TEST REPORT

REPORT NUMBER: G101654995SAT-001
ORIGINAL ISSUE DATE: October 28, 2014
REVISED DATE: NA

EVALUATION CENTER
Intertek Testing Services NA Inc.
16015 Shady Falls Rd.
Elmendorf, TX 78112

RENDERED TO

Acroplast, Inc.
1873 Williamstown Drive
St. Peters, MO 6376

PRODUCT EVALUATED: Arcoplast Modular Panels
EVALUATION PROPERTY: Heat Release, Flame Spread

Report of testing Arcoplast Modular Panel System for compliance with the applicable requirements of the following criteria: ISO 9705:1993(E), Full-scale room test for surface products, First Edition, Corrected and reprinted 1996-03-01

1 Table of Contents

2 Introduction

Intertek Testing Services NA (Intertek) has conducted testing for Arcoplast Inc. on Arcoplast modular panels to evaluate heat release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with ISO 9705 Full-scale room test for surface products. Annex B, Alternative ignition source. . This evaluation was performed on October 27, 2014.

3 Test Samples

3.1. SAMPLE SELECTION

Samples were submitted to Intertek directly from the client. Samples were not independently selected for testing. Samples were received at the Evaluation Center on October 23, 2014 and assigned Intertek ID No. SAT1410231847-001

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The substrate consisted of 3-5/8", 20 gauge, studs and track. 5/8" thick gypsum wall board was applied to the exterior of the studs and joist.

The test specimen consisted of 3/8" Acroplast panels, Aluminum spline and joint compounds.

Final interior dimensions were 8 feet high, 8 feet wide and 12 feet deep.

See drawings and photos in Appendix A and B for a visual depiction of the description.

4 Testing and Evaluation Methods

This fire test measures certain fire performance characteristics of 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.

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.

TEST EQUIPMENT AND INSTRUMENTATION

IGNITION SOURCE

The ignition source for the test is a gas burner with a nominal 305 mm by 305 mm top surface. The burner is filled with gravel and sand. The upper level of sand is to be level with the upper edge of the burner.

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 positioned directly against both walls in the left or right 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 for the first 5 minutes and when a second quarter-turn valve is opened the combined flow produces 160 kW for the remaining 10 minutes. The test ends when 15 minutes or flash over occurs or until signs of visual combustion have ceased, whichever occurs first.

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-foot walls. No other openings are present to allow ventilation. The test room is lined with 5/8” type X gypsum wallboard.

TOTAL HEAT FLUX GAUGE

A gauge shall be mounted a maximum of 2 inches above the floor surface, facing upward in the geometric center of the test room. The gauge shall be of the Gardon type, with a flat black surface, and a 180-degree view angle. In operation, it shall be maintained at a constant temperature (within ± 5% °F) above the dew point by water supplied at a temperature from 120° to 150°F.

THERMOCOUPLES

Bare chromel-alumel thermocouples 20 mil in diameter (24 GA. Type K, Chromel-Alumel, Special Limits of Error: ±1.1°C, purchased with Lot Traceability and with 5-point calibrations at each end of the Lot Purchase), with electrically welded thermo-junctions shall be used at each required location. The thermocouple wires, within 0.5 inches of the thermo-junction, shall be run along expected isotherms to minimize conduction errors. The insulation between the wires shall be stable to at least 2000°F or the wires shall be separated.

THERMOCOUPLE LOCATIONS

LOCATION	DESCRIPTION OF PLACEMENT
DOORWAY	A thermocouple is located in the interior plane of the door opening on the door centerline, 4 inches down from the top.
ROOM	Thermocouples are located 4 inches below the ceiling at the center of the ceiling, the center of each of the four ceiling quadrants and directly over the center of the ignition burner. To map the gas flow pattern in the room door opening there are seven probes. These probes are positioned at different heights and locations on a thermocouple tree.
HOOD EXHAUST DUCT	One pair of thermocouples is placed in the duct 9 duct diameters downstream of the entrance to the horizontal duct.

DUCT GAS VELOCITY

A bi-directional probe is used to measure gas velocity in the duct. The probe consists of a short stainless steel cylinder 1.75 inches long and 0.875 inches inside diameter, with a solid diaphragm in the center. The pressure taps on either side of the diaphragm support the probe. The axis of the probe is along the center line of the duct, 9 duct diameters downstream from the entrance. The pressure taps are connected to a pressure transducer capable of resolving pressure differences of 0.001 inches W.C.

CO and CO2 MEASUREMENTS

The exhaust duct measurement of CO and CO2 mole fractions is used principally as a measurement of the heat release rate as noted in Appendix F. Intertek has elected to utilize the oxygen depletion calculations for calorimetry described in ASTM and other methods. This method of calculation uses only oxygen depletion levels and has accuracy similar to the more complex ones. Using this method also has the advantage of eliminating potential sources of error which are not only mathematical, but can also show up in the additional complexities of hardware, potential for leaks, and time synchronization of instruments and gas flows.

OXYGEN MEASUREMENTS

A stainless steel gas sampling tube is located 10 duct diameters downstream from the entrance to the duct at the geometric center of the duct ±1/2 inch to obtain a continuously flowing sample for determining the oxygen concentration of the exhaust gas as a function of time. The oxygen content of the duct exhaust gas is determined by an oxygen analyzer with a relative accuracy of ±0.001% in the concentration range from 0 to 21% oxygen. The signal from the oxygen analyzer is within 5% of its final value within 30 seconds following a step change in the composition of the gas stream flowing past the sampling tube inlet.

PHOTOGRAPHIC RECORDS

Digital color photographs and DV video taping are both used to record and document the test. Care is taken to position the photographic equipment so as to not interfere with the smooth flow of air into the test room.

