TEST REPORT

REPORT NUMBER: G100017878COQ-004 rev 1
ORIGINAL ISSUE DATE: May 18, 2010
REVISION DATE: June 7, 2010

EVALUATION CENTER
Intertek Testing Services NA Ltd.
1500 Brigantine Drive
Coquitlam, B.C. V3K 7C1

RENDERED TO

GigaCrete Inc.
6775 Speedway Boulevard
Suite M105
Las Vegas, Nevada 89115
USA

PRODUCT EVALUATED: Plastermax and Insulated Concrete Form (ICF) Assembly
EVALUATION PROPERTY: Heat Release, Flame Spread

Report of testing Plastermax and ICF assembly for compliance with the applicable requirements of the following criteria: NFPA 286 *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth,* and International Building Code (IBC) 2009 sentence 803.1.2.

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2 Introduction

Intertek Testing Services NA (Intertek) has conducted testing for GigaCrete Inc., on Plastermax applied over an ICF assembly, to evaluate heat release, smoke release and flame spread properties when subjected to specific ignition conditions. Testing was conducted in accordance with NFPA 286-06, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*. This evaluation was performed on April 26, 2010. Testing was witnessed by Mr. Andrew Dennis representing GigaCrete Inc.

3 Test Samples

3.1. SAMPLE SELECTION

Sample manufacturing of Plastermax part A and part B was witnessed on March 25, 2010 by Intertek representative Fred Soto, at GigaCrete Inc.'s manufacturing facility, located at 6775 Speedway Blvd., Suite M105, Las Vegas, NV. ICF samples representing good quality industry standards of ICF samples were donated by Nudura. Insulated Concrete Forms (ICF) were selected on February 12, 2010 by Intertek representative Jean-Philippe Plourde. The subject test specimens are traceable samples selected from the manufacturer's facility. Intertek selected the specimens and has verified the composition, manufacturing techniques and quality assurance procedures. The samples were received at the Evaluation Centre on February 23, 2010 (ICF) and April 1, 2010 for Plastermax.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The test sample consisted of two 12 ft. wide by 8 ft. tall walls parallel to each other and an 8 ft. wide by 8 ft. tall wall (interior dimensions) connecting them at one end. All three walls were constructed using 6 in. ICF blocks filled with concrete. The interior of the ICF block was then prepped for finishing by abrading the surface of the ICF block using a rasp. A thin scratch coat of Plastermax was applied directly to the ICF block and then a layer of 4.5 oz. EIFS type fiberglass mesh was applied vertically and troweled into the scratch coat with a 2 in. to 4 in. overlap between sheets. Immediately after the scratch coat and mesh were applied the final coat of the sampe PlasterMax material was applied. The overall thickness of the Plastermax was a nominal 1/8 in.

After allowing the test sample to cure a ceiling and fourth wall were added to complete the test assembly. The ceiling and wall were constructed using steel stud and 1/2 in. type C gypsum board. The fourth wall contained an opening centered in the wall with overall dimensions of 30.75 in. ± 0.75 in. by 79.5 in. ± 0.75 in.

Insulated Concrete Form (ICF):	6 in. ICF Block, vertical joints were sealed with poly-urethane sealant foam
Plaster Finish:	Plastermax nominal 1/8 in. thick
Mesh:	4.5 oz. EIFS Fiberglass mesh 48 in. wide

The ICF wall was built by Mr. Jean-Marc Bouvier on March 10 and 11, 2010. The Plastermax was applied by Mr. Andrew Dennis and Mr. Rick Phillips both of GigaCrete Inc.

4 Testing and Evaluation Methods

4.1. THE FIRE TEST

The sample assembly as described in section 3.2 was built adjacent the collection hood canopy of an oxygen depletion calorimeter with the opening directly under one side of the canopy. Instrumentation was placed in the room as described in section 4.2. All the instrumentation was zeroed, spanned and calibrated prior to testing.

The diffusion burner was placed in the corner of the test assembly. The calorimeter blower was turned on and an initial flow was established. The gas sampling line is turned on and the flow rate is adjusted. Once all instruments are reading steady state values the data acquisition software and video equipment are started.

