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FIRE PERFORMANCE EVALUATION OF "SAMPLE 6LFLT LOW E," A NOMINAL 1/4-IN. THICK SCRIM FOIL/POLYETHYLENE FOAM/SCRIM FOIL, IN GENERAL ACCORDANCE WITH THE 2006 EDITION OF NFPA 286, STANDARD METHODS OF FIRE TESTS FOR EVALUATING CONTRIBUTION OF WALL AND CEILING INTERIOR FINISH TO ROOM FIRE GROWTH

FINAL REPORT
Consisting of 21 Pages

SwRI Project No. 01.11811.01.420b
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ABSTRACT

This report presents the results of a fire performance evaluation of a nominal 1/4 -in. thick Scrim Foil/Polyethylene Foam/Scrim Foil material identified as "Sample 6LFLT Low E," for Environmentally Safe Products, Inc., of New Oxford, PA. Testing was conducted in general accordance with the 2006 Edition of National Fire Protection Association (NFPA) Standard 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. The test standard requires the material tested to be installed on the interior of the test room frame. At the Client's request, a metal frame was constructed to simulate an actual metal building installation according to Environmentally Safe Products, Inc.'s Low-E installation instructions. The test material was installed behind the frame, on the walls and ceiling. The test was conducted on June 5, 2006, by Southwest Research Institute's[®] (SwRI[®]) Fire Technology Department, located in San Antonio, Texas.

NFPA 286 does not have criteria for passing or failing a product due to performance during the fire test. In general, this test is used as a tool for ranking material performance in a standard configuration. However, a major event that this test can identify is the propensity of a material to cause a standard room to "flashover," which according to NFPA 286, is determined to have occurred when two of five specified conditions are attained.

A summary of the test results obtained for "Sample 6LFLT Low E" is given in the table below.

Summary of Test Results and Flashover Limits.

Material ID	Maximum Rate of Heat Release (Total)	Total Heat Flux to the Floor	Maximum Average Upper Layer Temperature	Flames Extling Doorway	Auto-Ignition of Paper Target
"Sample 6LFLT Low E" Scrim Foil/Polyethylene Foam/Scrim Foil	315 kW	3.3 kW/m ²	290°C	No	No
Flashover Limits Per Section 1.3.11 of NFPA 286	1,000 kW	20 kW/m ²	600°C	Not Allowed	Not Allowed

Based on the test results, the material identified as "Sample 6LFLT Low E" did not cause the test room to flash over.

1.0 INTRODUCTION

This report presents the results of a fire performance evaluation of a nominal 1/4 -in. thick Scrim Foil/Polyethylene Foam/Scrim Foil material identified as "Sample 6LFLT Low E," for Environmentally Safe Products, Inc., of New Oxford, PA. Testing was conducted in general accordance with the 2006 Edition of National Fire Protection Association (NFPA) Standard 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. The test standard requires the material tested to be installed on the interior of the test room frame. At the Client's request, a metal frame was constructed to simulate an actual metal building installation according to Environmentally Safe Products, Inc.'s Low-E installation instructions. The test material was installed behind the frame, on the walls and ceiling. Testing was conducted on June 5, 2006, by Southwest Research Institute's® (SwRI®) Fire Technology Department, located in San Antonio, Texas.

2.0 OBJECTIVE

This test method is intended for the evaluation of the flammability characteristics of wall and ceiling interior finish, other than textile wall coverings, where such materials constitute the exposed interior surfaces of buildings. It determines how much a material will contribute to a fire by measuring the amount of heat and smoke released, along with the combustion products released.

NFPA 286 does not have criteria for passing or failing a product due to performance during the fire test. In general, this test is used as a tool for ranking material performance in a standard configuration. However, a major event that this test can identify is the propensity of a material to cause a standard room to "flash over," which according to NFPA 286, is determined to have occurred when two of five specified conditions are attained. The material being tested may perform differently when it is placed in a room of a different size or shape, or in different environmental conditions. The test data cannot be generalized to apply to these different conditions.

The results apply specifically to the specimens tested, in the manner tested, and not to similar materials, nor to the performance when used in combination with other materials.

3.0 TEST ASSEMBLY

Environmentally Safe Products, Inc., provided a material identified as "Sample 6LFLT Low E" for testing in general accordance with NFPA 286. The material consisted of nominal 1/4-in. thick Scrim Foil/Polyethylene Foam/Scrim Foil with a nominal density of 1.1 pcf. One roll of the material, measuring 72 in. wide x 1008 in. long with a nominal unit weight of 6.37 oz/sq yd, was received at SwRI on May 18,

2006. The roll was placed in a conditioning room maintained at 72°F and 50% relative humidity until the day of testing.

“Sample 6LFLT Low E” was attached to a skeletal metal room fabricated by SwRI staff according to drawings supplied by the Client (see Appendix D). Construction of the test room consisted of 3-5/8 x 1-5/8-in. x 16-ga. galvanized metal C-studs as main vertical corner supports. Zee-purlins measuring 6 x 2 x 1/2 in. x 14 ga. were used as the main horizontal supports and were spaced 32 in., on center. The bases of the walls were formed using 2 x 4-in. x 14-ga. base metal angle. The ceiling consisted of four zee-purlin supports placed 4 ft apart, on center. The outside dimensions of the skeletal room were 8 x 12 x 8 1/2 ft high. The test material was attached to the exterior side of the structure forming the test walls and ceiling and secured together with one layer of 0.004-in. thick aluminum foil tape on all joints and seams. The 1/2-in. thick type X gypsum board was attached over the test material, thus completing the assembly. “Sample 6LFLT Low E” and the gypsum board were secured using standard drywall screws backed with 1-1/4-in. fender washers every 24 in. on center to the zee-purlins.

4.0 INSTRUMENTATION

The rate of heat release is measured using the oxygen consumption technique. This technique requires the measurement of gas concentrations in the exhaust duct, as well as the volumetric flow of these gases. The products of combustion and entrained air are collected in a hood and extracted through an exhaust duct by a fan. A gas sample is drawn from the exhaust duct and analyzed for oxygen, carbon dioxide and carbon monoxide concentrations. The gas temperature and differential pressure across a bi-directional probe are measured for calculating the mass flow rate of the exhaust gases.

Smoke release rate is determined based on the measured light obscuration in the exhaust duct using a vertically-oriented white-light extinction photometer located close to the gas sampling point.

5.0 TEST RESULTS

The test was conducted by SwRI’s Fire Technology Department on June 5, 2006. The test room and building were at 75°F and 65% relative humidity during the test. Test results are summarized in graphical form in Appendix A. Relevant photographic documentation is provided in Appendix B, and visual observations can be found in Appendix C. A summary of the test results is given in Table 1 below.