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 5 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 15 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

ISO 9705:1993(E), Full-scale room test for surface products, First Edition, Corrected and reprinted 1996-03-01 ANNEX B- Alternative ignition source

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

FIRE TESTS
The test was started at 9:50 a.m. on October 27, 2014. The ambient temperature was 70°F with a relative humidity of 69%. The data acquisition system was started and the burner was ignited. Events during the test are described below:

TIME (hour:min:sec)	OBSERVATION
0:00	Ignition of burner. Heat output set to 40 kW.
0:10	Discoloration 1 to 3ft vertically above burner
1:35	Light smoke
4:00	Flame tips 7ft vertically in corner above burner
4:30	Increase in smoke
5:00	Increase gas flow 160 kW
5:10	Horizontal flame tips 4ft on walls
6:46	Pieces of facer falling to floor
7:44	Ignition 2ft vertically above burner
9:50	Multiple pieces of facer falling to floor
11:00	Horizontal flame tips 4ft on ceiling and walls
11:40	Increase smoke
12:10	Flames 6ft horizontally on ceiling and walls
13:12	Flaming 8ft on ceiling
14:10	Horizontal flaming on walls and ceiling 10ft
15:00	Gas off
15:01	**Begin Observation**
19:49	All flames cease
45:00	Slight smoke from outside of room back corner
1:10:44	All smoke ceased

Post Test Observations:

The sample had visible discoloration throughout entire top 2ft of room, with a minimal char layer on walls and ceiling.

6 Conclusion

The sample submitted, installed, and described in this report did not Flashover during the 15 minute exposure described in A.2 of ISO 9705 using the alternative ignition source (ANNEX B-Alternative ignition source).