The diffusion burner is lit and the gas flow rate is set to achieve a 40 kW flame for the first 5 minutes. At the 5 minute mark the gas flow rate is adjusted to achieve a 160 kW flame for the remaining 10 minutes of the test. During this period all temperature, heat flux and heat release data are recorded every 6 seconds, in addition observations and photographs are taken.

After the 15 minute test period the burner is shut off and all instrumentation readings are stopped. Post test observations are made and the damage is documented.

4.2. 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 kW for five minutes followed by a 160±5 kW for ten minutes. The flow rate is metered throughout the test.

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.

TOTAL HEAT FLUX GAUGE

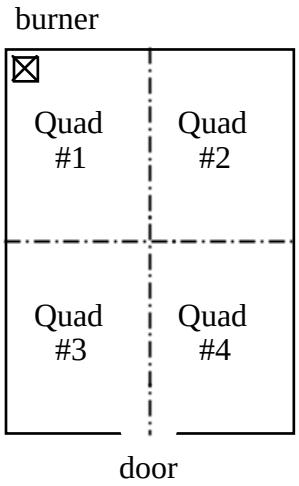
A gauge shall be mounted a maximum of 2 inches above the floor surface, facing upward in the geometric center of the test room. The gauge shall be of the Gardon type, with a flat black surface, and a 180-degree view angle. In operation, it shall be maintained at a constant temperature (within ± 5% °F)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

THERMOCOUPLE LOCATIONS

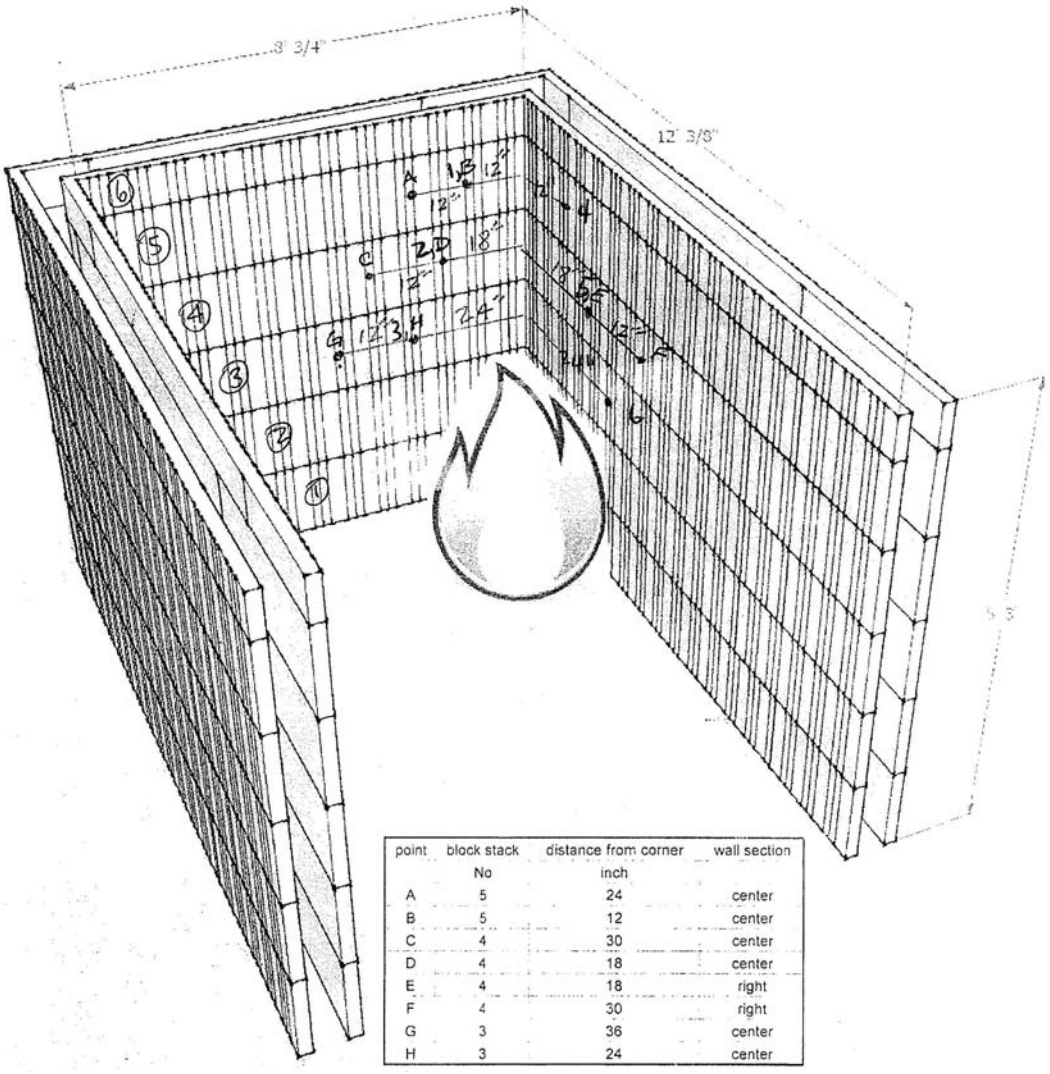
LOCATION	DESCRIPTION OF PLACEMENT
DOORWAY	A thermocouple is located in the interior plane of the door opening on the door centerline, 4 inches down from the top.
ROOM	Thermocouples are located 4 inches below the ceiling at the center of the ceiling, the center of each of the four ceiling quadrants and directly over the center of the ignition burner.
HOOD EXHAUST DUCT	One pair of thermocouples are placed in the duct 9 duct diameters downstream of the entrance to the horizontal duct.



