate heat release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with NFPA 286, 2019 Edition. This testing was performed on October 24, 2019.

The test room was built by QAI Laboratory personnel prior to the installation of the test sample. The three walls consisted of 2 x 4 wood studs, spaced 24 inches on center. The ceiling was constructed using 2 x 4 wood joists, spaced 24 inches on center, running parallel to the side walls. The interior ceiling and walls were covered with ½" thick, Type X gypsum board. The final interior dimensions were 8 feet high, 8 feet wide and 12 feet deep.

On October 23, 2019, QAI Laboratories staff installed the 2 ft x 4 ft FSA-26LU Wall Panels (measuring 2 ½ inches thick) on the walls of the room corner fixture. No panels were installed on the ceiling of the room corner fixture. The back corners of the room are constructed so that they meet the criteria of NFPA 286.

This room was placed into a conditioning room with conditions that meet the requirement of this standard for at least 48 hours prior to testing. The temperature of the test chamber prior to test was 70°F (21°C) and the relative humidity was 48%.

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 A300649, due for calibration 2/19/20) 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 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:

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

Thermocouple Placement:

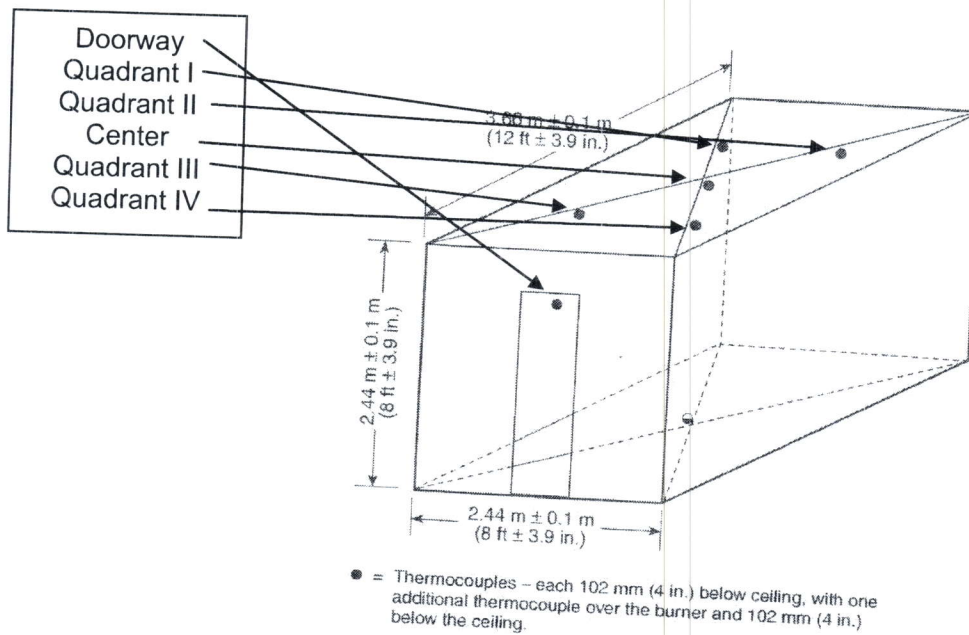


FIGURE 1. Thermocouple Locations



VISUAL OBSERVATIONS and DISCUSSIONS OF PERFORMANCE:

- 0:00:00 – Sand diffusion burner lit to 40 kW flame
- 0:00:15 – Sustained ignition on the back and left walls
- 0:00:23 – Discoloration and charring of the back and left walls
- 0:01:45 – Sample audibly crackling
- 0:02:13 – Sample material flaking
- 0:05:00 – Pieces of sample material falling to the floor
- 0:05:00 – Sand diffusion burner increased to 160 kW flame
- 0:05:32 – Embers falling to the floor
- 0:06:00 – Contribution of flame from walls noted, increased smoke light in color
- 0:07:00 – Minimal contribution of flame from walls, change in color of smoke darker in color
- 0:10:00 – Little change in conditions above
- 0:13:00 – Continued steady performance
- 0:15:00 – End of Test

Flame Spread and Char Measurement: *(video record on file)*

Flame spread of the sample was minimal. Only slight and negligible contribution from the test sample was noted around flames from burner for the first 5 minutes of test. From that point forward there was no significant contribution of material to the intensity of flaming. Flames did not reach the extremities of the test module and flashover, as defined in the specified test designation, did not occur.