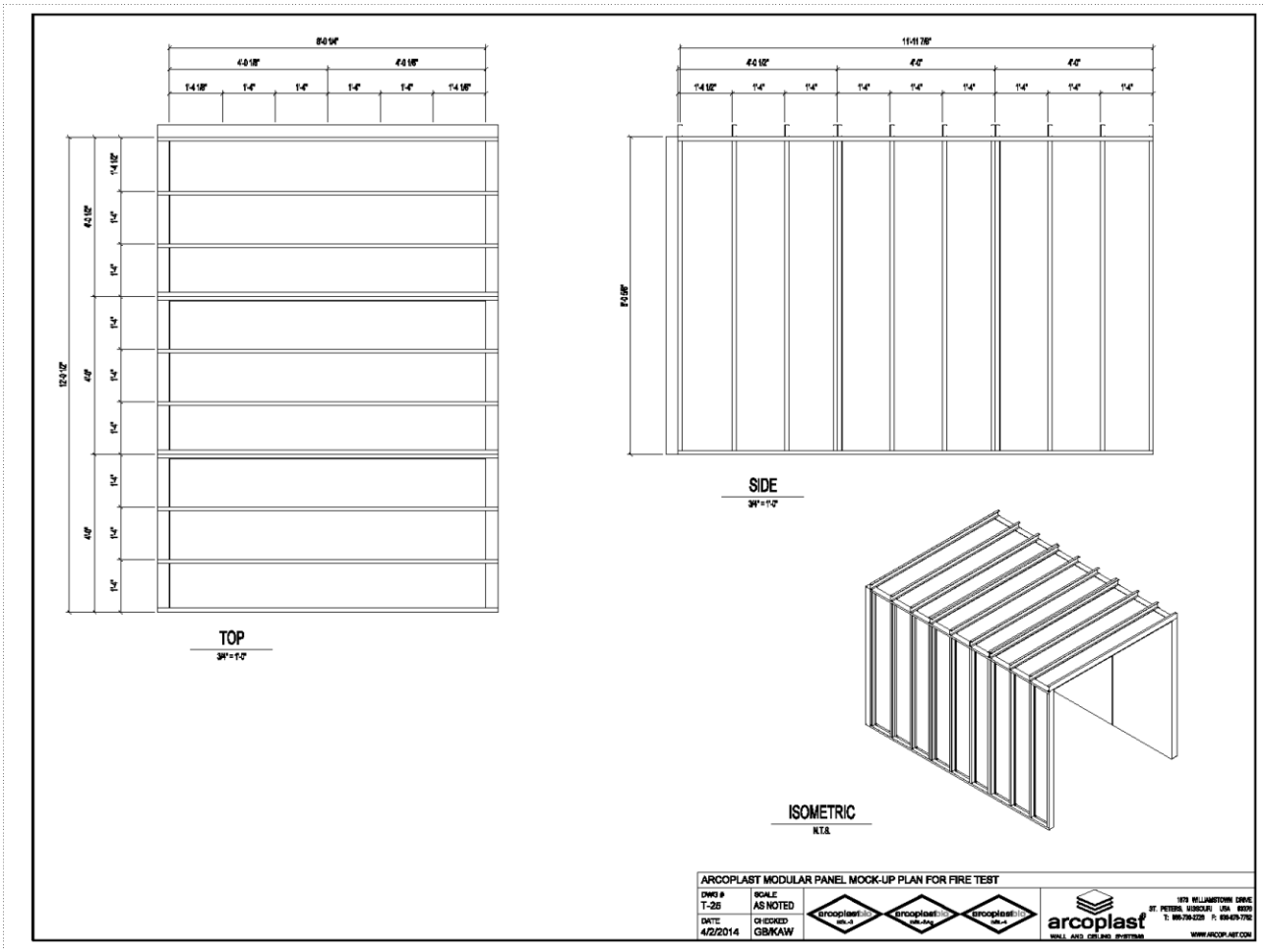
INTERTEK TESTING SERVICES NA

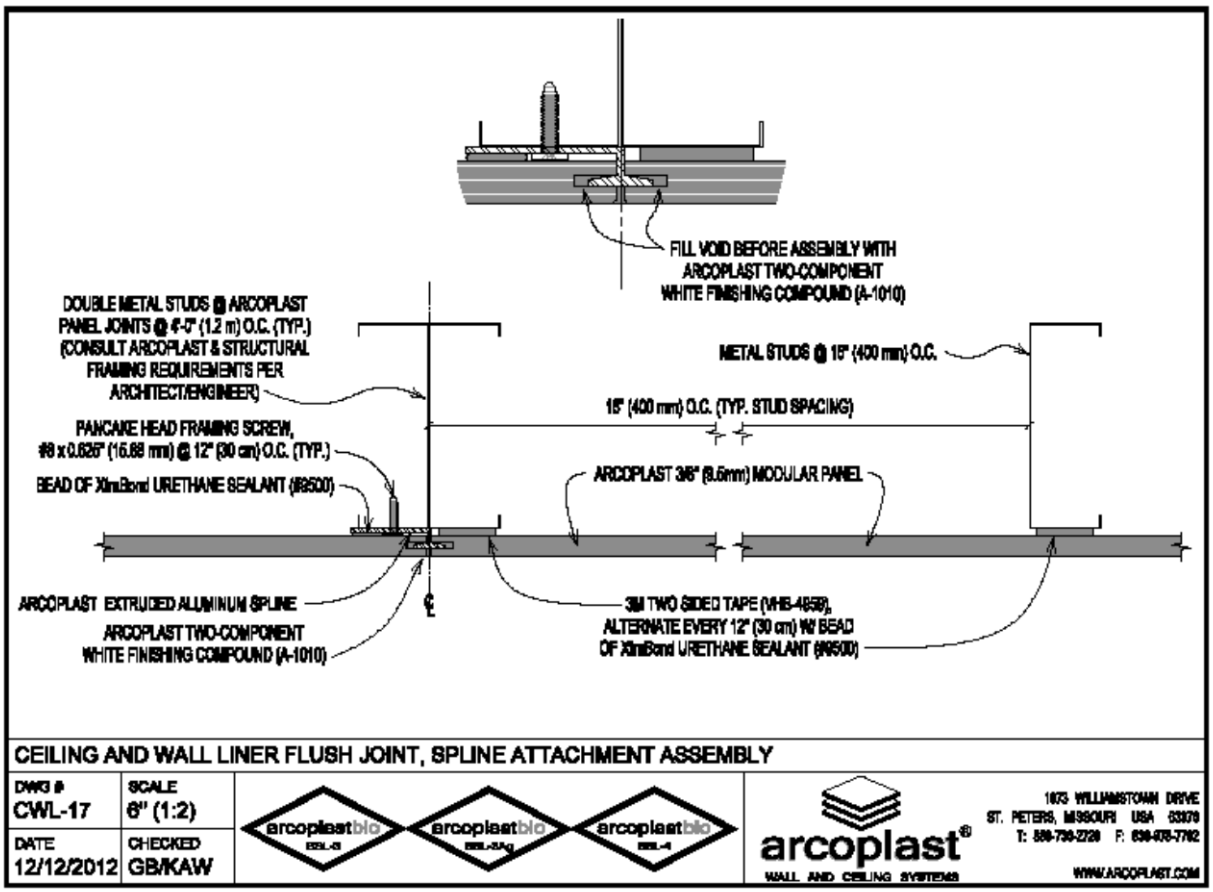
Reported by: _____
Troy G. Bronstad
Senior Associate Engineer

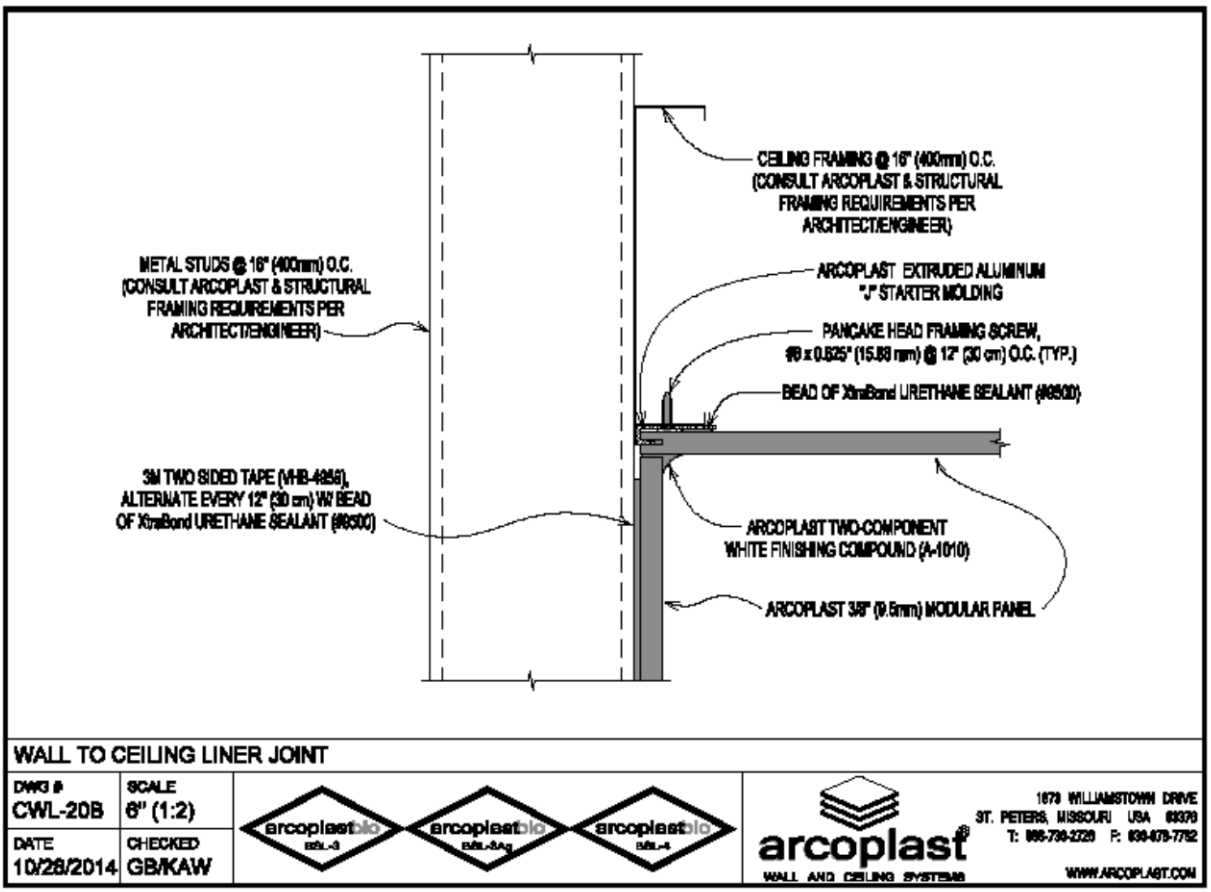
Reviewed by: _____
Joseph Zatopek
Engineering Team Leader, Fire Resistance