Room Quadrant Thermocouple Locations (Plan View)

ADDITIONAL THERMOCOUPLES

The following thermocouples were added to the test assembly at the request of the client.



point	block stack	distance from corner	wall section
	No	inch	
A	5	24	center
B	5	12	center
C	4	30	center
D	4	18	center
E	4	18	right
F	4	30	right
G	3	36	center
H	3	24	center

LOCATION	DESCRIPTION OF PLACEMENT
A to H	Thermocouples were placed on the inside of the ICF block between the foam and the concrete on the interior of the room at the locations shown on the diagram
B Ext, D Ext, H Ext	Thermocouples were placed on the inside of the ICF block between the foam and the concrete on the exterior of the room at the locations shown on the diagram
1 WC to 6 WC	Thermocouples were placed between the Plastermax and the ICF foam at locations on the diagram 1 to 6

Three additional thermocouples were placed on the exterior of the ICF block on the outside of the room. There was no temperature change throughout the test (data was not included).

CANOPY AND EXHAUST DUCT

A hood is installed immediately adjacent to the door of the fire room. The bottom of the hood is level with the top surface of the room. The face dimensions of the hood are 10- by 10-feet, with a depth of 3.5 feet. The hood feeds into a plenum having a 3- by 3-foot cross section and a height of 3 feet. The exhaust duct connected to the plenum is 16 inches in diameter, horizontal.

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.

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.

4.3. PERFORMANCE CRITERIA

NFPA 286-06 does not publish pass/fail criteria. The test standard describes that flashover has occurred when any two of the following conditions have been attained:

1) Heat release rate exceeds 1 MW
2) Heat flux at the floor exceeds 20 kW/m^2
3) Average upper layer temperature exceeds 600 °C (1112 °F)
4) Flames exit the doorway
5) Autoignition of a paper target on the floor occurs

IBC 2009 sentence 803.1.2.1 Acceptance criteria for NFPA 286:

1) During the 40 kW exposure, flames shall not spread to the ceiling
2) During the 160 kW exposure, the interior finish shall comply with the following:
    2.1) Flame shall not spread to the outer extremity of the sample on any wall or ceiling
    2.2) Flashover, as defined in NFPA 286, shall not occur
3) The peak rate of heat release throughout the NFPA 286 test shall not exceed 800 kW
4) The total smoke released throughout the NFPA 286 test shall not exceed 1000 m^2

