

Warnock Hersey



Test
Report

ITS Intertek Testing Services

LISTING REPORT

FINAL REPORT

FIRE PERFORMANCE EVALUATION FOR HEAT AND VISIBLE SMOKE RELEASE CONDUCTED BY INTERTEK TESTING SERVICES (ITS) IN ACCORDANCE WITH UL 2043, *STANDARD FOR FIRE TEST FOR HEAT AND VISIBLE SMOKE RELEASE FOR DISCRETE PRODUCTS AND THEIR ACCESSORIES INSTALLED IN AIR-HANDLING SPACES*, SECOND EDITION DATED DECEMBER 2, 1996.

ITS TEST REPORT 020326a&b

March 26, 2002

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Abstract

Intertek Testing Services (ITS), Fire Testing Laboratory located in Antioch, CA, conducted a fire performance evaluation test of the SM4T and SM1EZ speaker assemblies. Bogen Communications manufactured the equipment evaluated.

The assembly was tested to UL 2043, *Fire Test for Heat and Visible Smoke Release for Discrete Products and Their Accessories Installed in Air-Handling Spaces*.

The test samples were tested on March 26, 2002 in accordance with the test procedure specified in Section 6, Test Procedure, of the UL 2043 Standard and evaluated in accordance with Section 9, Acceptance Criteria.

Introduction

This report describes the test procedure, test assembly and the results obtained for the test conducted on the test sample. This report also includes graphical data as well as photographic documentation. The results presented in this report apply only to the assembly tested, in the manner tested, and not to any similar assembly or assembly combinations.

Test Procedure

Prior to testing, the test specimen is to be conditioned at $73 \pm 5^{\circ}\text{F}$ ($23 \pm 3^{\circ}\text{C}$) and at a relative humidity of 50 ± 5 percent for a minimum of 24 hours prior to the test.

The test chamber is comprised of a collection hood and exhaust duct that calculates heat release rate of the test specimen as described in *ISO 9705-1993: Fire Test-Full-Scale Room Test for Surface Products*.

Test Procedure:

- A steel angle frame is to be used to support the test specimen. The frame is to measure 36" high by 28" wide by 48" long and be comprised of nominal 1-1/2 by 1-1/2" angles.
- Nominal 1/2" wide ceramic boards are to be secured to the steel angle frame to form an enclosure. The boards are to be secured to the frame to extend 18" above the top of the steel angle frame creating a 12" gap at the base of the frame. The ceramic board is not prohibited from containing glazed observation windows for visual and photographic documentation.
- The test frame enclosure and burner are to be positioned on a ceramic fiber blanket. The gas burner is to be positioned in the center of the test frame on top of a nominal 8" high inorganic support.
- For products intended to be suspended in air-handling space area, such as sound masking systems, the specimen is to be mounted on two metal braces, or suspended above the burner with metal wire to hang

flush with the top edge of the steel angle frame. This can be accomplished by clamping metal angles to the top edge of the test frame in order to suspend the test sample over the burner. The specimen configuration is dependent upon the intended installation of the product.

- The pretest calibrations are to be performed and a nominal exhaust flow rate of 1500 cubic feet per minute through the duct is to be established. The exhaust flow rate is to be increased as necessary during the test to maintain a duct oxygen concentration above 14 percent.
- The test is to be conducted in an environment that is relatively free of spurious air currents, which will affect the isolation of the burner flame beneath the test specimen.
- When specified by the submitter, visual observations, still photographs and video recordings shall be taken of the specimen prior to, during, and after the test.
- Test items are mounted in accordance with Section A-2.3 of UL 2043, Appendix A, "Guide to Mounting Methods".
- Commercial-grade propane is to be used as fuel having a heating value of approximately 2500 Btu per cubic foot. To start the test, the propane gas burner is to be ignited and the propane gas flow is to be increased to 92 ± 2 cubic feet per hour to provide a flame which produces a heat release rate of 60 kilowatts. The digital data acquisition equipment is to be started simultaneously.
- The test is to be conducted for 10 minutes at which time the gas burner is to be shut off. Data is to be collected until flaming or other signs of combustion cease.