Table 1. Summary of Test Results and Flashover Limits.

Material ID	Maximum Rate of Heat Release (Total)	Total Heat Flux to the Floor	Maximum Average Upper Layer Temperature	Flames Exiting Doorway	Auto-Ignition of Paper Target
"Sample 6LFLT Low E" Scrim Foil/Polyethylene Foam/Scrim Foil	315 kW	3.3 kW/m ²	290°C	No	No
Flashover Limits Per Section 1.3.11 of NFPA 286	1,000 kW	20 kW/m ²	600°C	Not Allowed	Not Allowed

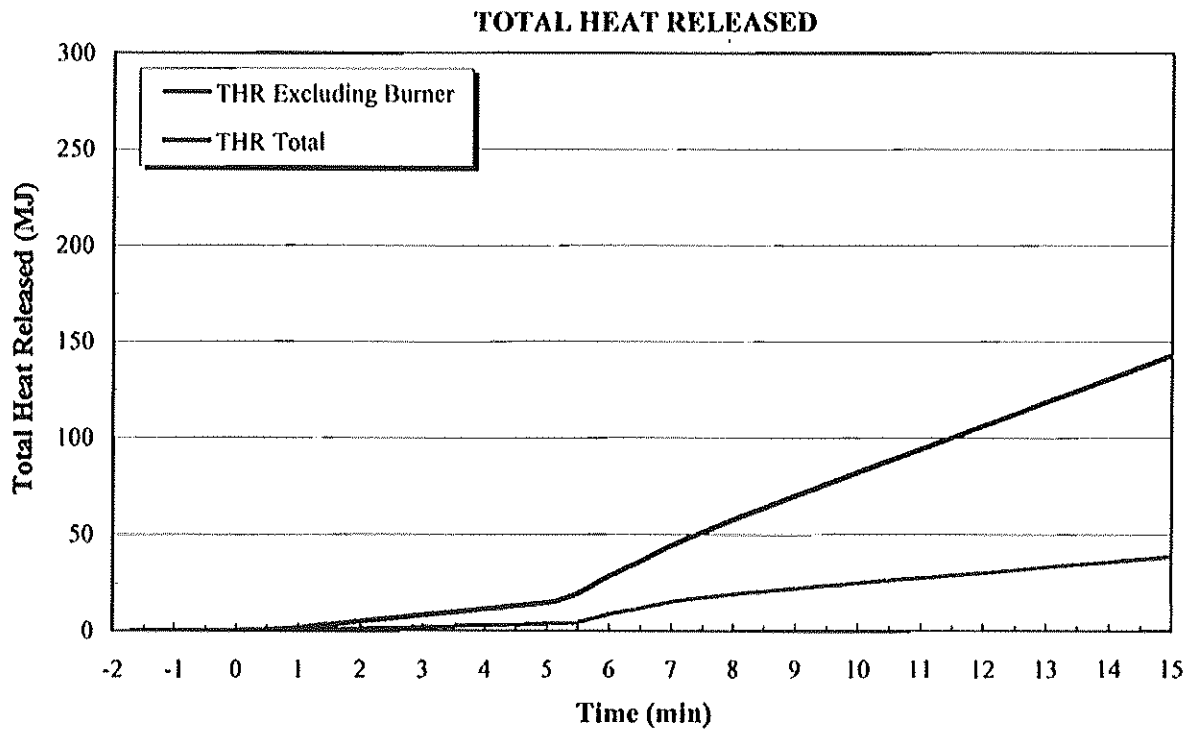
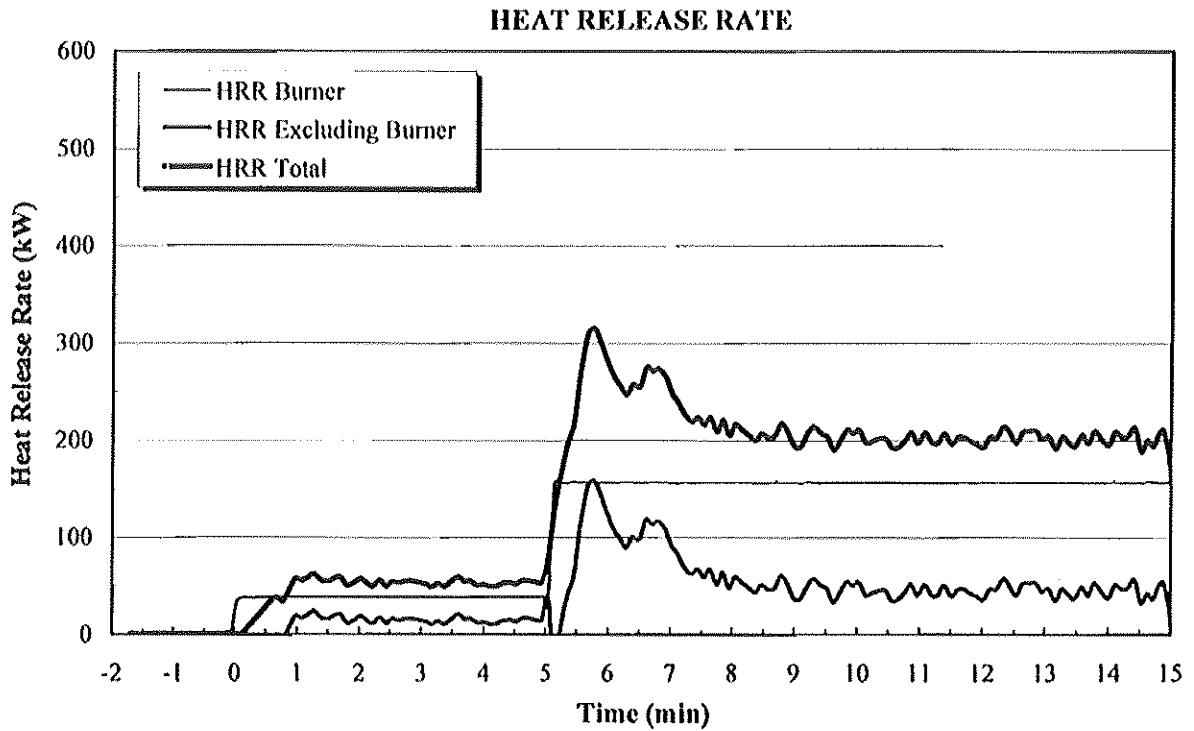
6.0 CONCLUSION

