TEST REPORT

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EVALUATION CENTER
Intertek Testing Services NA Inc.
16015 Shady Falls Rd.
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RENDERED TO

TPR² Corporation
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PRODUCT EVALUATED: *SEAL* ECTION AG™ open cell foam 5 ½" walls and 10" ceiling with 12 mil TPR^2 Fireshell® F10E intumescent coating. (walls only)
EVALUATION PROPERTY: Heat Release, Flame Spread

Report of testing *SEAL*ECTION AG™ 1/2lb open cell foam with TPR^2 Fireshell® F10E for compliance with the applicable requirements of the following criteria: NFPA 286 , with acceptance criteria of ICC-ES AC 377 Appendix A

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2 Introduction

Intertek Testing Services NA (Intertek) has conducted testing for Demilec USA, LLC, on *SEAL* ECTION AG™ open cell spray foam covered with 12 mils of fireshell® F10E on the walls only to evaluate heat release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with NFPA 286 and AC 377 Appendix A comparing to PN (3161466-007) tested on October 30 2008. This was Agribalance™ and ¼" plywood that had fire out the door in 4:29 (min/sec).

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. The spray foam was applied on September 22, 2008.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The test specimen consisted of three walls with 2x8 studs, 16 inches o.c. and 2x12 joists, 24 inches o.c. with a 15/32 inch plywood backing. The final interior dimensions were 8 feet high, 8 feet wide and 12 feet deep. Ceiling joists ran parallel to the short dimension of the room. The corner was constructed such that two studs met at their edges, forming a 90° angle.

On top of this substrate, the spray foam was applied to a thickness of 5 1/2 inches on the walls and 10 inches on the ceiling. There was no significant over spray outside of the cavities. The wall foam, and studs were covered with 12 mils of TPR^2 Fireshell® F10E intumescent coating.

See Photos in Appendix B for a visual depiction of the description.

4 Testing and Evaluation Methods

This standard describes a method for determining the contribution of textile wall and ceiling coverings to room fire growth during specified fire exposure conditions. This method is not intended to evaluate the fire endurance of assemblies, nor is it able to evaluate the effect of fires originating within the wall assembly. The method is not intended for the evaluation of floor finishes.

This method is to be used to evaluate the flammability characteristics of finish wall and ceiling coverings when such materials constitute the exposed interior surfaces of buildings. This test method does not apply to fabric covered less than ceiling height, freestanding, prefabricated panel furniture systems or demountable, relocatable, full-height partitions used in open building interiors. Freestanding panel furniture systems include all freestanding panels that provide

visual and/or acoustical separation and are intended to be used to divide space and may support components to form complete work stations.

This fire test measures certain fire performance characteristics of finish wall and ceiling covering materials in an enclosure under specified fire exposure conditions. It determines the extent to which the finish covering materials may contribute to fire growth in a room and the potential for fire spread beyond the room under the particular conditions simulated. The test indicates the maximum extent of fire growth in a room, the rate of heat release, and if they occur, the time to flashover and the time to flame extension beyond the doorway following flashover. It does not measure the fire growth in, or the contribution of, the room contents. Time to flashover is defined herein as either the time when the radiant flux onto the floor reaches 20 kW/m^2 or the temperature of the upper air reaches 600°C. A pair of crumpled single sheets of newspaper are placed on the floor 2 feet out from the center of the rear wall and front walls to determine flashover. The spontaneous ignition of this newspaper provides the visual indication of flashover.

The potential for spread of fire to other objects in the room, remote from the ignition source, is evaluated by measurements of:

1. The total heat flux incident on the center of the floor.
2. A characteristic upper-level gas temperature in the room.
3. Instantaneous net peak rate of heat release.

The potential for the spread of fire to objects outside the room of origin is evaluated by the measurement of the total heat release of the fire.

TEST EQUIPMENT AND INSTRUMENTATION

IGNITION SOURCE

The ignition source for the test is a gas burner with a nominal 12- by 12-inch porous top surface of a refractory material. The burner used at this laboratory is 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, and the burner enclosure is located such that the edge of the diffusion surface is located 1 inch from both walls in the left corner of the room opposite from the door.