Test Sample

The test samples are the Bogen SM4T and SM1EZ speaker assemblies. The equipment was received in good condition at ITS on March 22, 2001 and conditioned until the time of test.

Test Results

The test frame was positioned directly under the center of the exhaust hood. The unit was mounted in the center of the frame. The propane burner was ignited, the flame was allowed to stabilize, and the test samples were inserted into the test frame.

Observations were made throughout the test. Photographic documentation is presented in Appendix A. The measured smoke opacity and heat release rate were recorded every 2 seconds. This data is presented graphically in Appendix B.

The required criteria for each test sample are:

- The peak rate of heat release (HRR) measured during each test shall be 100 kilowatts or less.
- The peak normalized optical density measured during each test shall be 0.50 or less.

- The average normalized optical density (10 minute test duration) shall be 0.15 or less.

Test No. 020326a

The test sample assembly (SM4T) for Test No. 020326a is shown in the photographs of Appendix A. Prior to the start of the test, the test chamber had an initial temperature of 70°F and a relative humidity of 52%. The visual observations of the test are presented in Table 1.

Table 1 - Test observations

Test Time	Test Observations
0:00	Start of test, 60kW
1:00	Light smoke
3:00	Ceiling tile support melting and bending; moderate smoke
4:00	Flame drippings; heavy smoke
5:00	More flame drippings; continued heavy smoke
8:00	Light smoke
10:00	Stopped burner
12:00	Stopped test
After Test	Observations <ul style="list-style-type: none">- Speaker melted away- Heavy soot buildup on ceiling tile

The results of this test meet the fire resistance criteria of the UL 2043 Standard. The peak rate of corrected heat release measured was 56.53 kW (less than the allowable 100 kW). The total duration was 12 min. The peak normalized optical density measured during the test was 0.484 (less than the allowable 0.50). Flaming drippings were observed. The average normalized optical density over the 10-minute test duration was 0.060 (less than the allowable 0.15). The peak smoke release rate was 0.202 m²/sec. The total smoke released was 29.88 m². See Appendix B for the graphs illustrating the resulting data.

Test No. 020326b

The test sample assembly (SM1EZ) for Test No. 020326b is shown in the photographs of Appendix A. Prior to the start of the test, the test chamber had an initial temperature of 72°F and a relative humidity of 52%. The visual observations of the test are presented in Table 1.