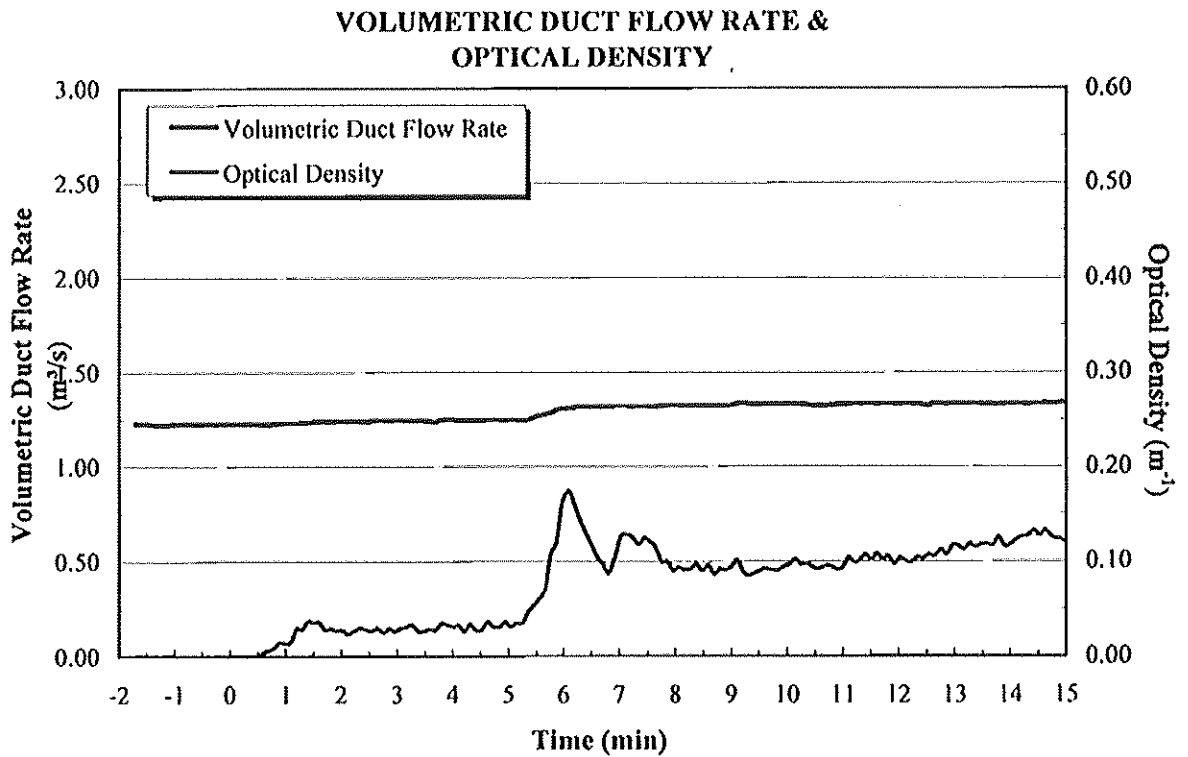
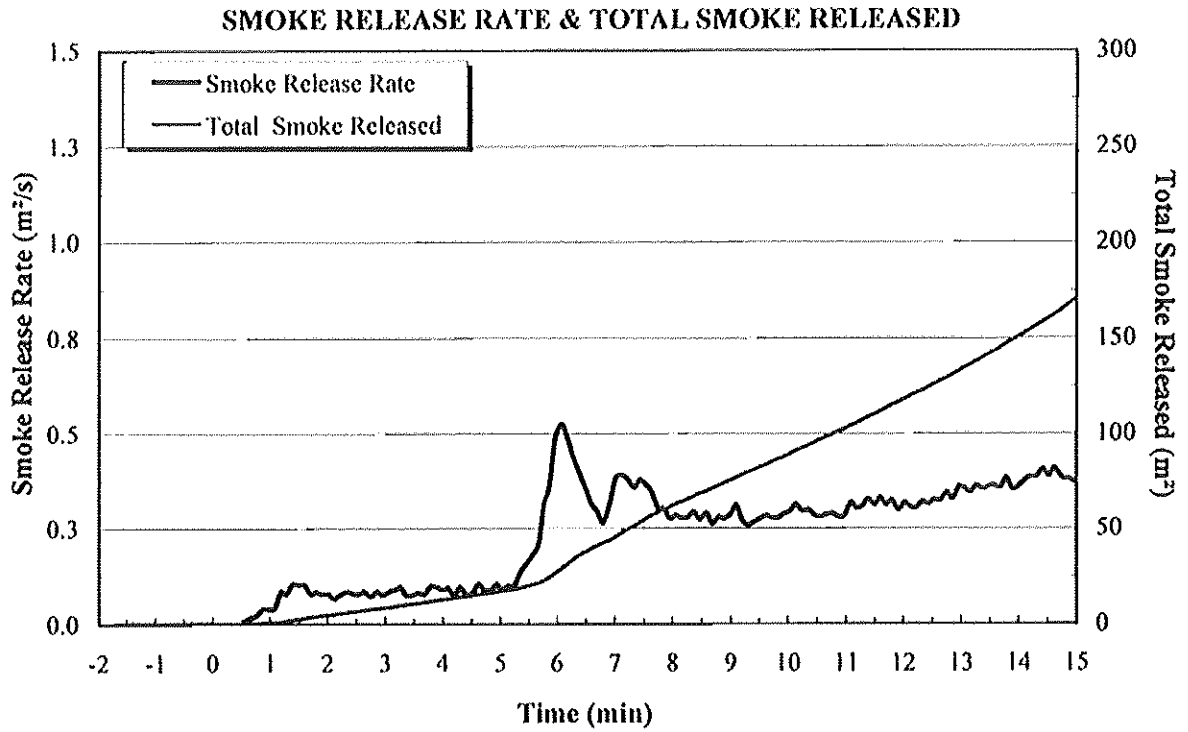
Based on the test data, "Sample 6LFLT Low E" provided by Environmentally Safe Products, Inc., did not cause the room to flash over.