All charring as a result of testing this assembly was limited to the corner of the burner placement and directly above the burner on the ceiling. There was a “V” pattern of char in the corner of ignition that went up to the ceiling, starting at the burner and ending up charring a section measuring approximately three feet in both directions to the ceiling. The ceiling itself was black with char and soot deposition as was each of the three walls measuring approximately 2 feet down from the ceiling.



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 193 kW
- Heat Flux at floor – Peak of 4.1 kW/m²
- Average upper average temperature – 847°F (453°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.
- The total smoke released shall not exceed 1000 m²

RESULTS:

Temperature vs. Time Chart:

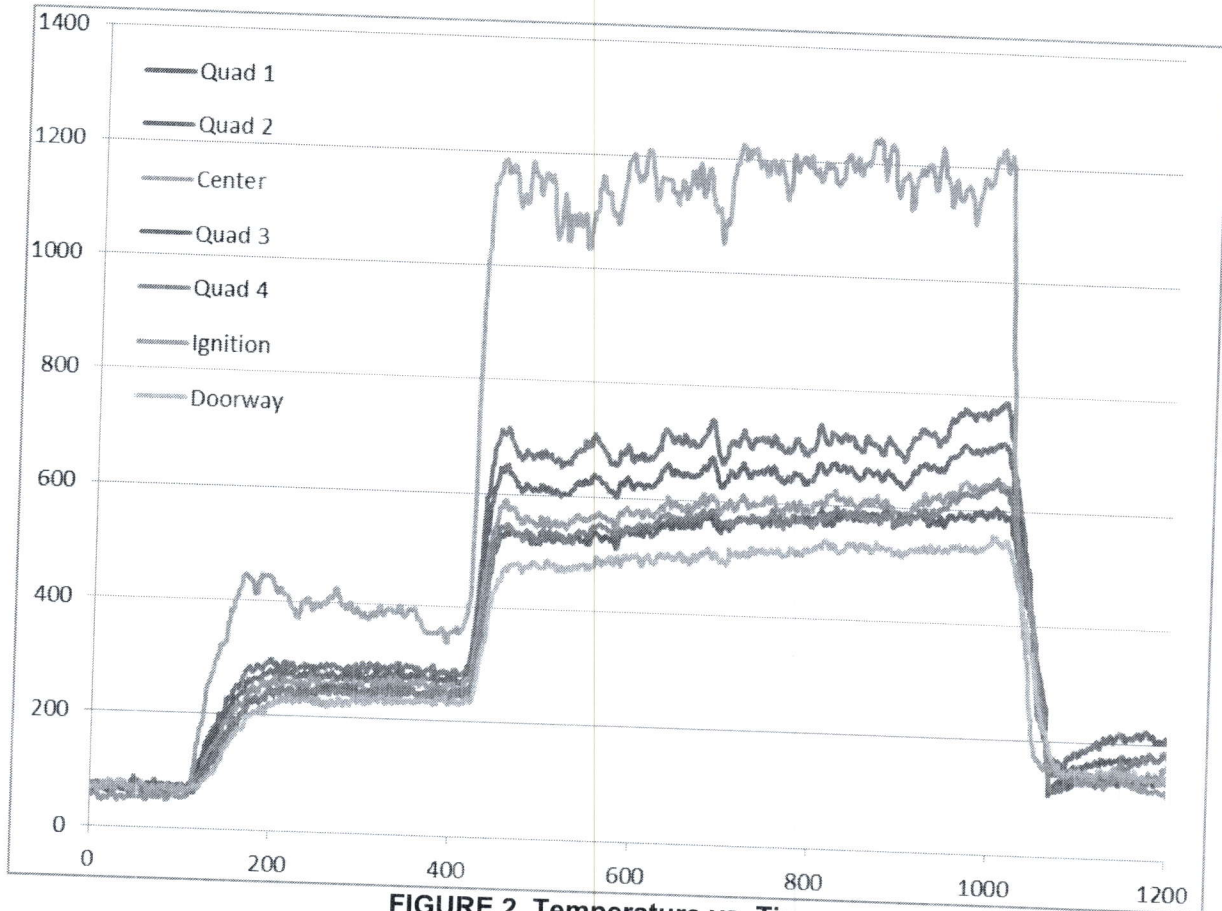


FIGURE 2. Temperature vs. Time

Maximum Peak Temperatures:

Doorway	555°F (290°C)
Center	605°F (318°C)
Quadrant I	789°F (421°C)
Quadrant II	718°F (381°C)
Ignition	1245°F (674°C)
Quadrant III	605°F (318°C)
Quadrant IV	653°F (318°C)

PEAK AVERAGE UPPER LAYER TEMP – 847°F (453°C)

Heat Release Rate vs. Time Chart:

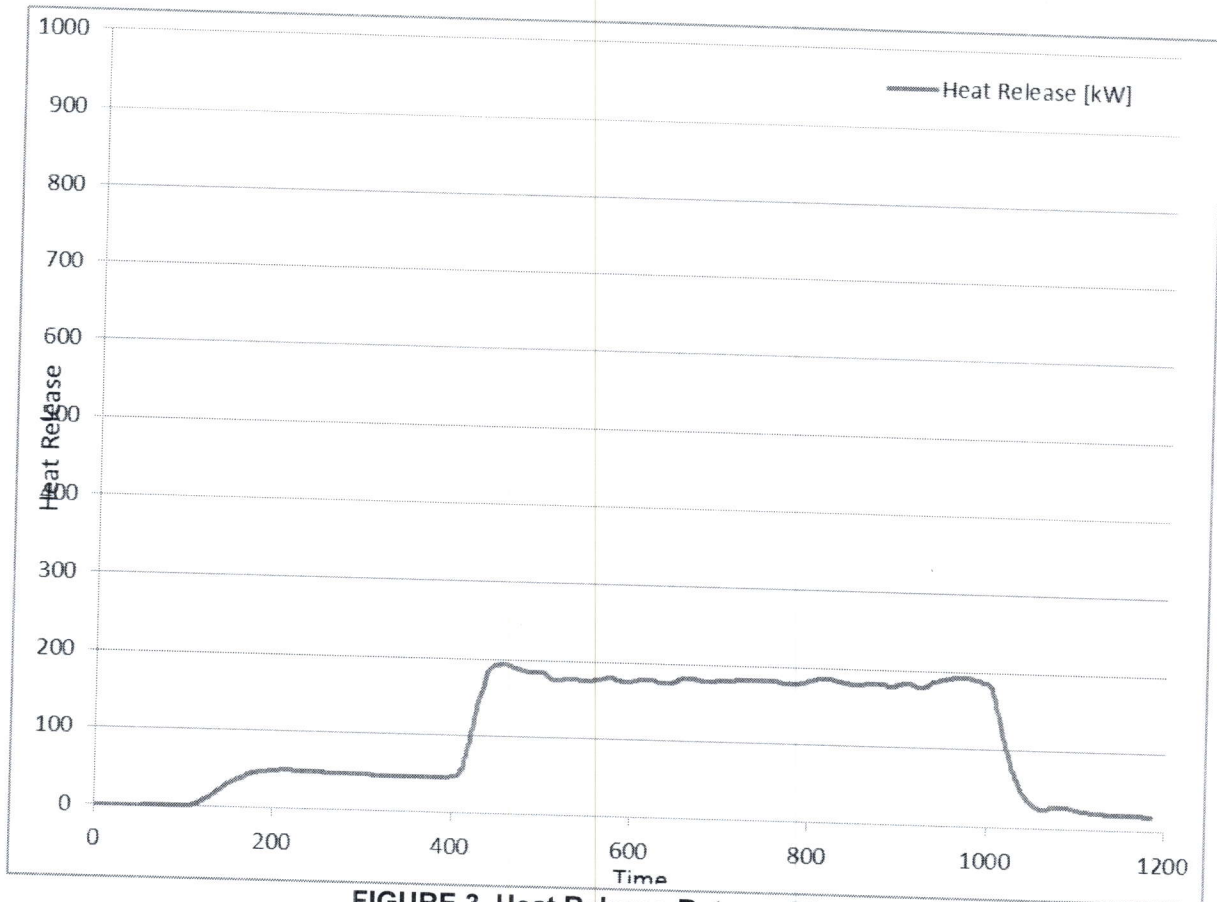


FIGURE 3. Heat Release Rate vs. Time

Numerical Values:

0-5 min average (kW)	41
5-15 min average (kW)	180
Peak Heat Release Rate	193 kW @ 5:53
Total Heat Released During 15 min Test	180

Smoke Obscuration and Smoke Release Rate:

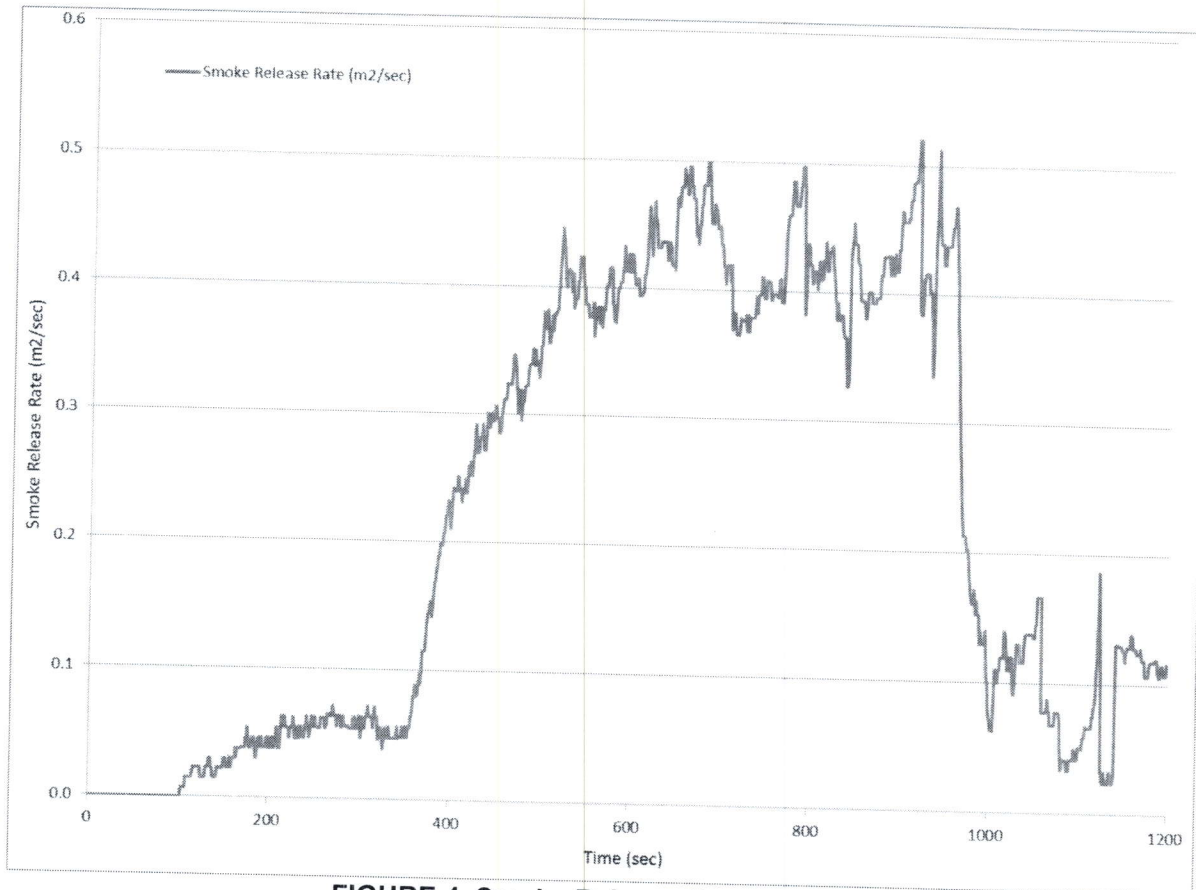


FIGURE 4. Smoke Release Rate vs. Time

Numerical Values:

0-5 min average (m ² /s)	0.1
5-15 min average (m ² /s)	0.4
Peak Smoke Release Rate	0.5 m ² /s @ 13:35
Total Smoke Released (m ²)	267
Peak Obscuration	45%
Optical Density (L/m)	0.64

Heat Flux at Floor:

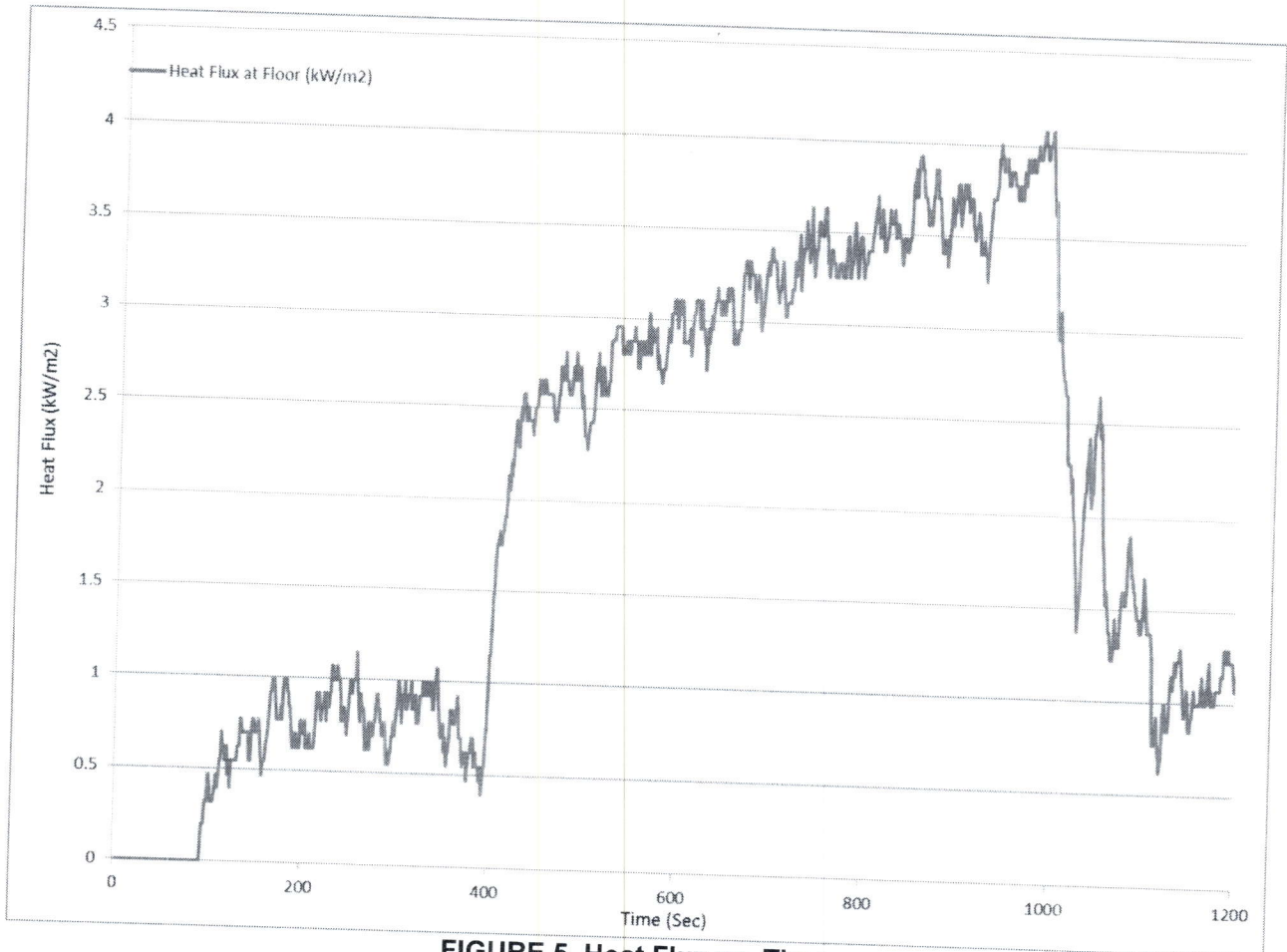
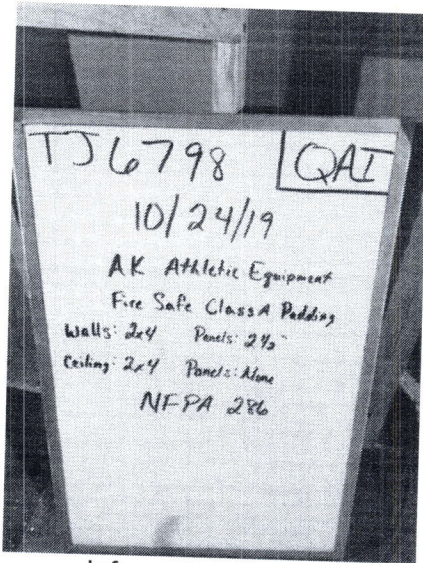