Table 2 - Test observations

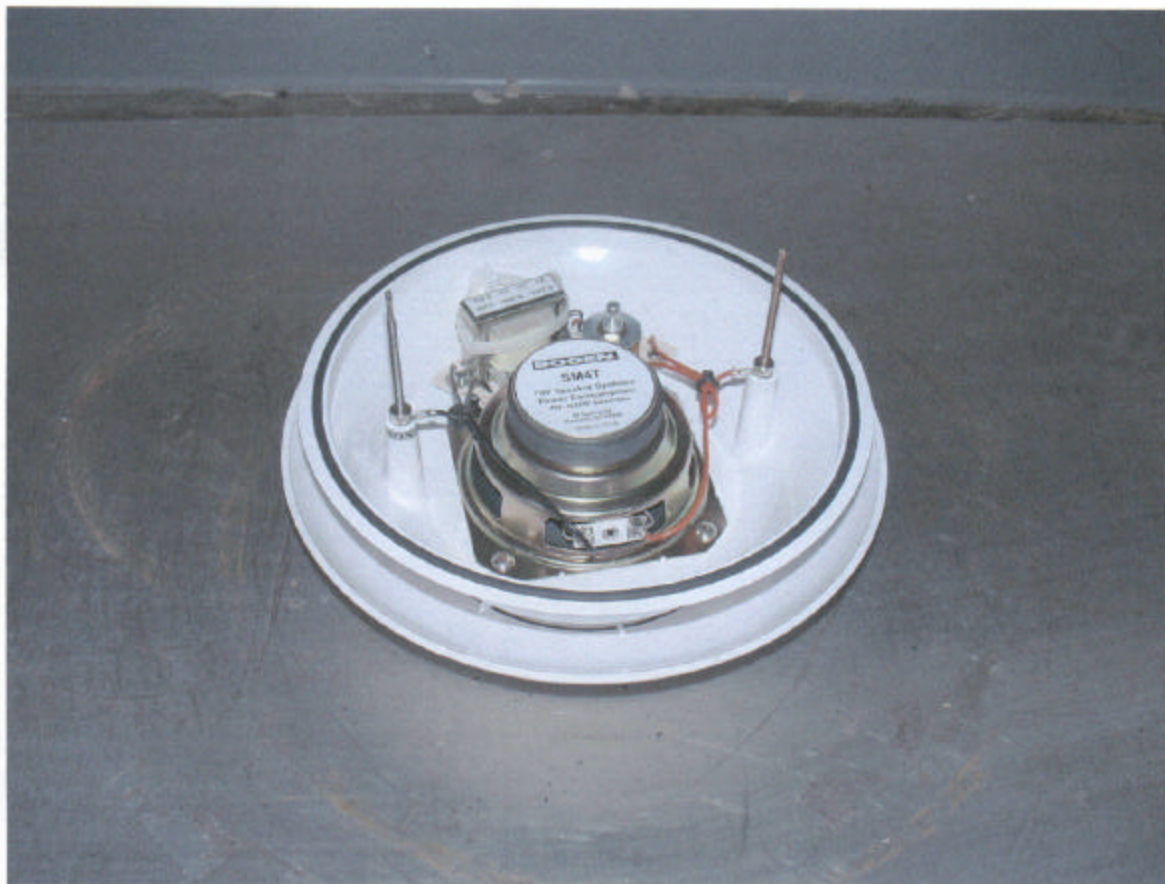
Test Time	Test Observations
0:00	Start of test, 60kW
1:00	Light smoke
3:00	Moderate smoke; ceiling support arm beginning to melt
5:00	Flaming drippings falling to ground; heavy smoke
7:00	Heavy smoke continued
9:00	Moderate to lite smoke
10:00	Stopped propane burner
12:00	Light smoke
15:00	Stopped test
After Test	Observations <ul style="list-style-type: none">- Test assembly melted away- Heavy soot buildup on ceiling tile

The results of this test meet the fire resistance criteria of the UL 2043 Standard. The peak rate of corrected heat release measured was 33.70 kW (less than the allowable 100 kW). The total duration was 15 min. The peak normalized optical density measured during the test was 0.433 (less than the allowable 0.50). Flaming drippings were observed. The average normalized optical density over the 10-minute test duration was 0.0639 (less than the allowable 0.15). The peak smoke release rate was 0.181 m²/sec. The total smoke released was 32.05 m². See Appendix B for the graphs illustrating the resulting data.

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Appendix A – Photographs

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Photograph 1 - Top view prior to test 020326a