The gas supply to the burner is C.P. grade propane (99 percent purity). The burner is capable of producing a gross heat output of 40±1 for five minutes followed by a 160±5 kW for ten minutes. The flow rate is metered throughout the test. The design of the burner controls is such that when one quarter-turn ball valve is opened, the flow of gas to the burner produces 40 kW and when a second quarter-turn valve is opened the combined flow produces 160 kW.

COMPARTMENT GEOMETRY AND CONSTRUCTION

The interior dimensions of the floor of the fire room, when the specimens are in place, measures 8 feet, by 12 feet. The finished ceiling is 8 feet ± 0.5 inches above the floor. The four walls are at 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' walls. No other openings are present to allow ventilation.

PROCEDURE

SUMMARY OF METHOD

A calibration test is run within 30 days of testing any material as specified in the standard. All instrumentation is zeroed, spanned and calibrated prior to testing. The specimen is installed and the diffusion burner is placed. The collection hood exhaust duct blower is turned on and an initial flow is established. The gas sampling pump is turned on and the flow rate is adjusted. When all instruments are reading steady state conditions, the computer data acquisition system and video equipment is started. Ambient data is taken then the burner is ignited at a fuel flow rate that is known to produce 40 kW of heat output. This level is maintained for five minutes at which time the fuel flow is increased to the 160 kW level for a 10-minute period. During the burn period, all temperature, heat release and heat flux data is being recorded every 6 seconds. At the end of the fifteen minute burn period, the burner is shut off and all instrument readings are stopped. Post test observations are made and this concludes the test.

All damage is documented after the test is over, using descriptions, photographs and drawings, as is appropriate.

4.1. TEST STANDARD

NFPA 286. as defined in ACC 377 Appendix A

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

FIRE TESTS
The test was started at 11:25 am on October 30, 2008. The ambient temperature was 68°F with a relative humidity of 62%. The data acquisition system was started and the burner was ignited. Events during the test are described below:

TIME (min:sec)	OBSERVATION
0:00	Ignition of burner. Heat output set to 40 kW.
0:22	The walls began to discolor.
1:00	There was intermittent ignition on the left side wall near the burner.
1:10	Both the back and side walls ignited.
5:00	The burner was increased to 160 kW.
5:15	The ceiling ignited. Smoke increasing.
5:45	Flames began to spread. The smoke ceiling showed intermittent flaming.
5:49	The paper targets ignited indicating flashover conditions. (Failure)
5:50	Test Terminated

Post Test Observations:
The intumescent and foam were heavily charred in a manner consistent with flashover.

For additional details, see the post-test photographs later in this report.

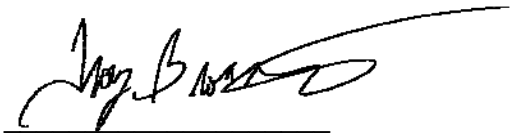
6 Conclusion

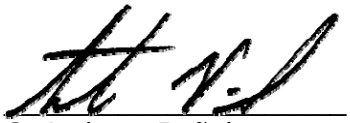
The sample submitted, installed, and tested as described in this report displayed high levels of heat release, high upper level temperatures, and had flames exiting the test chamber. The heat flux on the floor did reach flashover levels. The sample did not spread flames to the ceiling during the 40 kW exposure.

NFPA 286 does not publish pass/fail criteria. One must consult the codes to determine pass fail.

This specimen **met** the criteria for ICC ES AC377 Appendix A in comparison to PN (3161466-007) Agribalance foam covered with ¼" BC plywood on October 30, 2008.