APPENDIX A

Test Drawings and Data


TOP
SIDE
ISOMETRIC
N.T.S.
ARCOPLAST MODULAR PANEL MOCK-UP PLAN FOR FIRE TEST
DWG #
T-25
SCALE
AS NOTED
DATE
4/2/2014
CHECKED
GB/KAW
arcoplast


FILL VOID BEFORE ASSEMBLY WITH
ARCOPLAST TWO-COMPONENT
WHITE FINISHING COMPOUND (A-1010)
DOUBLE METAL STUDS @ ARCOPLAST
PANEL JOINTS @ 4'-0" (1.2 m) O.C. (TYP.)
(CONSULT ARCOPLAST & STRUCTURAL
FRAMING REQUIREMENTS PER
ARCHITECT/ENGINEER)
METAL STUDS @ 16" (400 mm) O.C.
16" (400 mm) O.C. (TYP. STUD SPACING)
PANCAKE HEAD FRAMING SCREW,
#8 x 0.625" (15.88 mm) @ 12" (30 cm) O.C. (TYP.)
BEAD OF XtraBond URETHANE SEALANT (#8500)
ARCOPLAST 3/8" (9.6mm) MODULAR PANEL
ARCOPLAST EXTRUDED ALUMINUM SPLINE
ARCOPLAST TWO-COMPONENT
WHITE FINISHING COMPOUND (A-1010)
℄
3M TWO SIDED TAPE (VHB-4658),
ALTERNATE EVERY 12" (30 cm) W/ BEAD
OF XtraBond URETHANE SEALANT (#8500)
CEILING AND WALL LINER FLUSH JOINT, SPLINE ATTACHMENT ASSEMBLY
DWG #
CWL-17
SCALE
6" (1:2)
DATE
12/12/2012
CHECKED
GB/KAW
arcoplastbio
arcoplastbio
arcoplastbio
arcoplast®
WALL AND CEILING SYSTEMS
1673 WILLIAMSTOWN DRIVE
ST. PETERS, MISSOURI USA 63376
T: 888-730-2720 F: 636-978-7702
WWW.ARCOPLAST.COM