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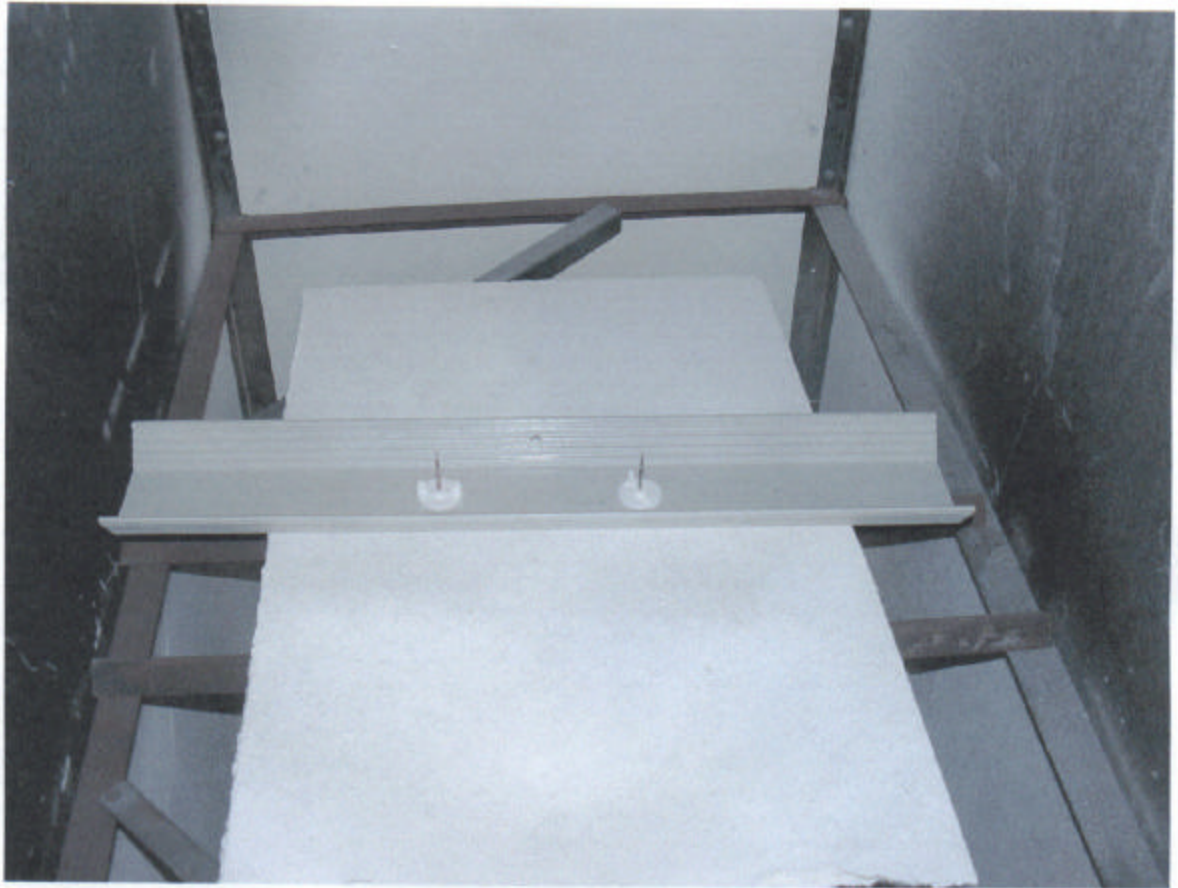
Photograph 2 - Bottom view prior to test 020326a