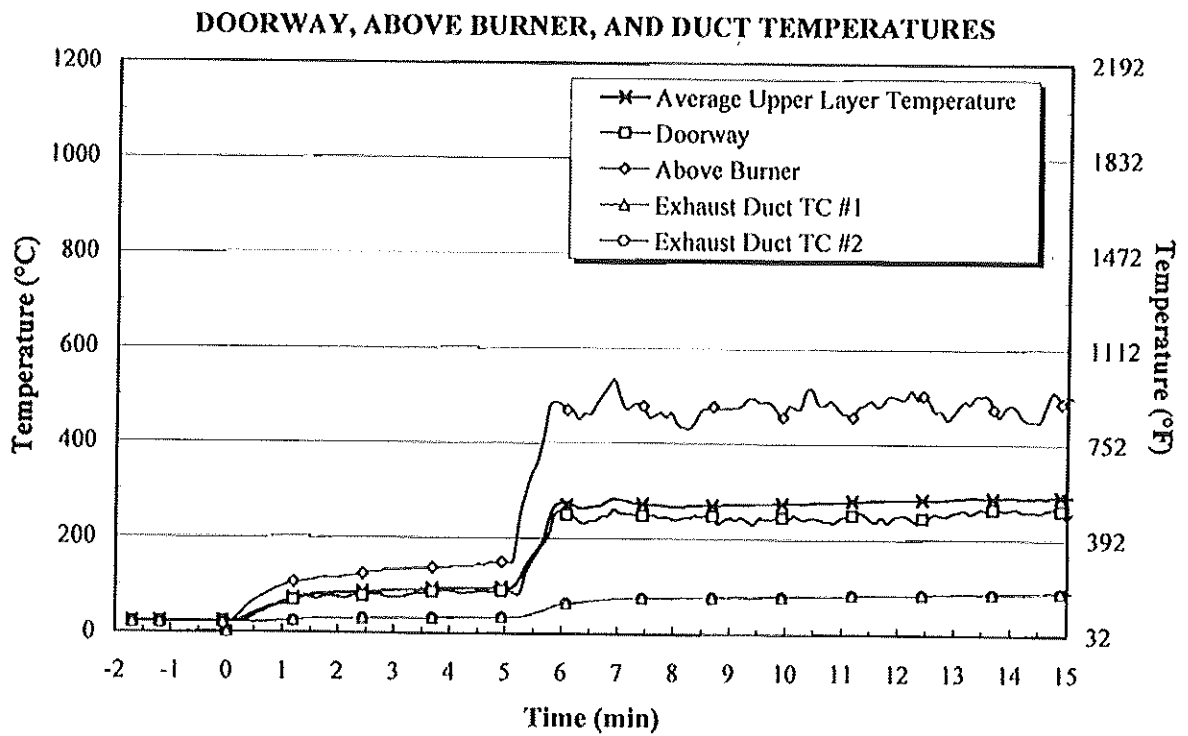
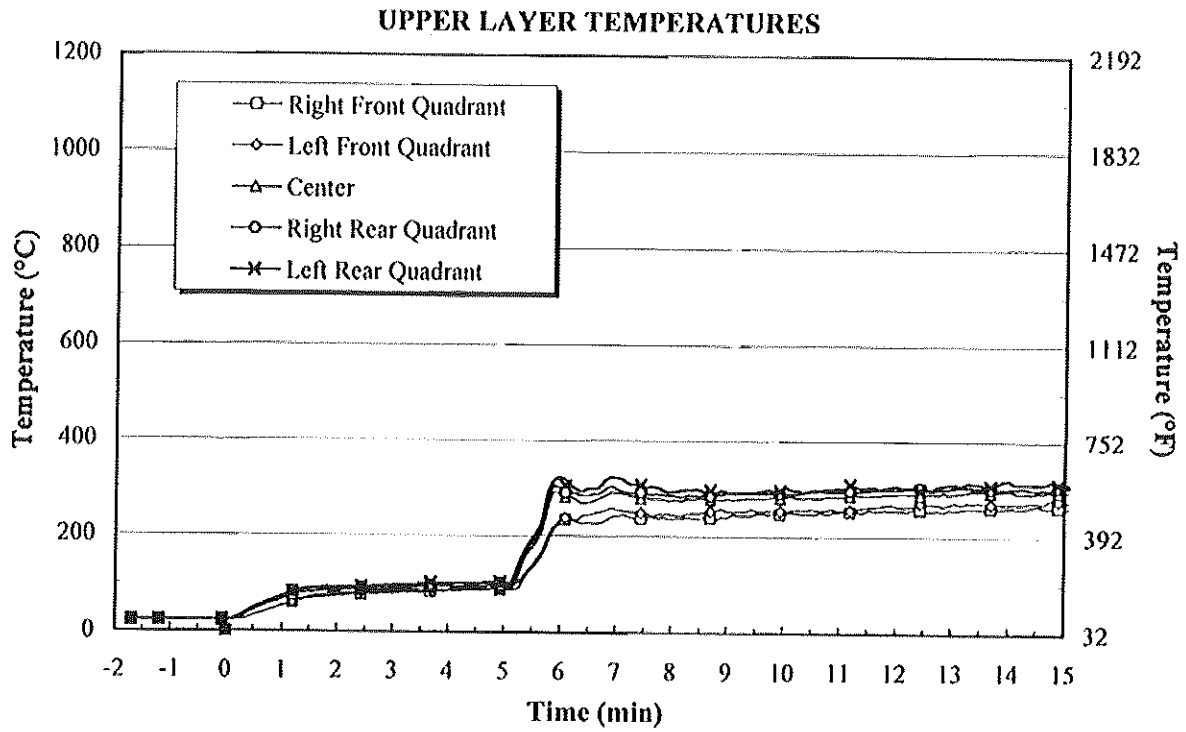
APPENDIX A
TEST DATA
(Consisting of 5 Pages)