CEILING FRAMING @ 16" (400mm) O.C.
(CONSULT ARCOPLAST & STRUCTURAL
FRAMING REQUIREMENTS PER
ARCHITECT/ENGINEER)
METAL STUDS @ 16" (400mm) O.C.
(CONSULT ARCOPLAST & STRUCTURAL
FRAMING REQUIREMENTS PER
ARCHITECT/ENGINEER)
ARCOPLAST EXTRUDED ALUMINUM
"J" STARTER MOLDING
PANCAKE HEAD FRAMING SCREW,
#9 x 0.625" (15.88 mm) @ 12" (30 cm) O.C. (TYP.)
BEAD OF XtraBond URETHANE SEALANT (#8500)
3M TWO SIDED TAPE (VHB-4954),
ALTERNATE EVERY 12" (30 cm) W/ BEAD
OF XtraBond URETHANE SEALANT (#8500)
ARCOPLAST TWO-COMPONENT
WHITE FINISHING COMPOUND (A-1010)
ARCOPLAST 3/8" (9.5mm) MODULAR PANEL
WALL TO CEILING LINER JOINT
DWG #
CWL-20B
SCALE
6" (1:2)
DATE
10/28/2014
CHECKED
GB/KAW
arcoplastbio
arcoplastbio
arcoplastbio
arcoplast
WALL AND CEILING SYSTEMS
1673 WILLIAMSTOWN DRIVE
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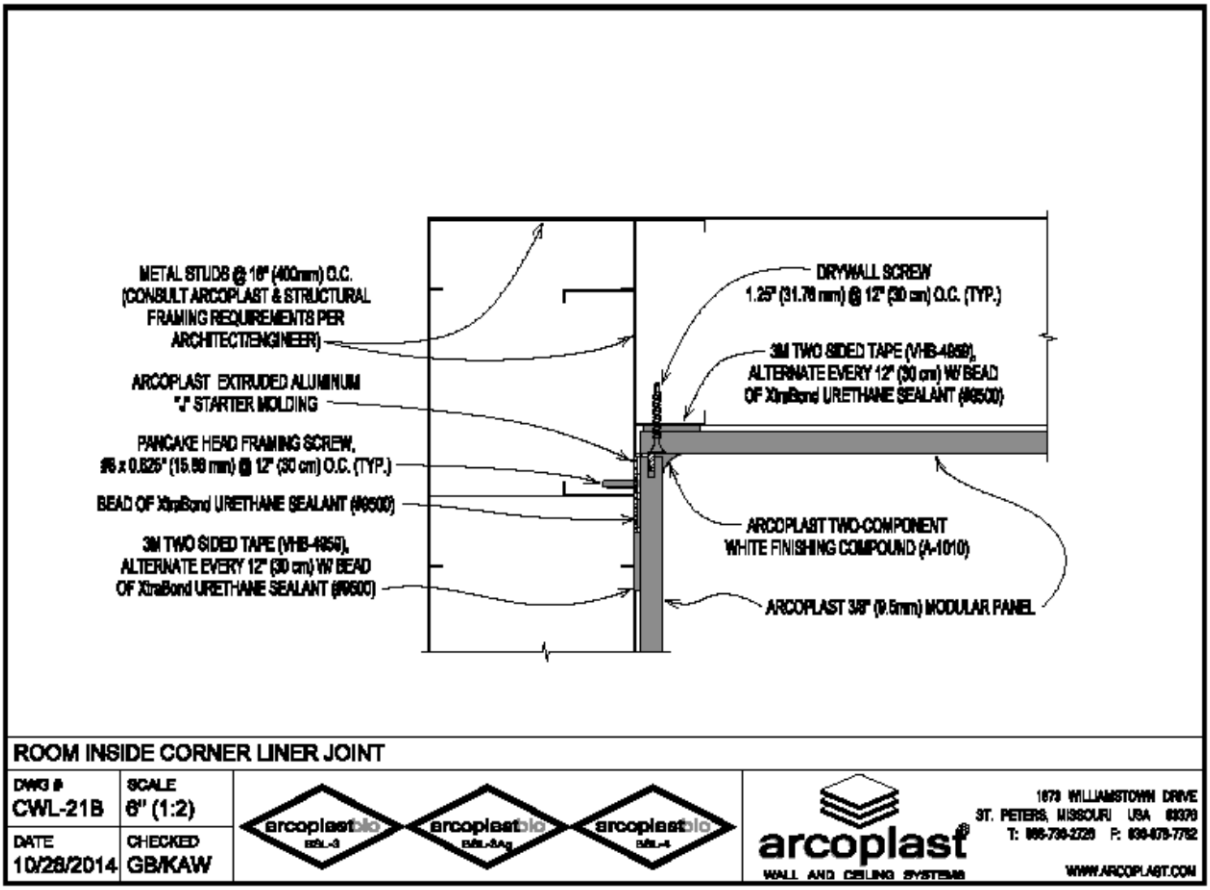
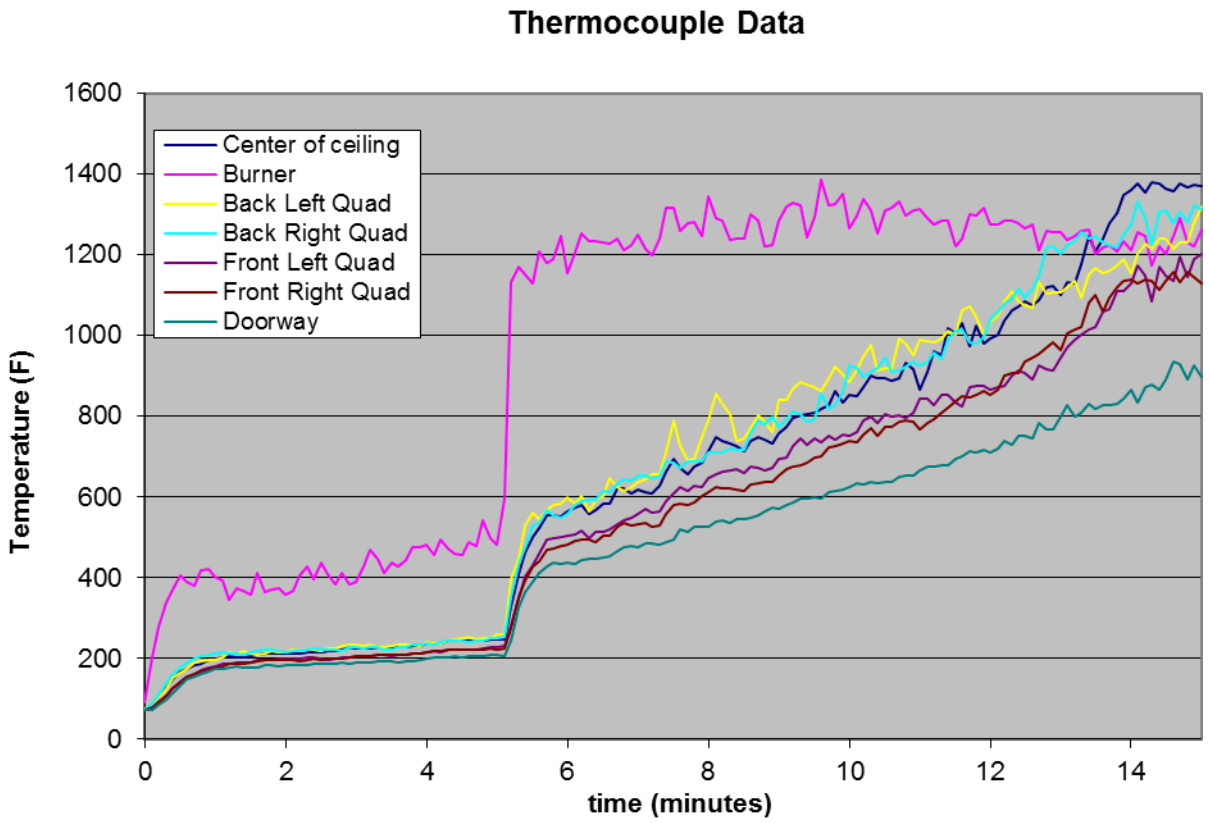
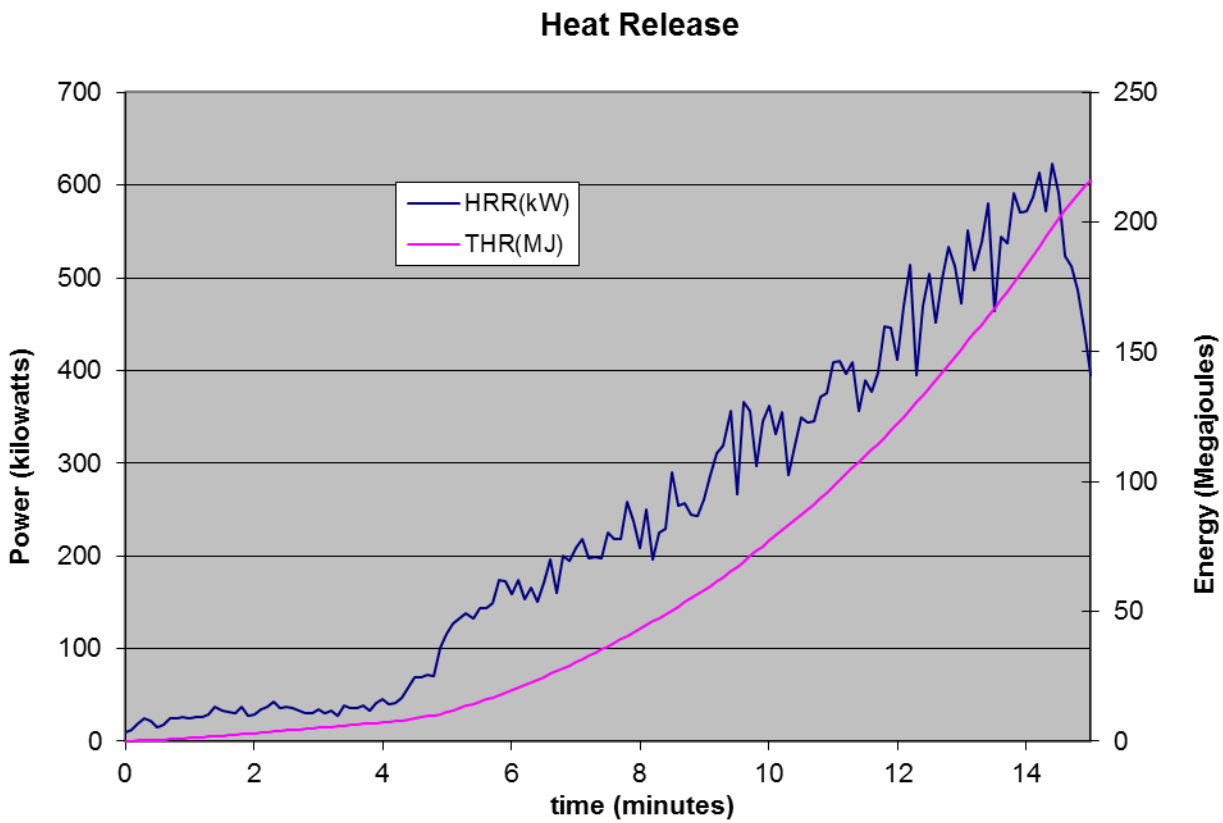
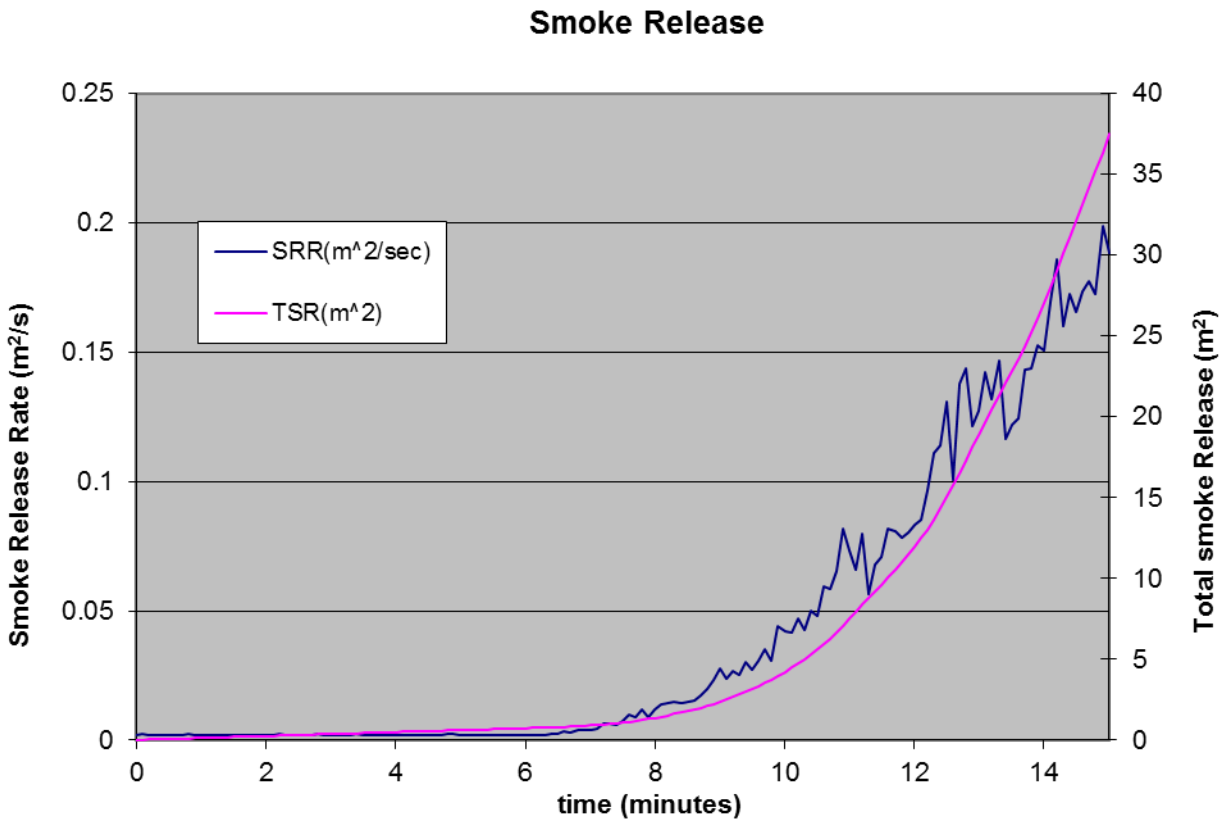
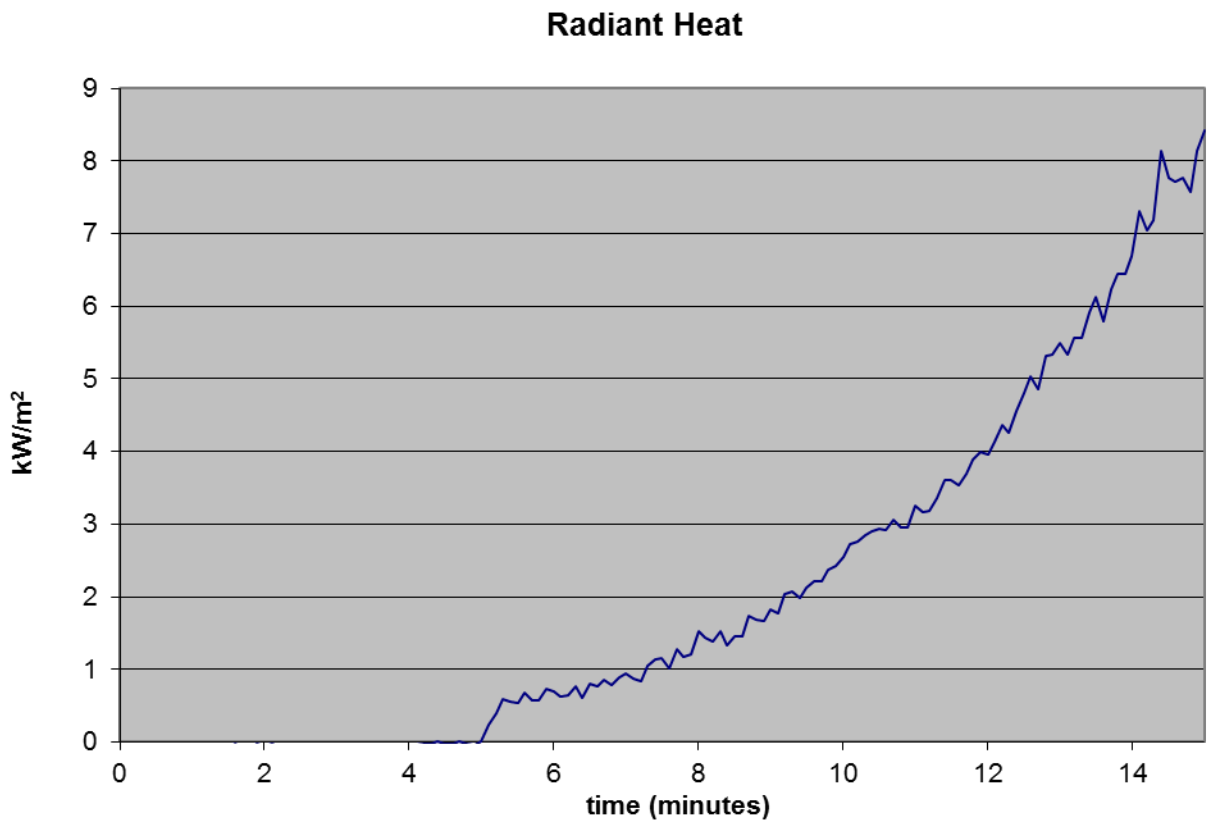
WWW.ARCOPLAST.COM