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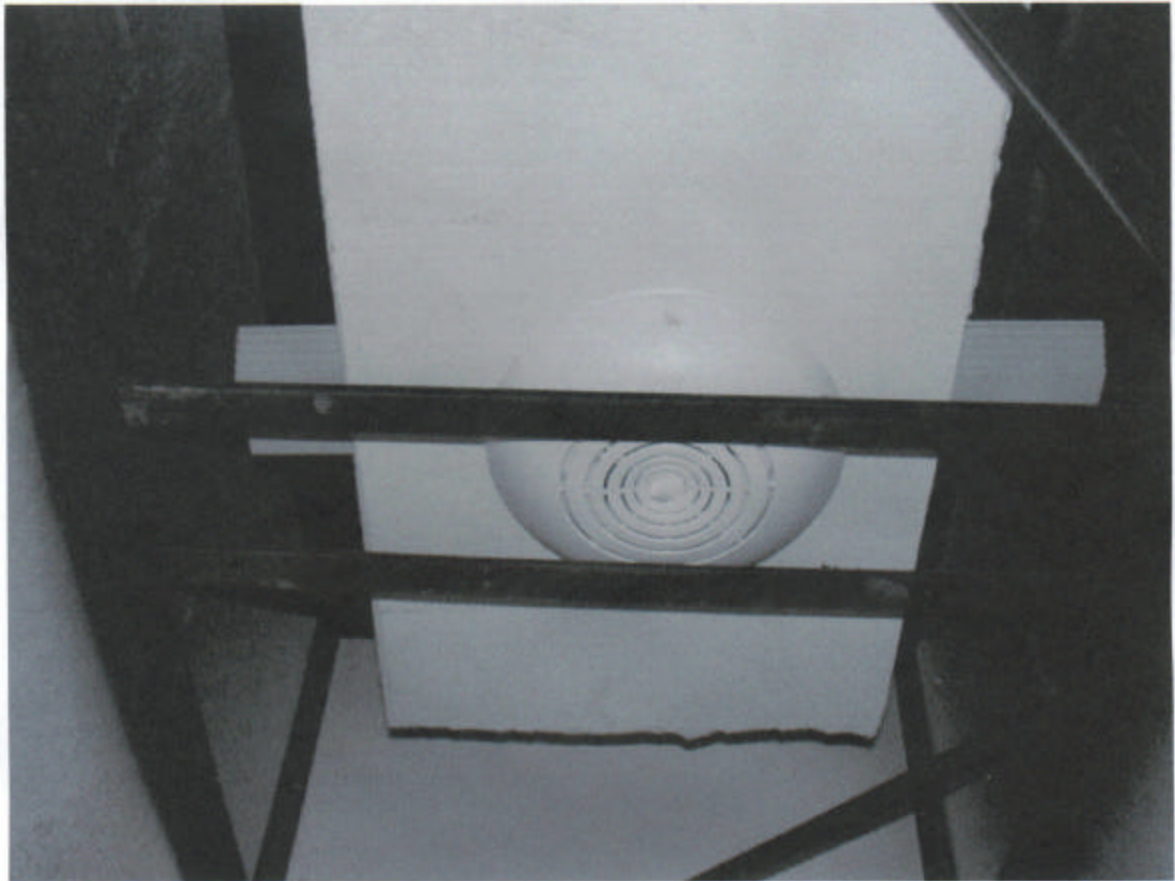
Photograph 3 - Front view of test setup prior to test 020326a