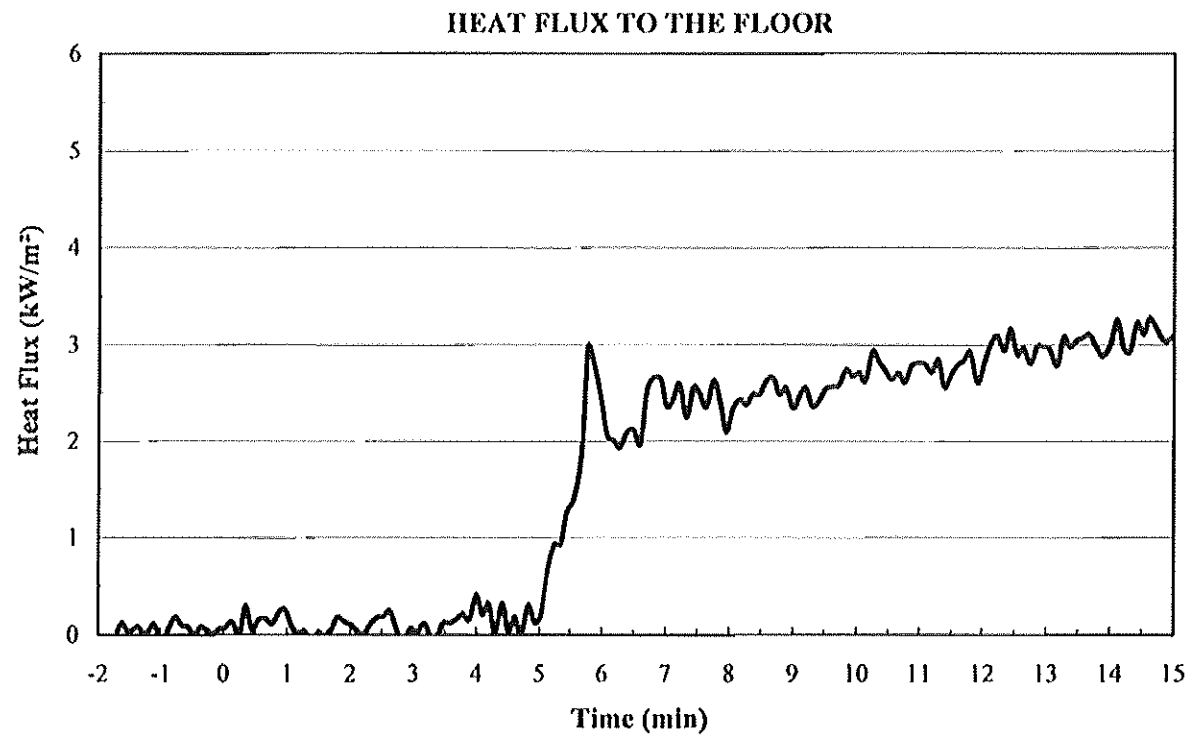
**SUMMARY OF
 TEST RESULTS**

Maximum HRR_{total}	315 kW	at	5 min 46 sec
Average HRR_{total}	162 kW		
Total Heat Released	146 MJ		
Maximum $HRR_{excl. burner}$	159 kW	at	5 min 46 sec
Average $HRR_{excl. burner}$	45 kW		
Total Heat Released (Excluding Burner)	40 MJ		
Maximum Smoke Release Rate	0.53 m ² /s	at	6 min 5 sec
Average Smoke Release Rate	0.20 m ² /s		
Total Smoke Released	176 m ²		
Maximum Optical Density	0.17 1/m	at	6 min 5 sec
Maximum Duct Flow Rate	1.31 m ³ /s		
Average Optical Density	0.081 1/m		
Average Volumetric Duct Flow Rate	1.29 m ³ /s		
Total Heat Flux to the Floor	3.3 kW/m ²	at	14 min 37 sec
Max. Average Upper Layer Temperature	290°C 554°F	at	14 min 48 sec
Maximum Doorway Temperature	264°C 508°F	at	14 min 6 sec









APPENDIX B
PHOTOGRAPHIC DOCUMENTATION
(Consisting of 5 Pages)

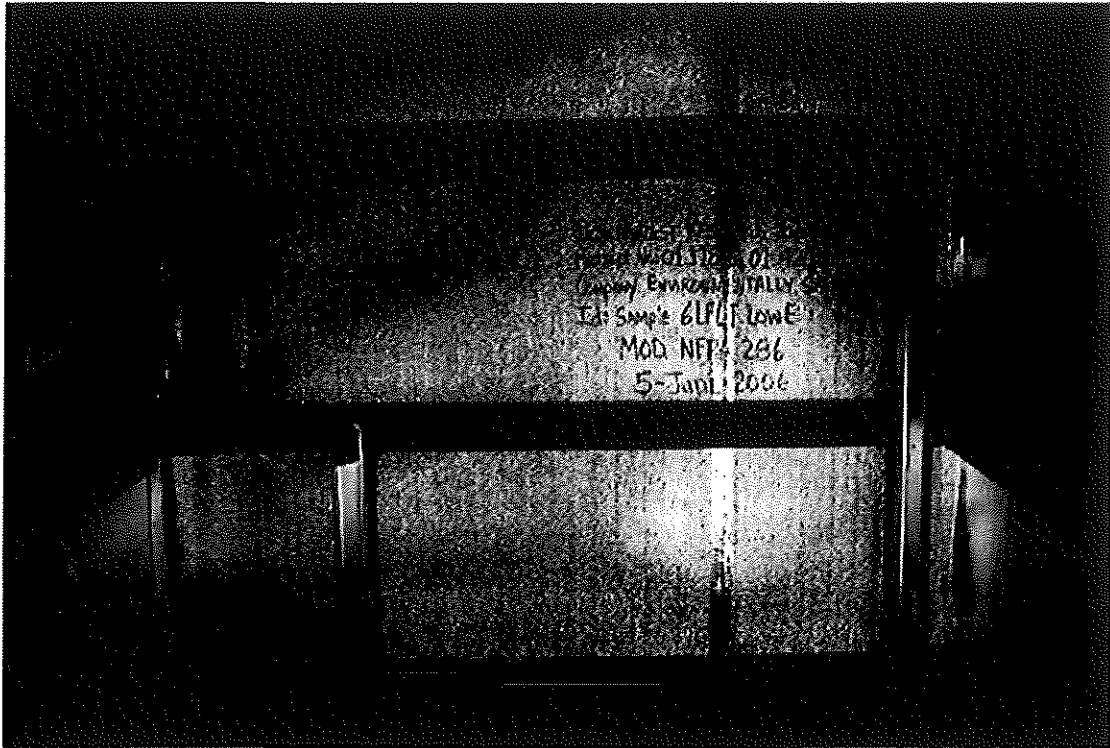


Figure B-1. Pre-Test Conditions. Vertical Corner Support Studs Were Cut Away and Moved to Allow Placement of Burner Against Vertical Plane of Zee-Purlins.