FIGURE 5. Heat Flux vs. Time

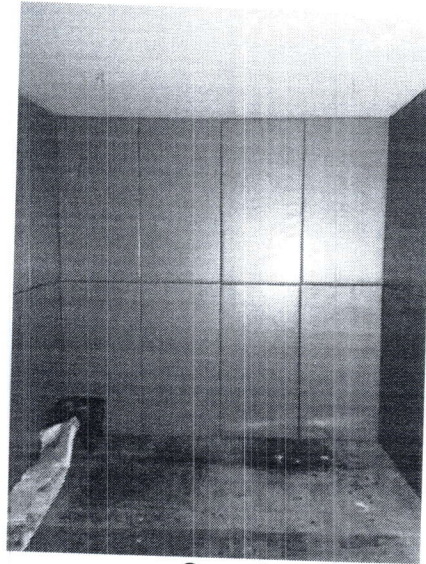
Numerical Values:

Peak Heat Flux *	4.1 kW/m ² @ 15:00
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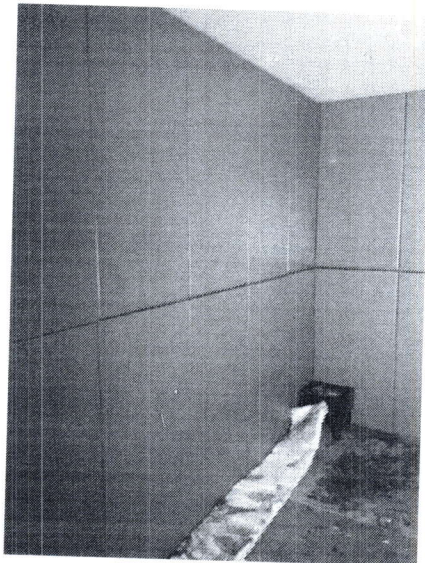
PHOTO: BEFORE TEST