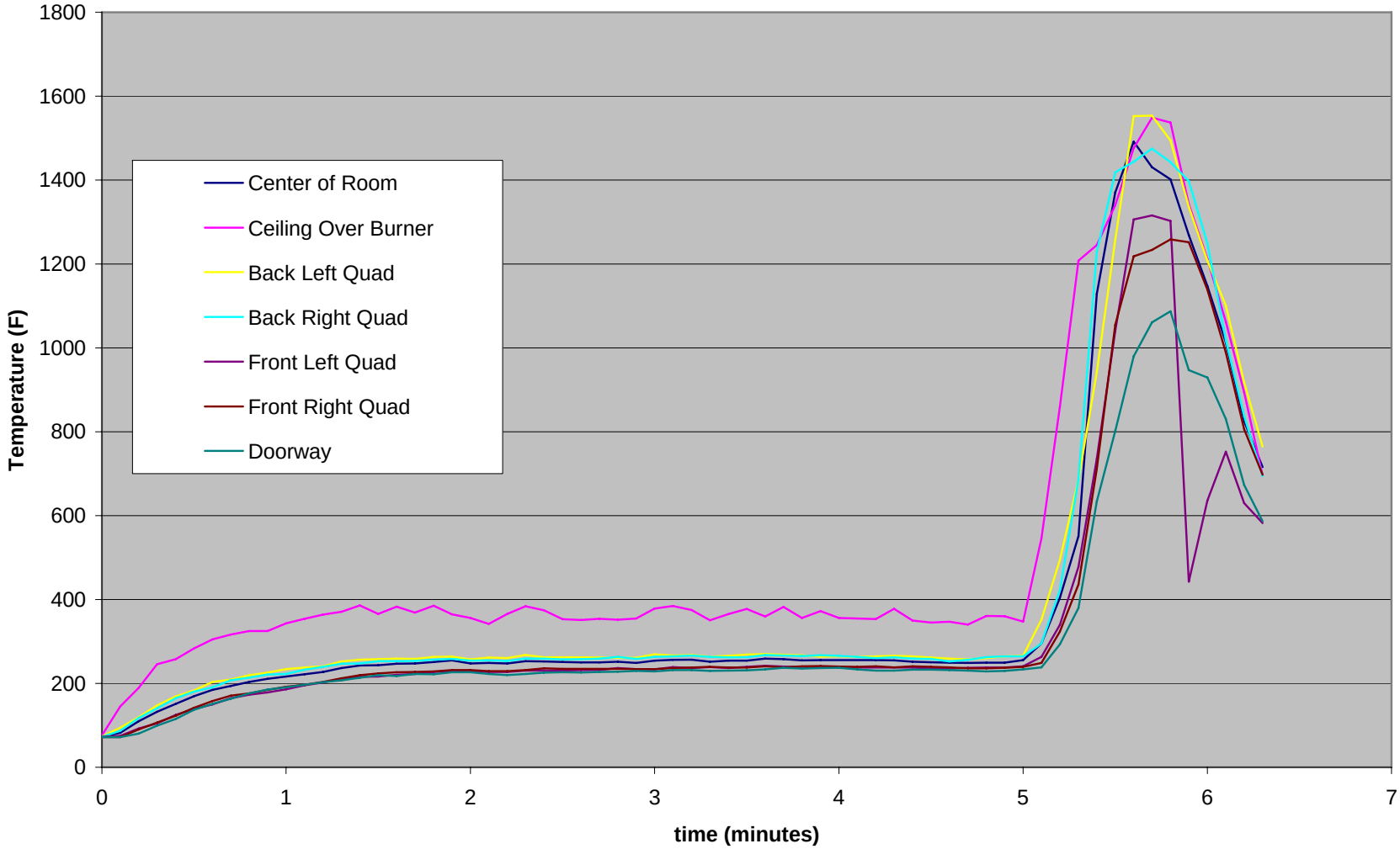
INTERTEK TESTING SERVICES NA

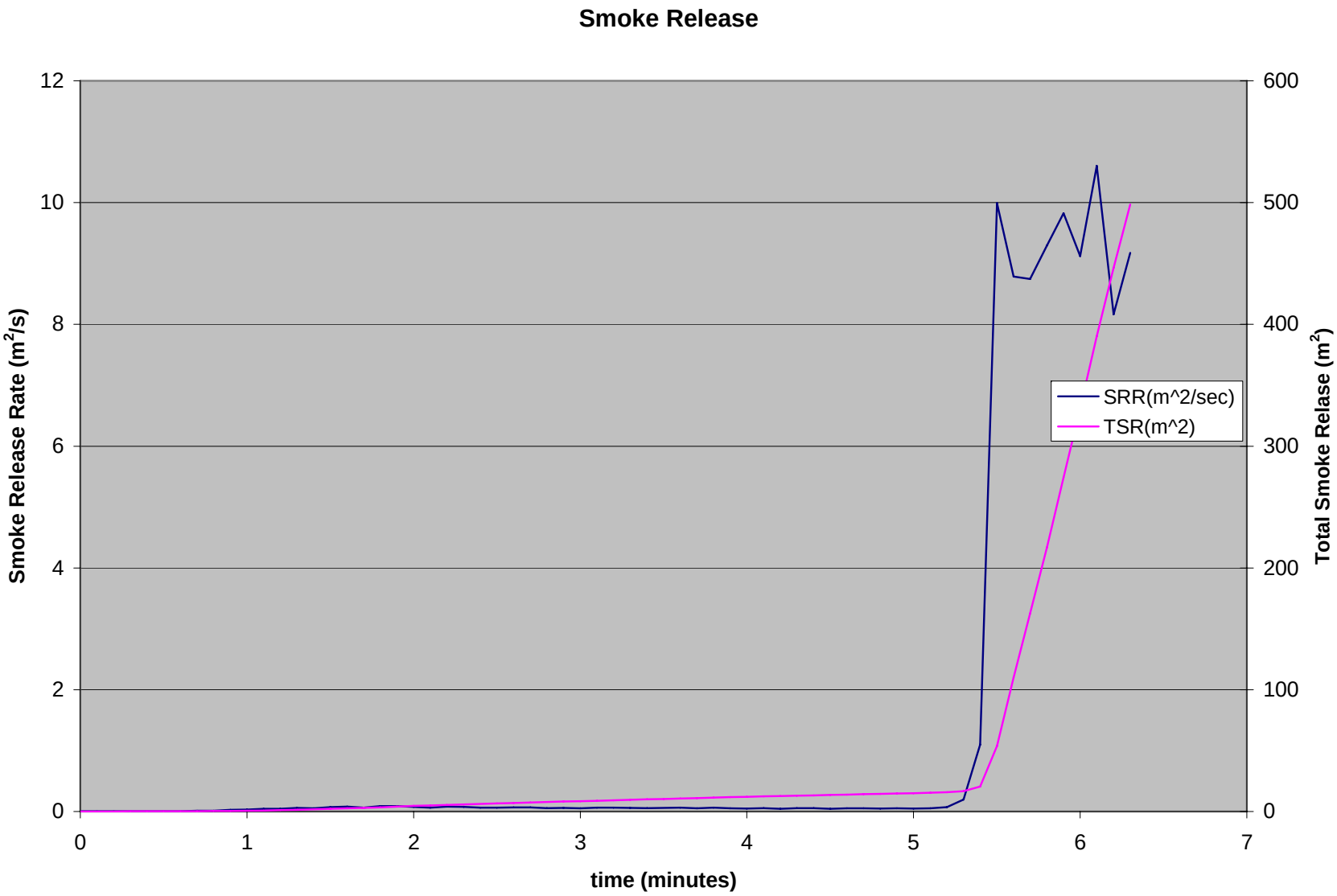
Reported by: 
Troy G. Bronstad
Team Leader, Building Products

Reviewed by: 
C. Anthony Peñaloza
Flammability Testing Team Leader, Building Products