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Photograph 4 - Top view of speaker assembly prior test 0020326a

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Photograph 5 - Bottom view of speaker assembly before test 020326a

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Photograph 6 – Top view of speaker assembly after burn 020326a

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Photograph 7 – Bottom view of speaker assembly after test 020326a

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Photograph 8 – Debris from flaming drippings after test 020326a

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Photograph 9 – Top view prior to test 020326b

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Photograph 10 – Bottom view prior to test 020326b

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Photograph 11 – Top view of speaker assembly after to test 020326b

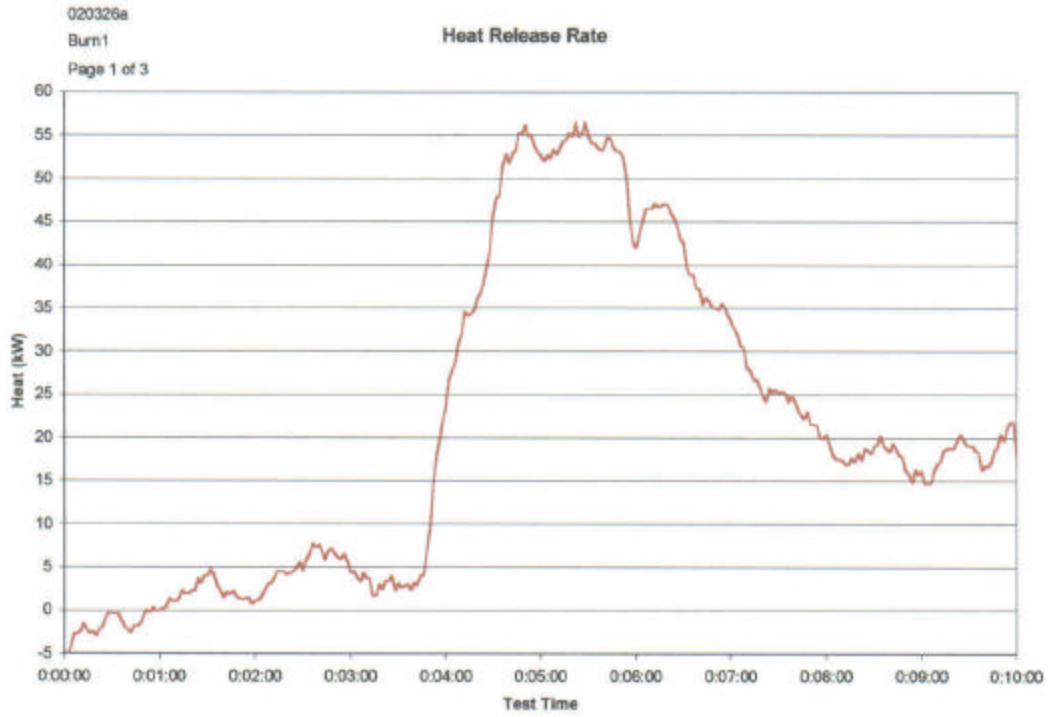
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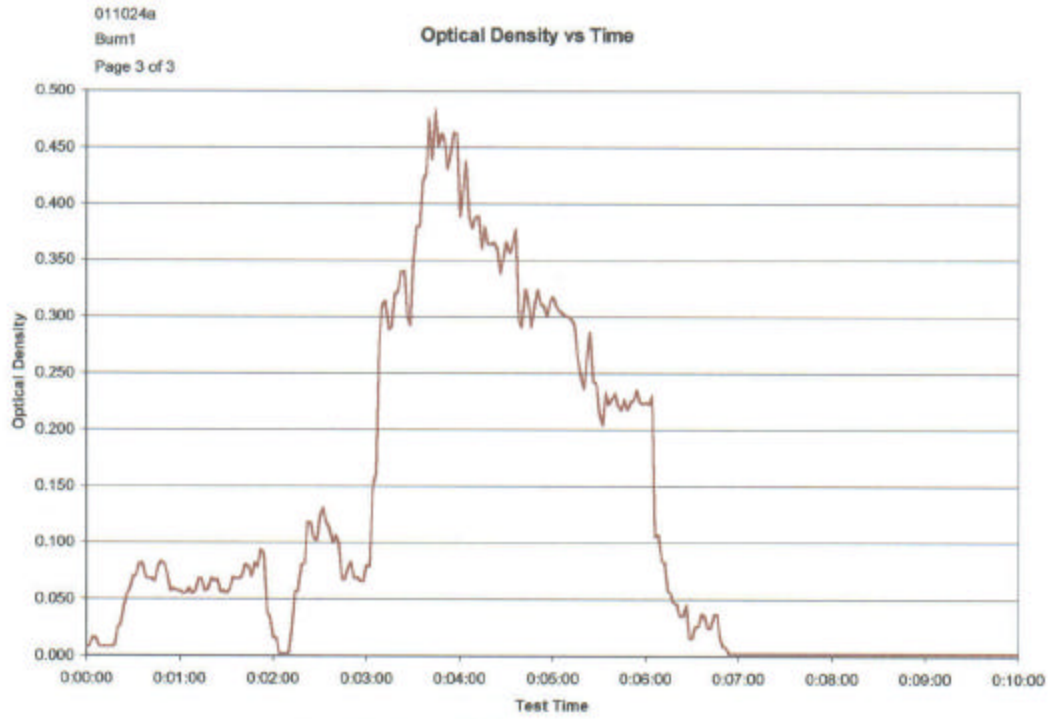
Photograph 12 – Bottom view of speaker assembly after to burn 020326b