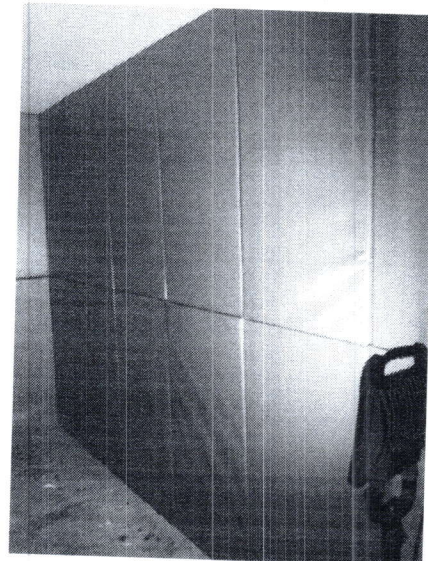
Information Sign



Overall

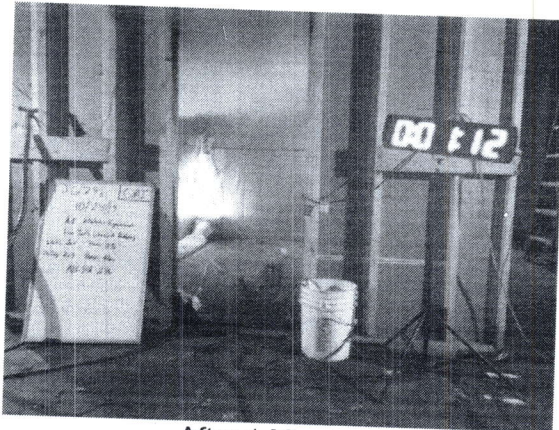


Ignition Corner

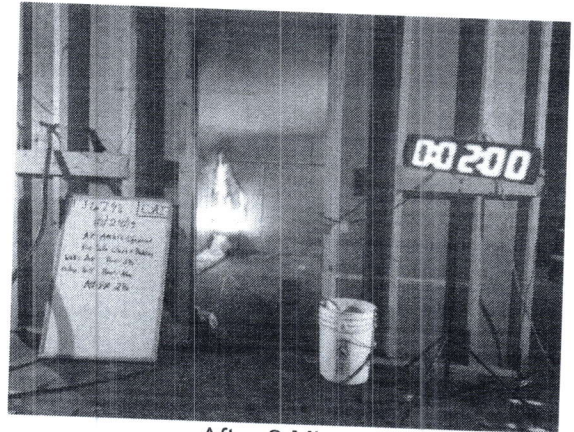


Opposite

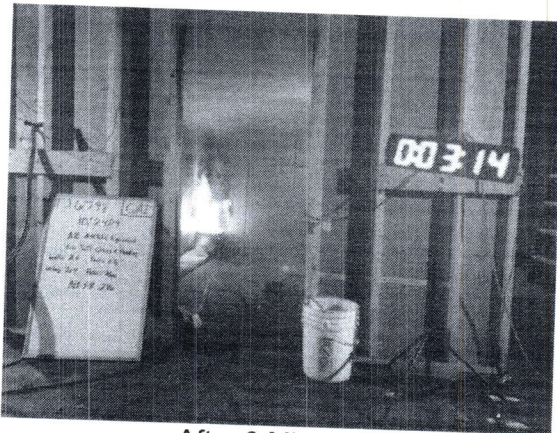
PHOTOS: DURING TEST



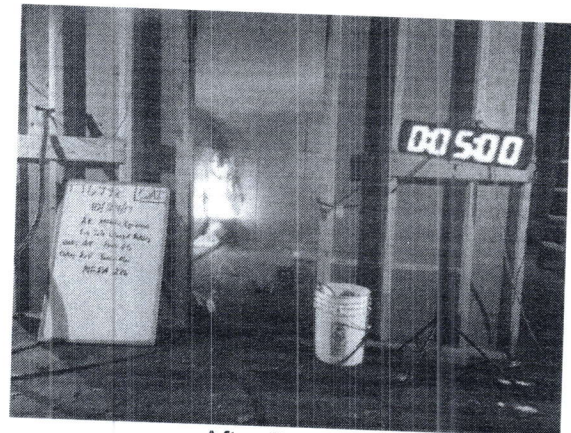
After 1 Minute



After 2 Minutes

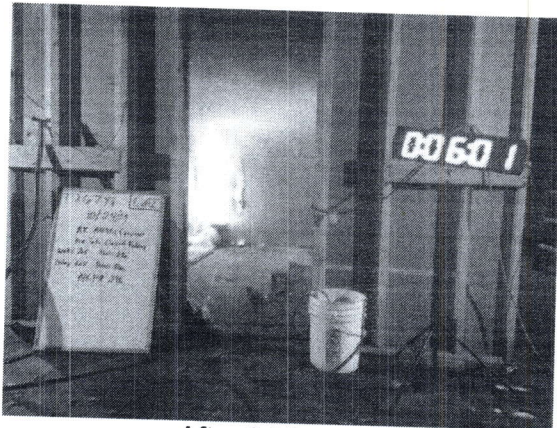


After 3 Minutes

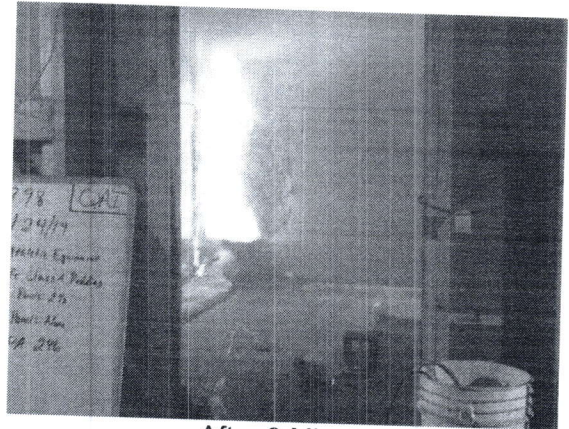


After 5 minutes

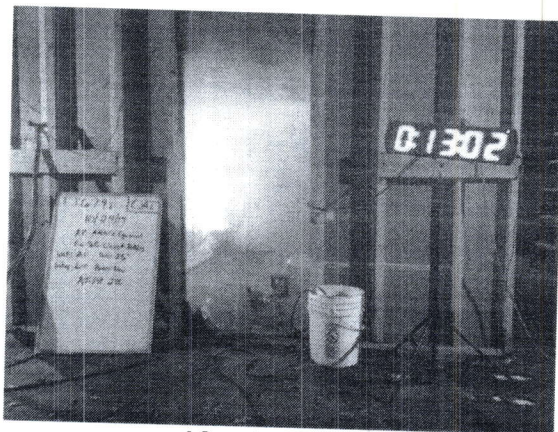
PHOTO: DURING TEST (Cont.)