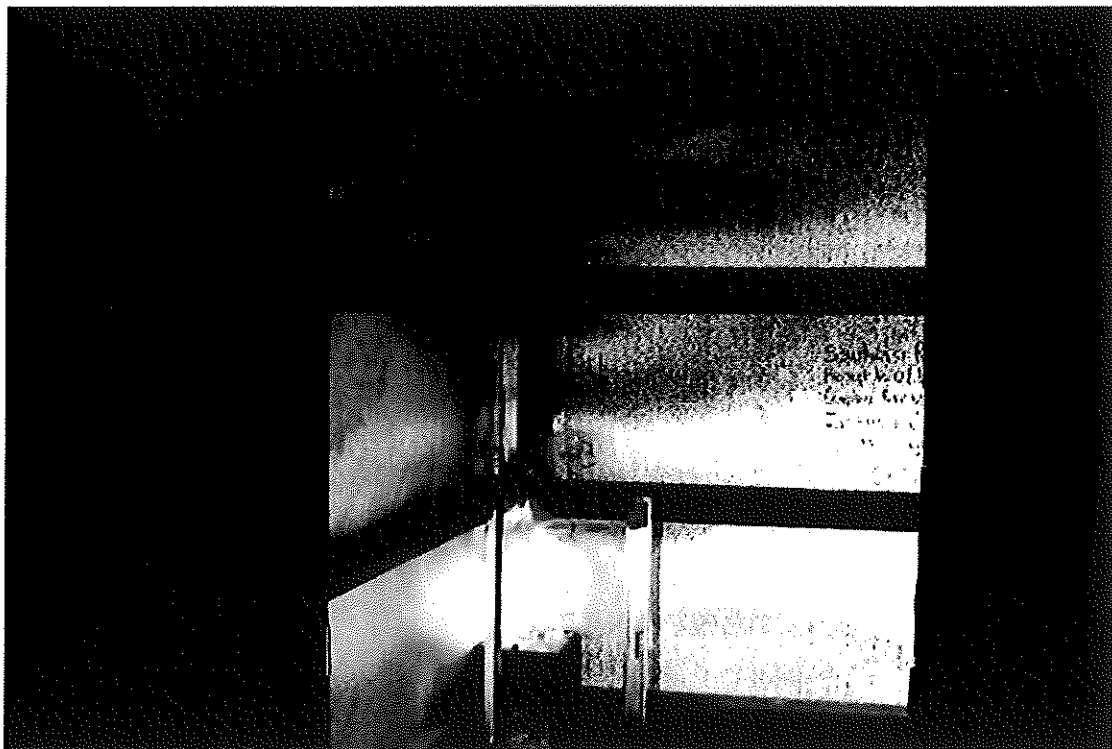


Figure B-2. Start of Test, Burner Set at 40 kW.

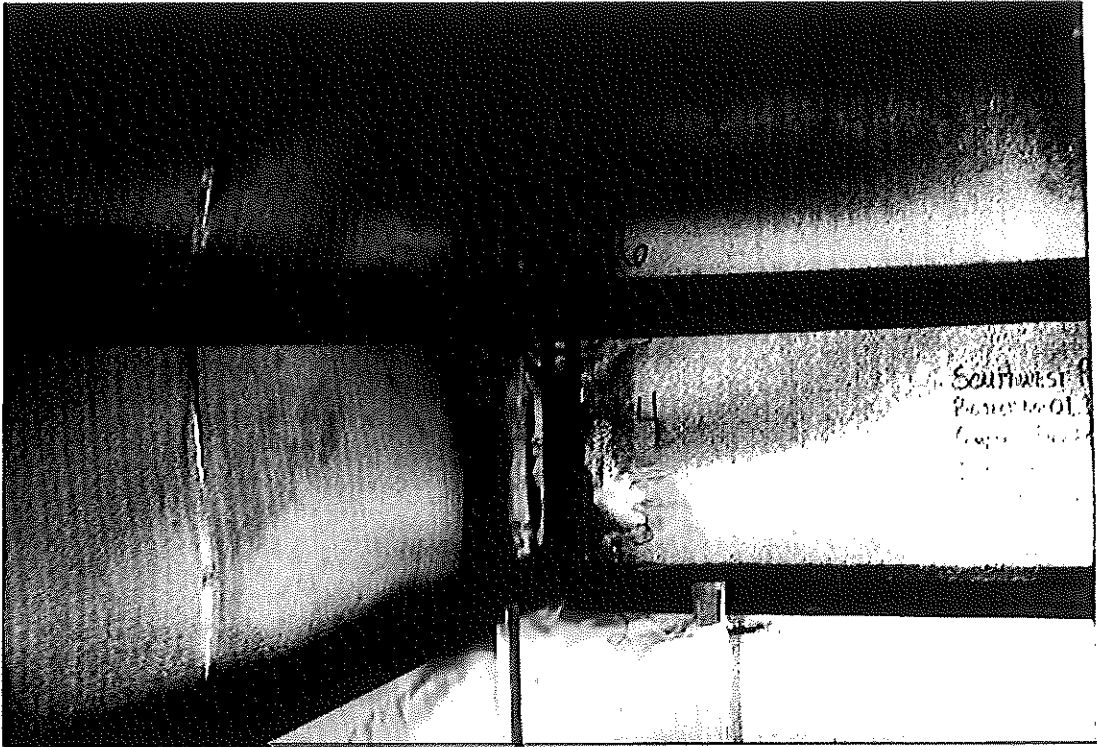


Figure B-3. Approximately 4 Min 45 Sec Into Test.

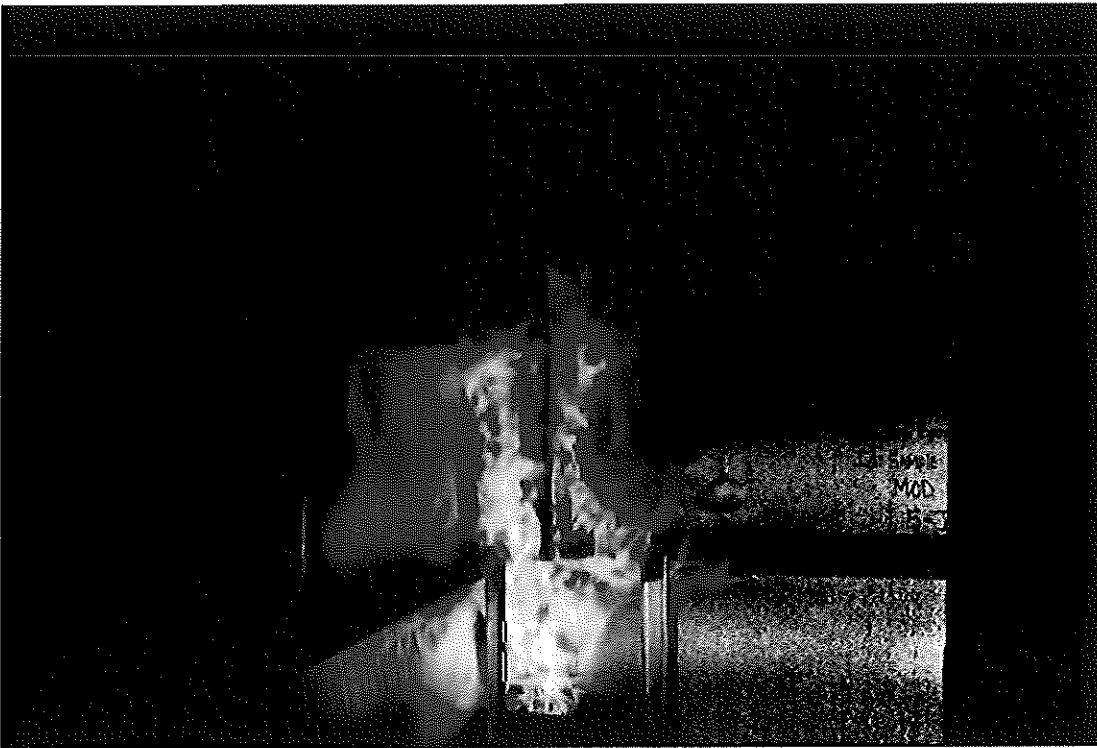


Figure B-4. Burner Increased to 160 kW.