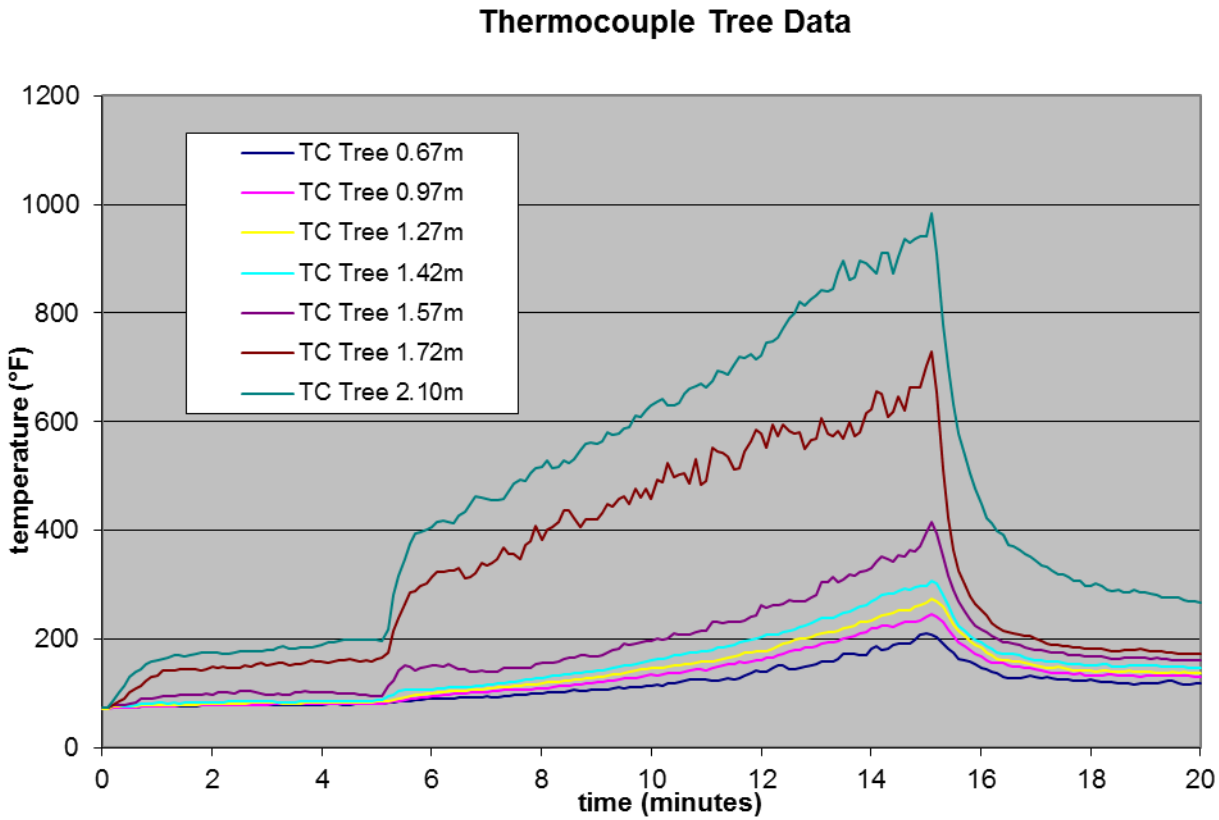

METAL STUDS @ 16" (400mm) O.C.
(CONSULT ARCOPLAST & STRUCTURAL
FRAMING REQUIREMENTS PER
ARCHITECT/ENGINEER)
ARCOPLAST EXTRUDED ALUMINUM
"J" STARTER MOLDING
PANCAKE HEAD FRAMING SCREW,
#6 x 0.625" (15.88 mm) @ 12" (30 cm) O.C. (TYP.)
BEAD OF XtraBond URETHANE SEALANT (#6500)
3M TWO SIDED TAPE (VHB-4959),
ALTERNATE EVERY 12" (30 cm) W/ BEAD
OF XtraBond URETHANE SEALANT (#6500)
DRYWALL SCREW
1.25" (31.76 mm) @ 12" (30 cm) O.C. (TYP.)
3M TWO SIDED TAPE (VHB-4959),
ALTERNATE EVERY 12" (30 cm) W/ BEAD
OF XtraBond URETHANE SEALANT (#6500)
ARCOPLAST TWO-COMPONENT
WHITE FINISHING COMPOUND (A-1010)
ARCOPLAST 3/8" (9.5mm) MODULAR PANEL
ROOM INSIDE CORNER LINER JOINT
DWG #
CWL-21B
SCALE
6" (1:2)
DATE
10/28/2014
CHECKED
GB/KAW
arcoplastbio
arcoplastbio
arcoplastbio
arcoplast
WALL AND CEILING SYSTEMS
1679 WILLIAMSTOWN DRIVE
ST. PETERS, MISSOURI USA 63376
T: 866-730-2729 F: 636-479-7752
WWW.ARCOPLAST.COM


Thermocouple Data
Temperature (F)
time (minutes)
Center of ceiling
Burner
Back Left Quad
Back Right Quad
Front Left Quad
Front Right Quad
Doorway
0
200
400
600
800
1000
1200
1400
1600
0
2
4
6
8
10
12
14


Heat Release
HRR(kW)
THR(MJ)
Power (kilowatts)
Energy (Megajoules)
time (minutes)
0
100
200
300
400
500
600
700
0
50
100
150
200
250
0
2
4
6
8
10
12
14


Smoke Release
SRR(m^2/sec)
TSR(m^2)
Smoke Release Rate (m²/s)
Total smoke Release (m²)
time (minutes)
0.25
0.2
0.15
0.1
0.05
0
40
35
30
25
20
15
10
5
0
0
2
4
6
8
10
12
14

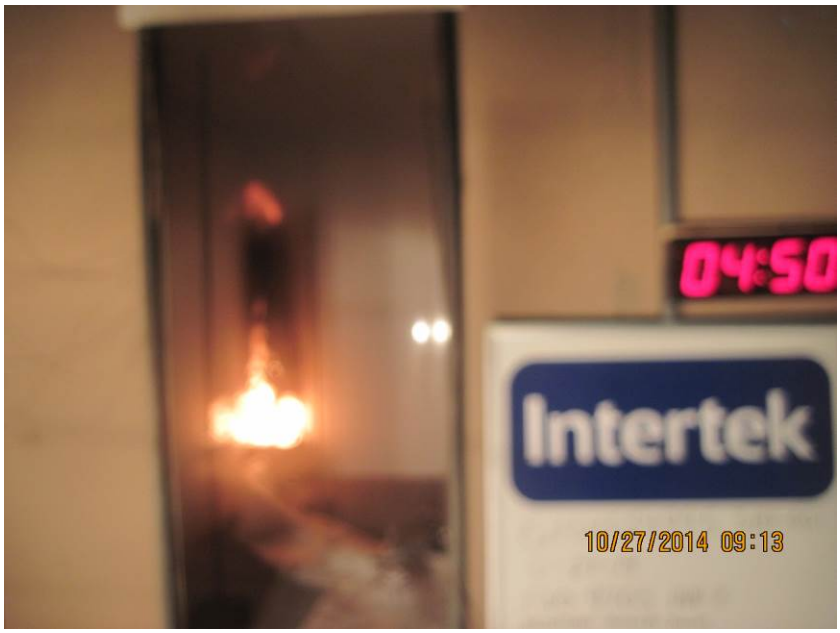

Radiant Heat
kW/m²
0
1
2
3
4
5
6
7
8
9
0
2
4
6
8
10
12
14
time (minutes)


Thermocouple Tree Data
TC Tree 0.67m
TC Tree 0.97m
TC Tree 1.27m
TC Tree 1.42m
TC Tree 1.57m
TC Tree 1.72m
TC Tree 2.10m
temperature (°F)
0
200
400
600
800
1000
1200
0
2
4
6
8
10
12
14
16
18
20
time (minutes)

APPENDIX B
Photographs

Pre-test photo

Start of test 40kW



Test photo

Test photo

Test photo

Test photo

Observation

Observation

Observation

Post test photo

LAST PAGE OF TEST REPORT

REVISION SUMMARY

DATE	SUMMARY
October 28, 2014	Original issue.