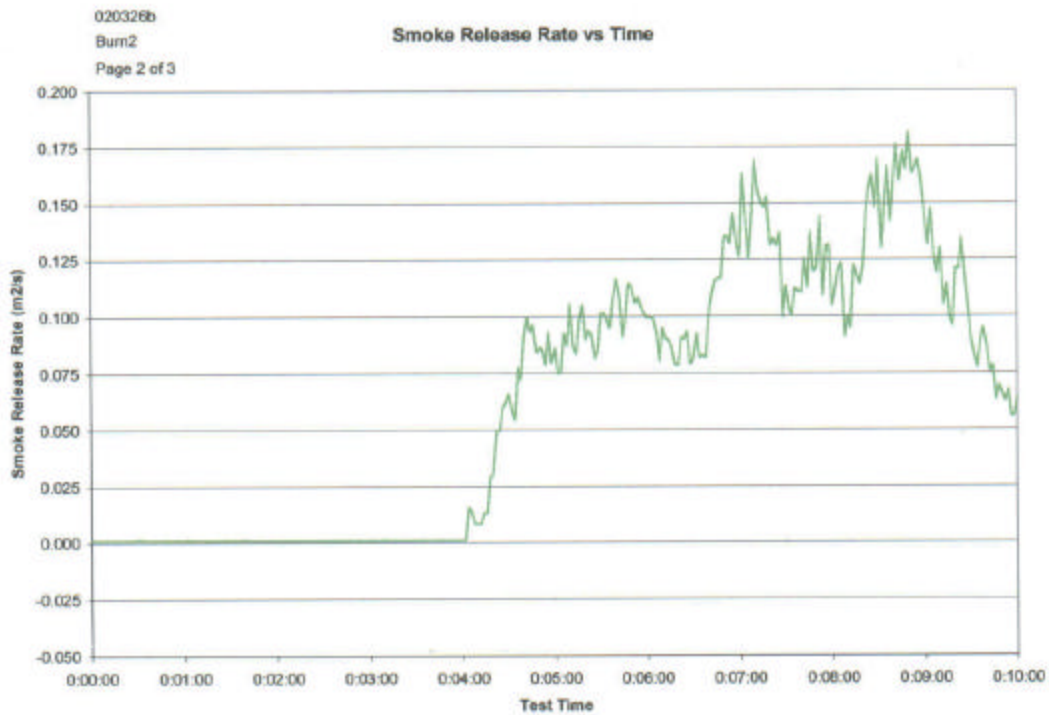
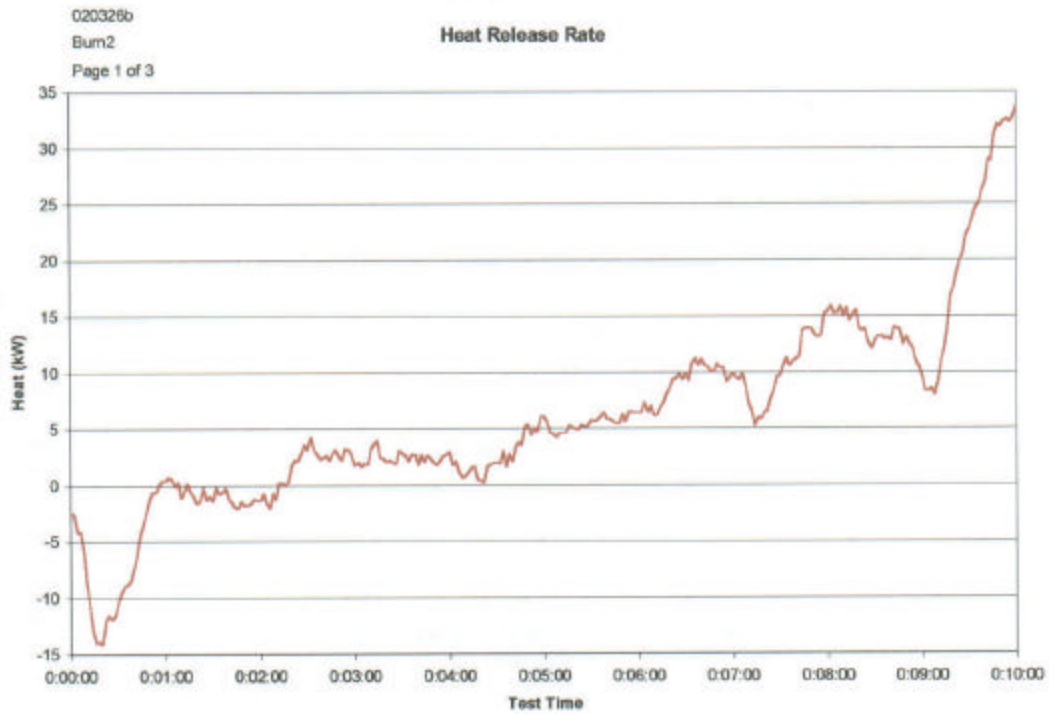
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Appendix B – Graphical Results



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