QAI LABORATORIES
CERTIFICATION TESTING INSPECTION

1325 N. 108th E. Ave.
Tulsa, OK 74116
918.437.8333 ph. | 918.437.8487 fx.

CLIENT: **NEWMAT USA, LTD.**
81 Mahan Street
West Babylon, NY 11704

Test Report No:	**TJ3159**	**Date:**	**August 28, 2015**

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 **"M15 Panel"**. This project was entered into our receiving system on August 10th, 2015 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* – 2015 Edition. The referenced procedure was used to generate this report and data obtained from the test.

SAMPLING DETAIL: Test samples were randomly selected by QAI Laboratories representative David Wren on July 2nd, 2015. QAI verified the inspector marks upon receipt of samples at the laboratory. Construction of the test room was witnessed by QAI in accordance with Section 3.3 of ICC-ES AC85.

TEST DATE: August 19th, 2015

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, 2015 Edition.

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 for Newmat USA, Ltd. on "M15 Panel" to evaluate heat release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with NFPA 286, 2015 Edition. This testing was performed on August 19th, 2015.

The test room was constructed by QAI Laboratory personnel from the submitted test samples. The samples submitted were considered a ceiling only assembly and measured approximately 7 feet, 10.5 inches long, 3 feet 11.6 inches wide and a total of 3 inches in thickness. There were three total panels considered for this ceiling assembly. All three samples were laid next to each other parallel to the long side and laid on a metal frame that measured approximately 12 feet by 8 feet in dimensions that was attached to the top of the walls of the room module with the fabric side facing down. The walls were of 2 x 4 wooden construction with studs placed on 24 inch centers. Drywall measuring ½ inch thick covered the interior surface of the room on walls. The final interior dimensions were 8 feet high, 8 feet wide and 12 feet deep. Representative photographs of the sample and the construction are presented starting on Page 9 of this test report.

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 77° F (25° C) and the relative humidity was 51%.

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 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 06/03/16) 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:

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

Thermocouple Placement:

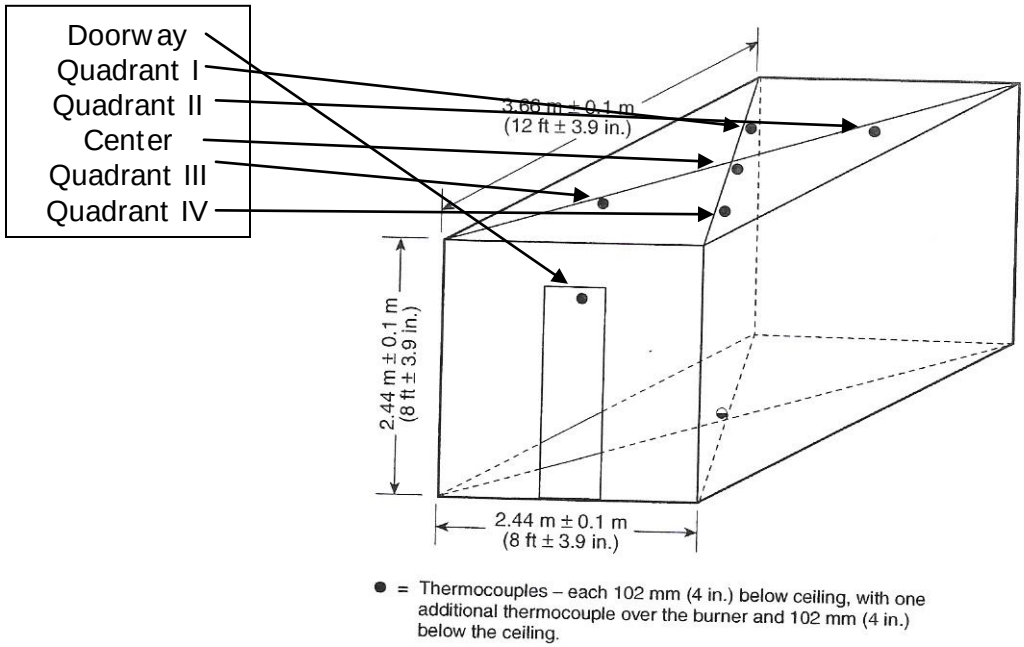


FIGURE 1. Thermocouple Locations

VISUAL OBSERVATIONS and DISCUSSIONS OF PEFORMANCE:

0:00:00 – Sand diffusion burner lit to 40 kW flame
0:01:00 – Very light smoke and no contribution from assembly other than melting away from flame
0:02:00 – Flame height leveling off at around 4 feet from floor
0:03:00 – Continued light smoke development, very little contribution from assembly
0:04:00 – Little change in conditions above, most of test panel closest to burner melted away
0:05:00 – Sand diffusion burner increased to 160 kW flame
0:06:00 – Slight smoke increase, flames from burner hitting ceiling
0:08:00 – Minimal contribution of flame from walls, smoke light in color
0:10:00 – Little change in conditions above, most of material is melted away from flames
0:12:00 – Flame intensity and smoke development steady
0:13:00 – Continued steady performance, very little visible contribution from assembly
0:14:00 – Fairly steady flame intensity and smoke developed throughout test
0:15:00 – NFPA 286 test complete, flames immediately self-extinguish after gas shut off

Flame Spread: *(video record on file)*

Flame spread of the sample was minimal. Almost no visible 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 as the sample was observed melting away from the heat source Flames did not 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 value of 70% (30% obscured) and a Peak Smoke Release Rate was measured to be 0.25 m^2/s 5 minutes and 35 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 2.7 kW/m^2 at 5:40 into test.

CHARRING MEASUREMENT:

All charring as a result of testing this assembly was limited to the corner of the burner placement and specific to the drywall only. There was a "V" pattern of char in the corner of ignition that went all the way 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 had slight 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 600ºC (1112ºF)
- 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 181 kW
- Heat Flux at floor – Peak of 2.7 kW/m²
- Average upper average temperature – 547ºF (286° 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:

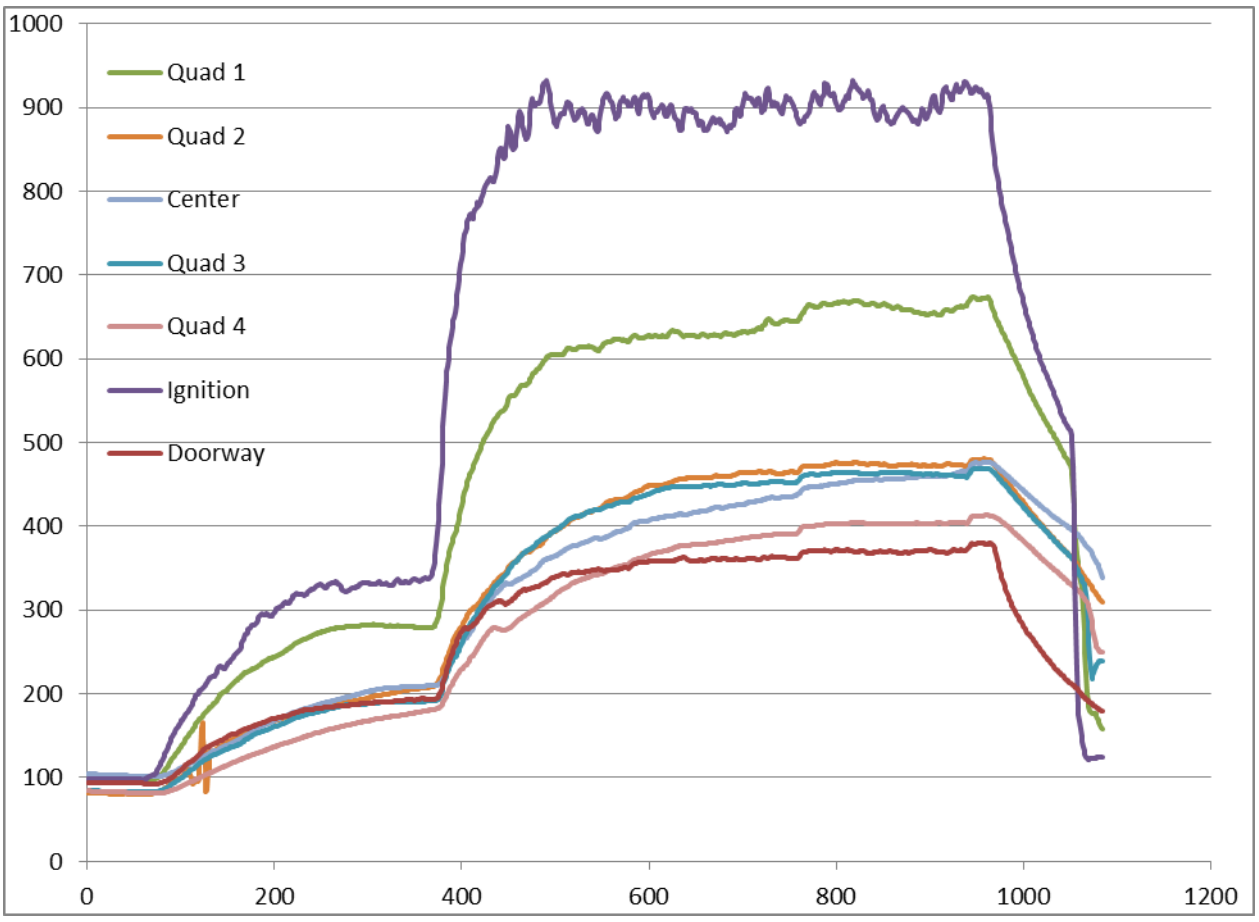


FIGURE 2. Temperature vs. Time

Maximum Peak Temperatures:

Doorway	380° F (193° C)
Center	476° F (247° C)
Quadrant I	674° F (357° C)
Quadrant II	480° F (249° C)
Ignition	933° F (501° C)
Quadrant III	469° F (243° C)
Quadrant IV	413° F (212° C)

PEAK AVERAGE UPPER LAYER TEMP – 547ºF (286ºC)

Heat Release Rate vs. Time Chart:

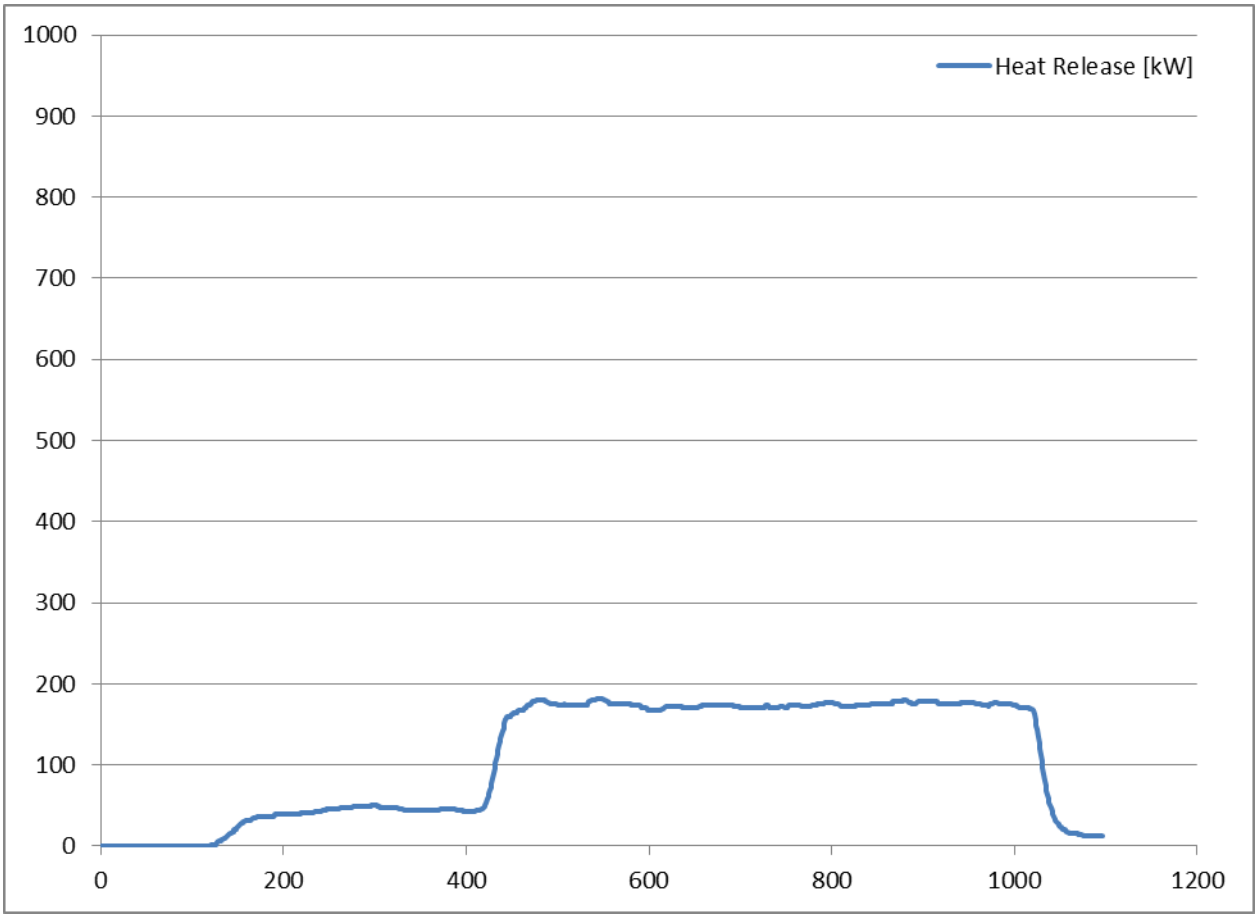


FIGURE 3. Heat Release Rate vs. Time

Numerical Values:

0-5 min average (kW)	43
5-15 min average (kW)	174
Peak Heat Release Rate	181 kW @ 5:55
Total Heat Released During 15 min Test	118

Smoke Obscuration and Smoke Release Rate:

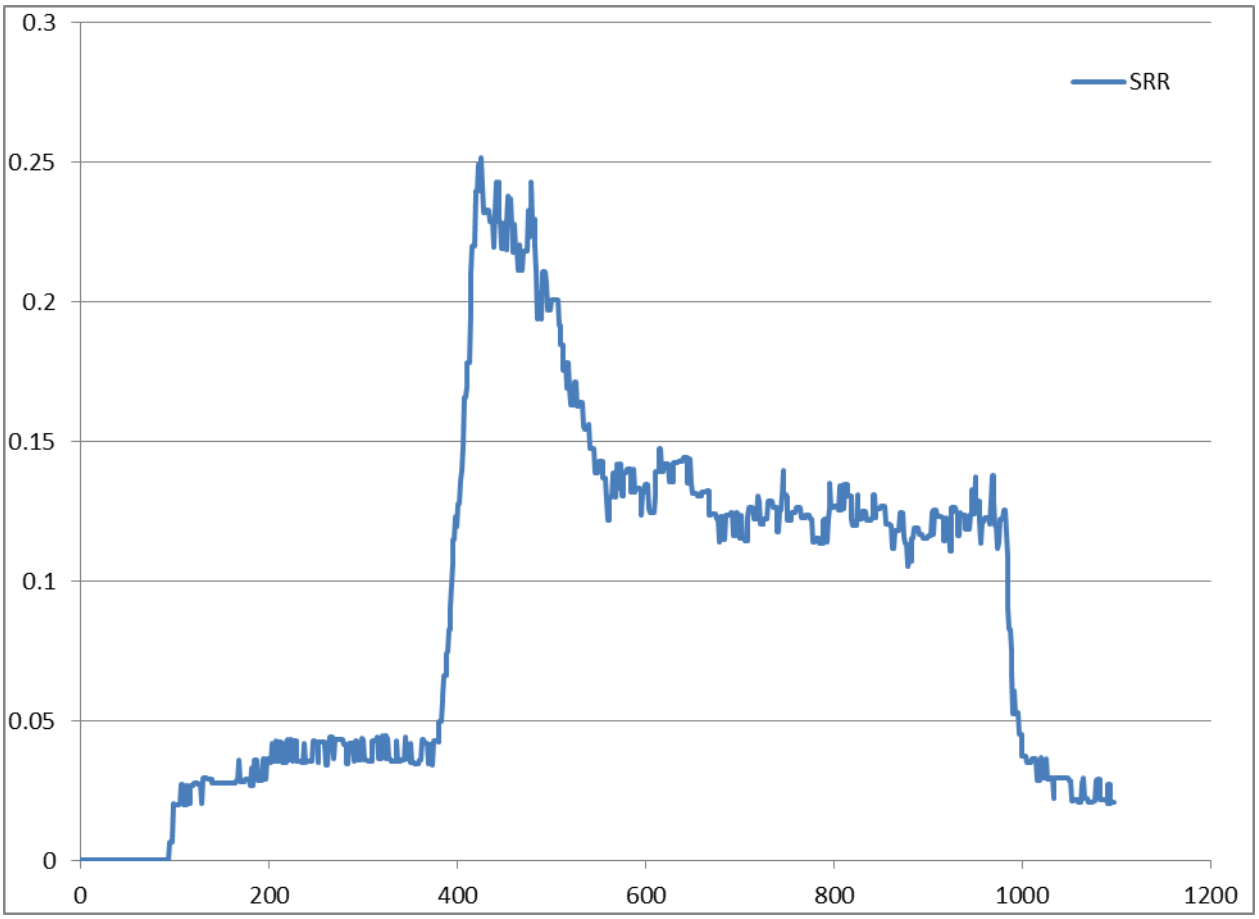


FIGURE 4. Smoke Release Rate vs. Time

Numerical Values:

0-5 min average (m²/s)	0.06
5-15 min average (m²/s)	0.12
Peak Smoke Release Rate	0.25 m²/s @ 5:35
Total Smoke Released	98.4
Peak Obscuration	30%

PHOTO: BEFORE TEST

Overall

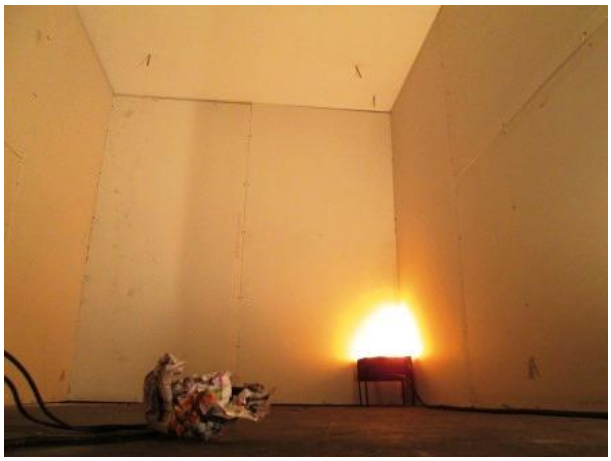
Ceiling

Information Sign

Ignition Corner

Opposite Corner

PHOTOS: DURING TEST



Test Start

After 2 Minutes

After 3 Minutes

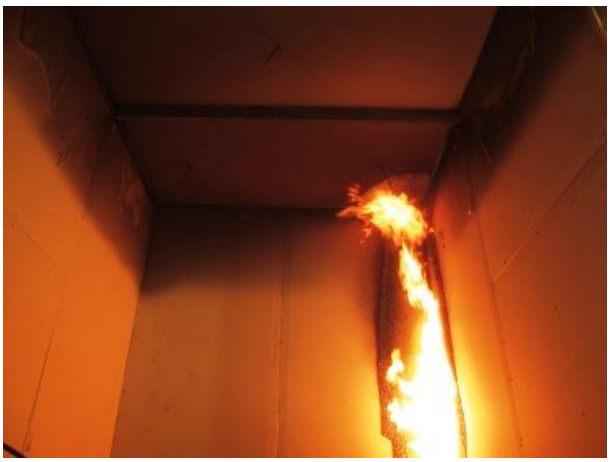
At 5 minutes

PHOTO: DURING TEST (Cont.)

After 6 Minutes

After 9 Minutes

After 13 Minutes



After 15 Minutes

PHOTO: AFTER TEST:

Photos Immediately After Test

****

END OF REPORT