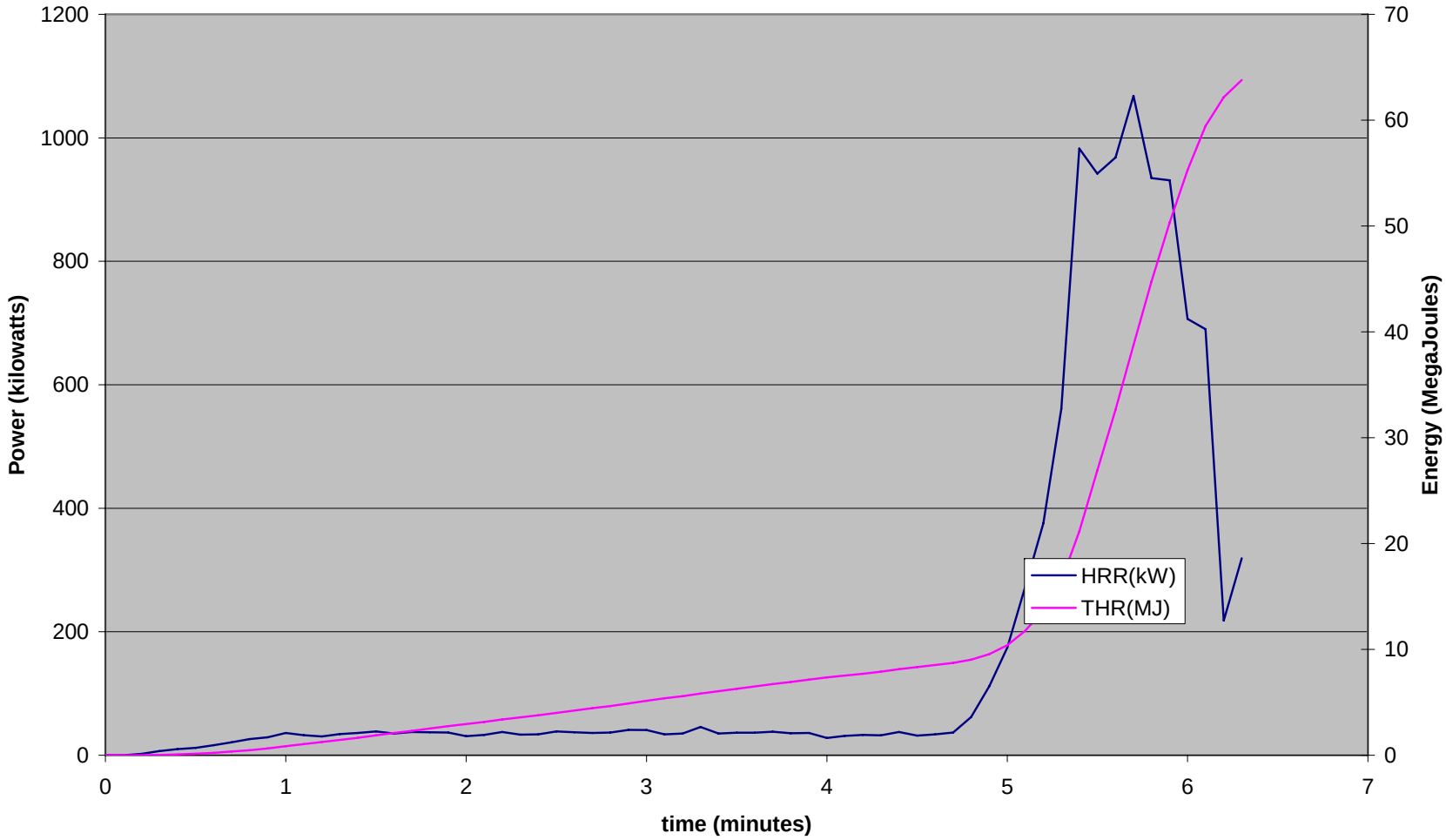
APPENDIX A
Test Data

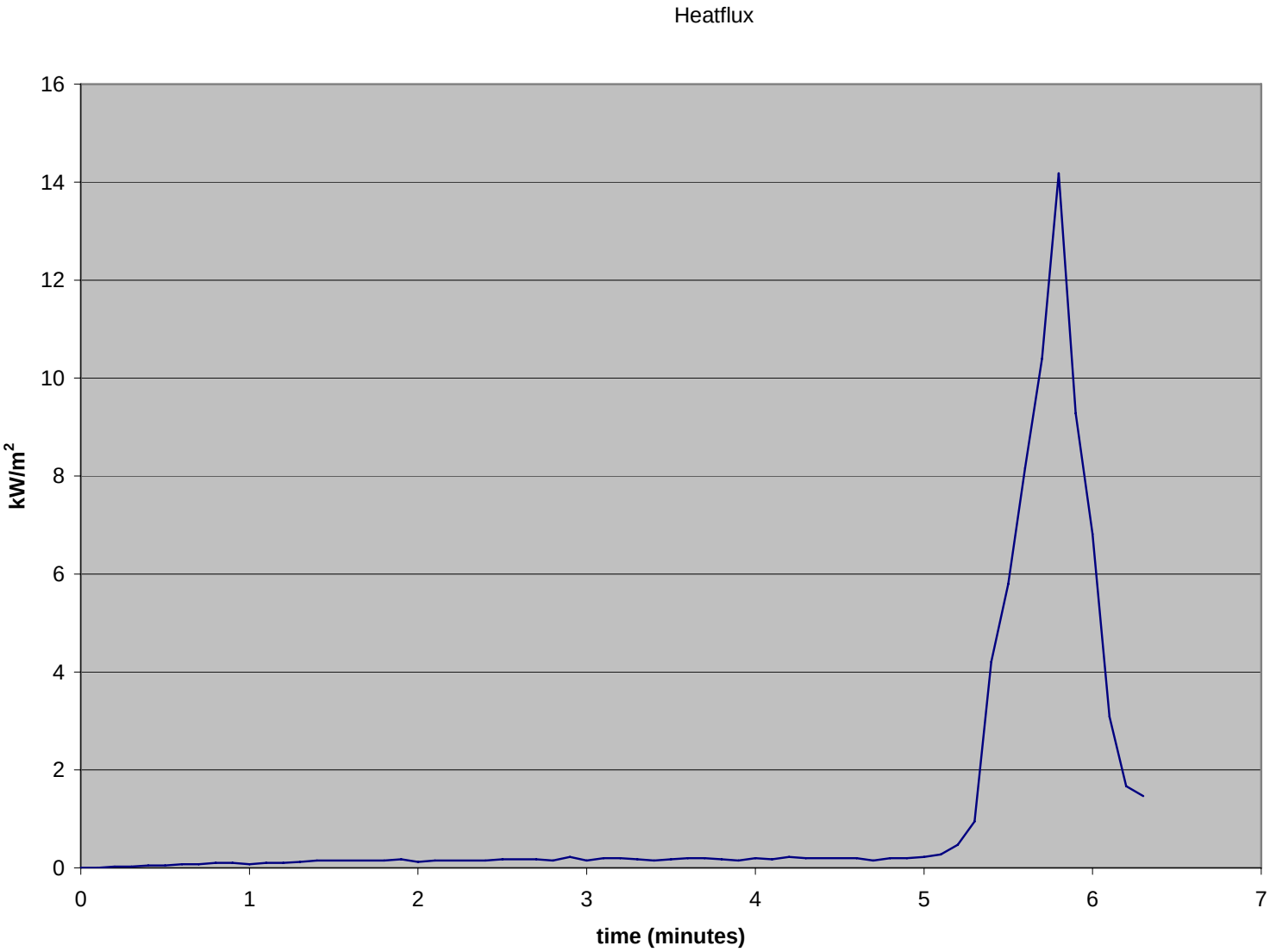
Thermocouple Data

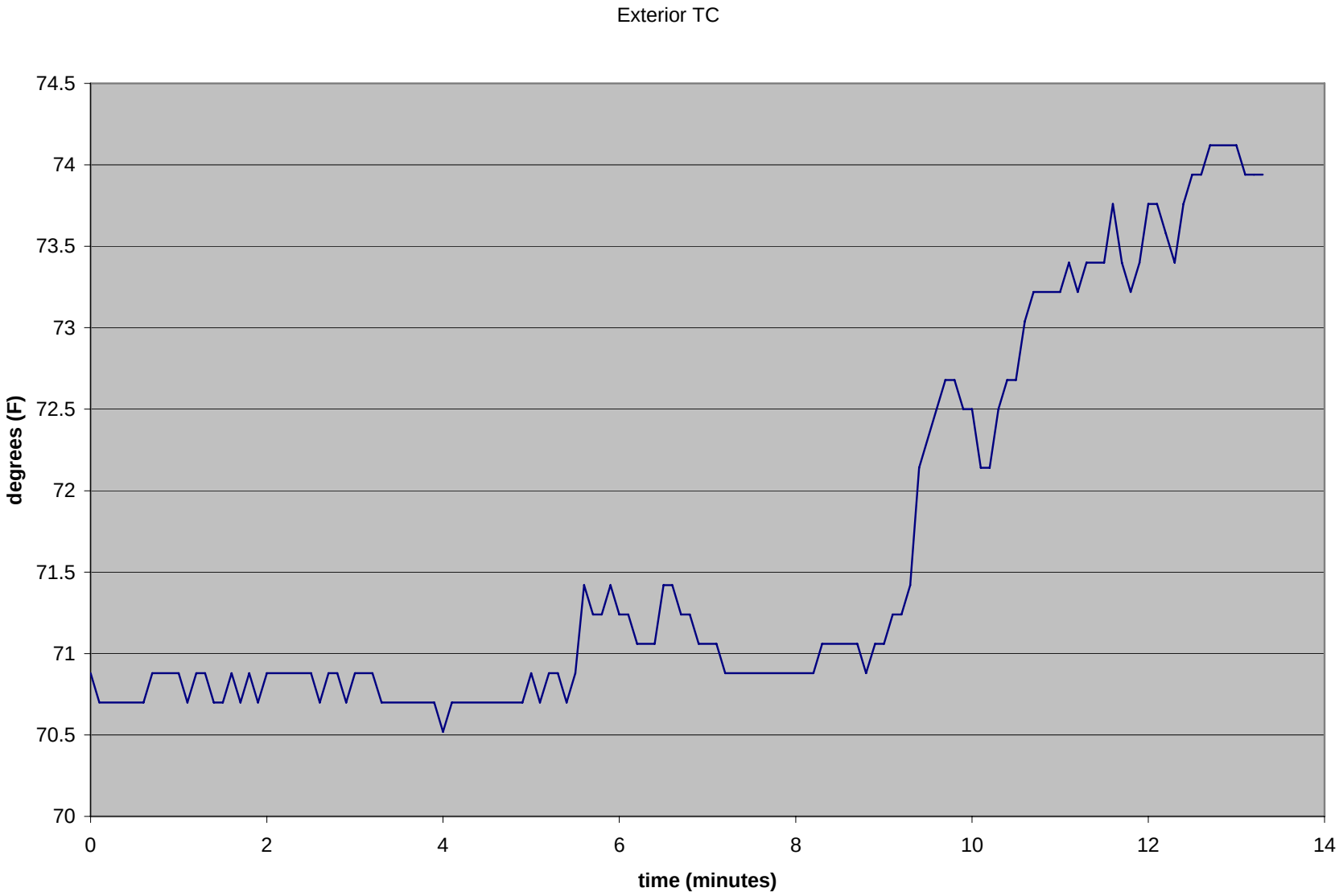



Smoke Release
Smoke Release Rate (m²/s)
Total Smoke Relase (m²)
time (minutes)
SRR(m^2/sec)
TSR(m^2)
0
2
4
6
8
10
12
0
100
200
300
400
500
600
0
1
2
3
4
5
6
7

Heat Release




Heatflux
16
14
12
10
8
6
4
2
0
kW/m²
0
1
2
3
4
5
6
7
time (minutes)


Exterior TC
74.5
74
73.5
73
72.5
72
71.5
71
70.5
70
degrees (F)
0
2
4
6
8
10
12
14
time (minutes)

APPENDIX B
Photographs

Pre-test photo back wall

Pre-test photo ceiling

Pre-test photo corner.

Start of test. 40kW

Test photo discoloration

Test photo. Ignition.

160kW and ignition of ceiling

Test photo

Post test picture of ceiling

Post-test photo corner above burner

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REVISION SUMMARY

DATE	SUMMARY
May 29, 2009	First issue. No revisions.