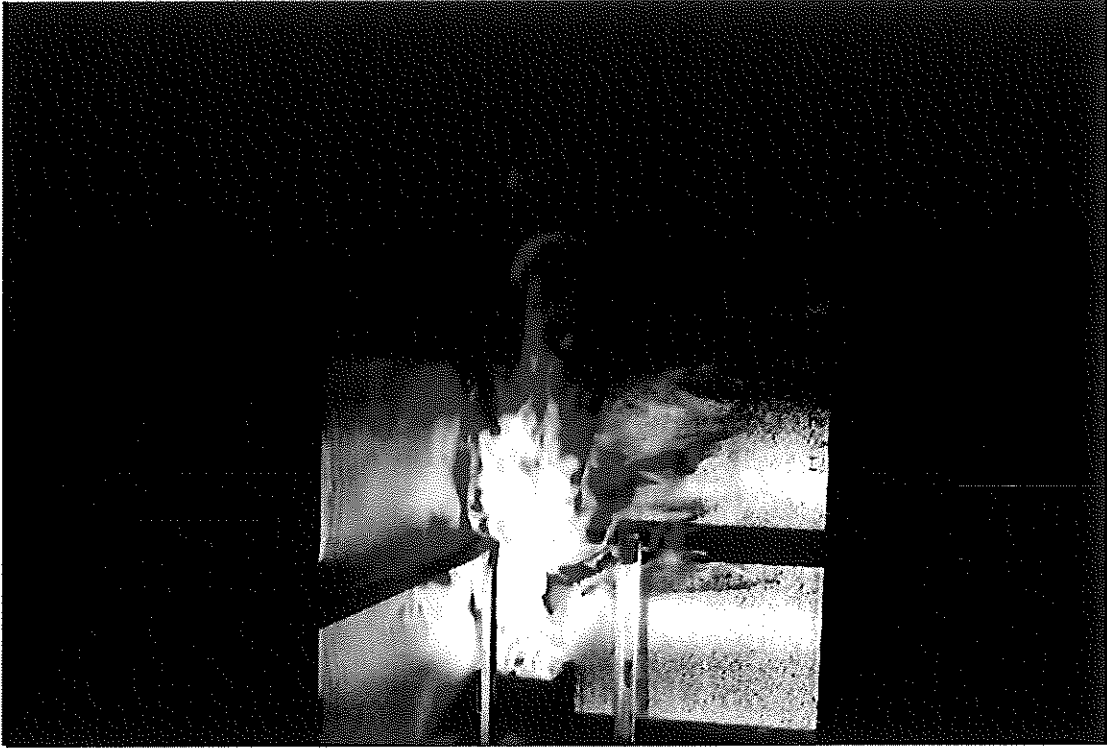


Figure B-5. Approximately 7 Min Into Test.



Figure B-6. Approximately 13 Min Into Test.



Figure B-7. Approximately 15 Min Into Test.

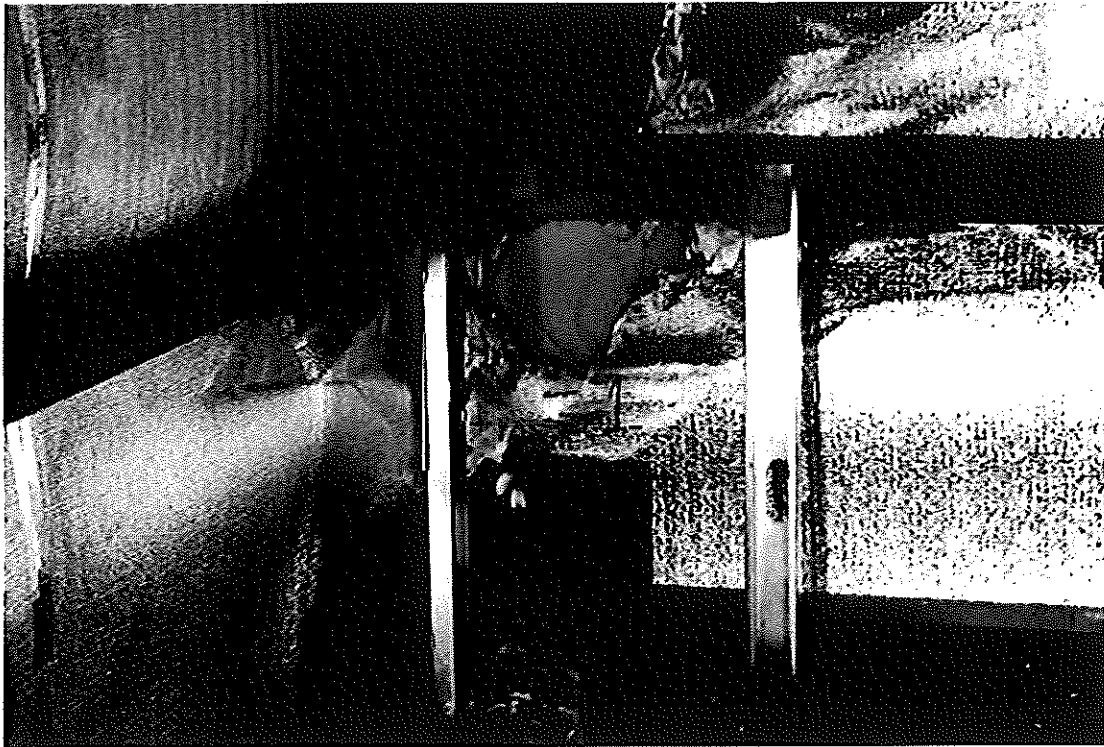


Figure B-8. Test Terminated. View of Room Interior, Back Corner.