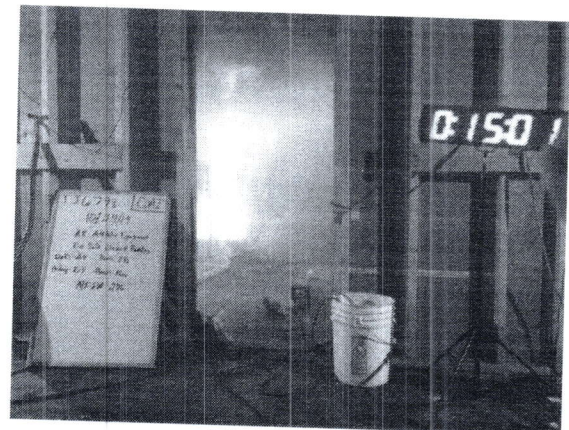
After 6 Minute



After 9 Minutes

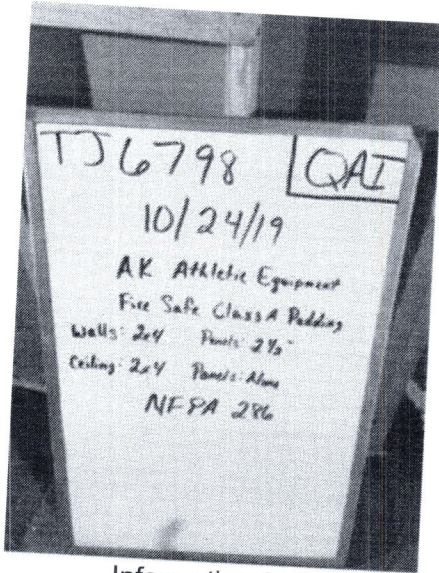


After 13 Minutes

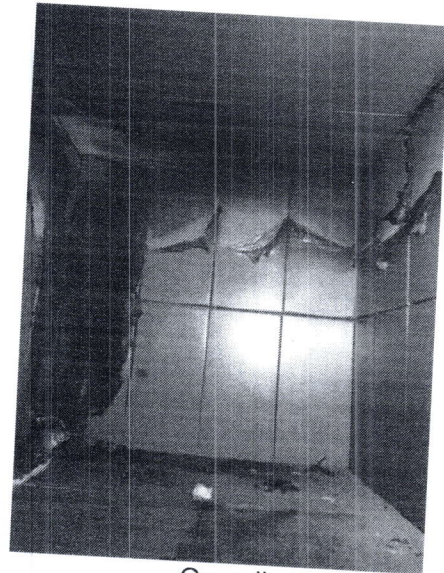


After 15 minutes

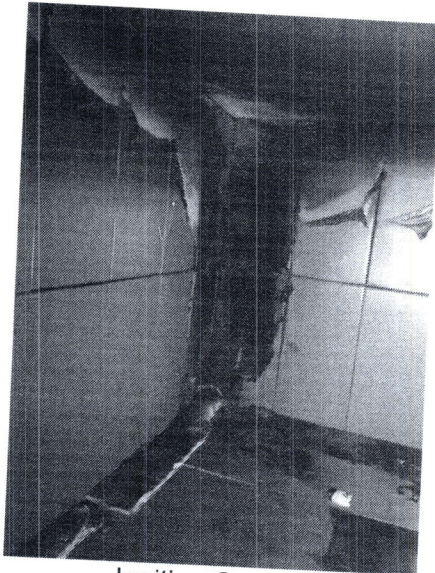
PHOTO: AFTER TEST



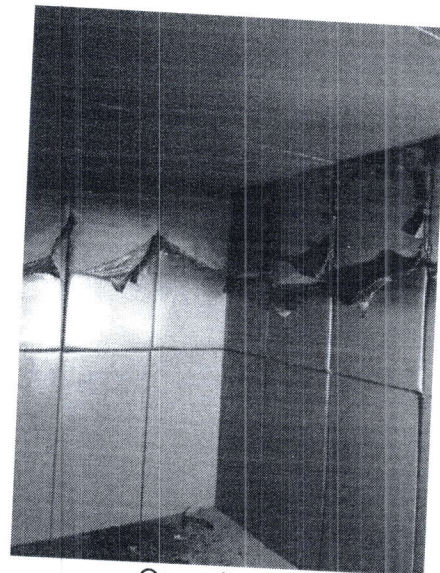
Information Sign



Overall



Ignition Corner



Opposite

END OF REPORT