Figure B-9. Test Terminated. View of Room Interior, Back Corner.

APPENDIX C
VISUAL OBSERVATIONS
(Consisting of 1 Page)

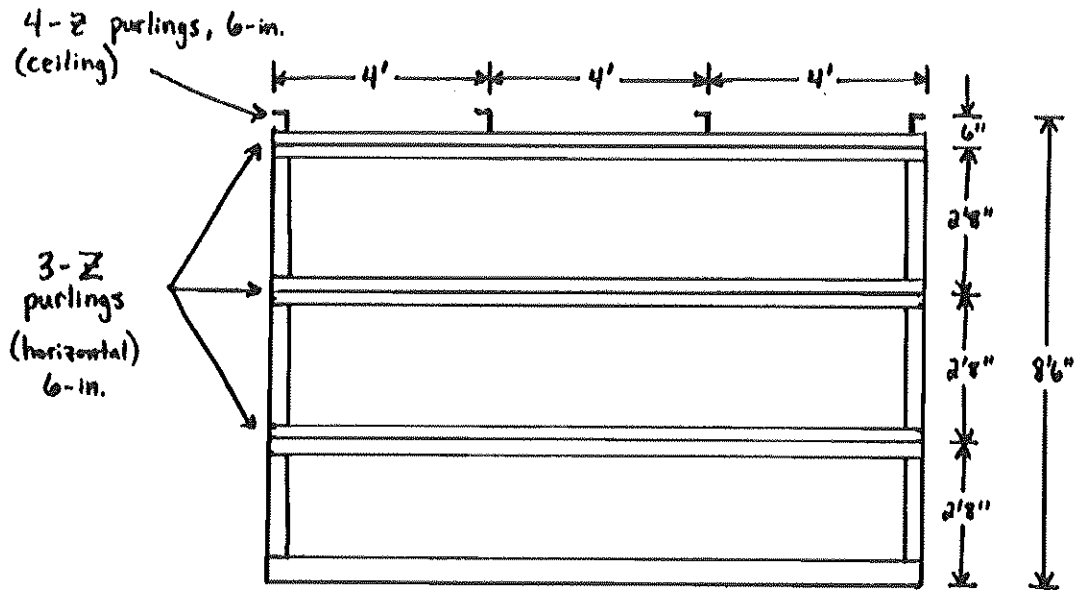
Southwest Research Institute
Project No. 01.11811.01.420b
June 5, 2006
Environmentally Safe Products, Inc.
Material I.D.: "Sample 6LFLT Low E"
Scrim foil/polyethylene foam/scrim foil

OBSERVATIONS

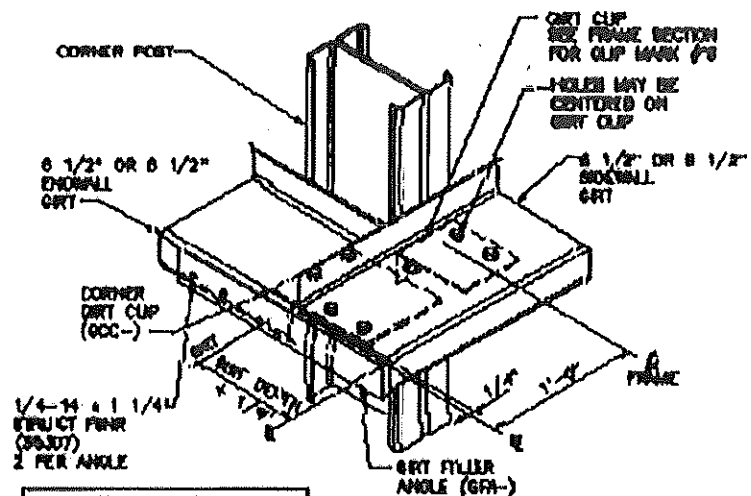
TIME
MIN:SEC

- 00:00 Start of Test, burner set at 40 kW.
00:30 Flames from the burner up to the first horizontal zee-purlin.
01:00 Light grey layer of smoke in the room interior down to 5 1/2 ft above the floor.
01:05 Ignition in the burner corner on the back wall from the top of the burner to the underside of the first zee-purlin.
02:45 Flames from the burner are 3 to 3 1/2 ft in height and continuous to the underside of the first horizontal zee-purlin. Warping on the face of the building wrap approximately 1 ft in width along both walls up to 2 ft from the floor.
03:25 Slight discoloration in the burner corner up to the ceiling and on the ceiling located directly over the burner.
05:00 **Burner Increased to 160 kW.** Flames are up to the ceiling, flames are up to the underside of the first zee-purlin and burning 2 to 3 ft laterally away from the burner corner.
05:10 Flames are burning on the building wrap up to 5 ft from the floor in the burner corner and beginning to impinge on the underside of the second zee-purlin.
05:30 Flames are continuous to 8 ft and intermittent to the underside of the ceiling.
05:45 Flaming is approximately 16 in. in width along both corner walls up to 5 ft from the floor. Flames from the burner are intermittent to the ceiling.
06:30 Continuous flaming from the top of the burner up to 6 ft from the floor.
10:00 No change in room interior.
13:00 Flames from the burner are intermittent to the ceiling. Flames from the burner are up to the first zee-purlin and flashing 1 to 2 ft along the underside. Flames in the burner corner are up to the second zee-purlin and flashing 1 ft laterally on the underside.
14:00 Damage to the building wrap is approximately 24 in. in width starting at the top of the burner to the underside of the first zee-purlin. Damage to the building wrap is approximately 18 in. in width along both walls between the first and second zee-purlin. The building wrap is intact from the top of the second zee-purlin to the underside of the ceiling with no damage to the building wrap on the ceiling.
14:55 No change in room interior. Light grey smoke in the room interior down to 5 1/2 ft above the floor.
15:00 **End of Test, burner extinguished.**

APPENDIX D
CLIENT-SUPPLIED CONSTRUCTION DRAWING
(Consisting of 1 Page)



TEST ROOM FOR ENVIRONMENTALLY SAFE PRODUCTS, IAC
(side view)



NOTE: ALL HOLES TO BE 1/2" X 1 1/2" A325 (48000) HIGH-TEN BOLTS TO BE AS PER CONDITION AS DEFINED BY THE AISI/ROSC SPECIFICATION FOR STRUCTURAL JOINTS USING AISI S23 OR A490 BOLTS

NOTE: GIRT CLIPS MAY BE SHOPWELDED.

GIRT CONN. AT CORNER POST
ANY OUTSET GIRT AT EW, ANY GIRT AT SW

WS12B2