5 Testing and Evaluation Results

5.1. FIRE TEST OBSERVATIONS

TIME (min:sec)	OBSERVATION
0:00	Ignition of burner. Heat output set to 40 kW. Flame at 3ft.
1:55	Flame at 4ft
3:30	Smoke beginning to develop
5:10	Gas flow was increased to 160 kW
5:20	Flame reached ceiling height
6:50	Minimal smoke
7:37	Ceiling portion above the burner is discoloring
8:28	Smoke becoming heavier
9:30	Wall spawling
10:20	Discolouration has spread to the 2ft mark horizontally at mid height
15:00	Test completed.

The paper targets did not spontaneously ignite due to flash-over conditions.

5.2. EXAMINATION OF RESULTS

During the 15 minute test period there was very little damage to the test assembly. The damage to the Plastermax was limited to discolouration and cracking in the immediate area of the burner flame. After removal of the plaster it was also apparent that the only damage to the EPS on the ICF was limited to the corner where the burner was located and along the ceiling extending 8 ft. in both directions (see photograph in Appendix – B). Flashover did not occur as defined in NFPA 286-06. The following data was recorded during the test.

1) During the 40 kW exposure flames did not extend past the 4 ft. vertical mark
2) During the 160 kW exposure:
    2.1) Flames did not extend past the 2 ft. mark horizontally
    2.2) Flashover, as defined in NFPA 286-06, did not occur
3) The peak rate of heat release during the NFPA 286 test was 185 kW
4) The total smoke released during the NFPA 286 test was 31 m^2

6 Conclusion

The GigaCrete Inc. Plastermax, when installed as described in this report and when tested in accordance with NFPA 286*, "Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth"*, met the conditions of International Building Code (IBC) 2009 sentence 803.1.2.

The conclusions of this test report may be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA LTD.

Tested and
Reported by: 

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Technician – Construction Products Testing

Reviewed by: 

Greg Philp
Reviewer – Fire Testing

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APPENDIX A
Test Data

ADDITIONAL THERMOCOUPLE DATA (°F)

Time (min)	TC WC #1	TC WC #2	TC WC #3	TC WC #4	TC WC #5	TC WC #6
2.6	67	66	65	68	N/A	65
2.7	67	66	65	69	N/A	65
2.8	68	66	65	70	N/A	65
2.9	69	67	66	71	N/A	65
3	69	67	66	73	N/A	66
3.1	70	67	66	74	N/A	66
3.2	71	67	66	75	N/A	66
3.3	72	68	67	76	N/A	66
3.4	73	68	67	77	N/A	67
3.5	74	69	67	79	N/A	67
3.6	76	69	67	80	N/A	67
3.7	77	70	67	82	N/A	67
3.8	78	70	68	83	N/A	68
3.9	79	71	68	85	N/A	68
4	80	71	69	86	N/A	68
4.1	81	72	69	87	N/A	69
4.2	82	72	69	89	N/A	69
4.3	83	73	69	90	N/A	69
4.4	84	73	69	91	N/A	69
4.5	85	74	70	93	N/A	70
4.6	86	74	70	94	N/A	70
4.7	87	75	70	95	N/A	70
4.8	88	76	71	96	N/A	71
4.9	89	76	71	98	N/A	71
5	91	76	71	99	N/A	71
5.1	91	77	71	100	N/A	72
5.2	92	78	72	102	N/A	72
5.3	93	78	72	103	N/A	73
5.4	94	79	72	105	N/A	73
5.5	95	79	72	106	N/A	73
5.6	96	80	73	107	N/A	73
5.7	97	80	73	108	N/A	74
5.8	98	81	73	109	N/A	74
5.9	99	82	74	110	N/A	74
6	100	82	74	111	N/A	75
6.1	101	83	74	112	N/A	75
6.2	103	83	74	113	N/A	75
6.3	104	84	75	114	N/A	76
6.4	105	85	75	115	N/A	76
6.5	105	85	75	116	N/A	76
6.6	107	85	76	117	N/A	77
6.7	108	86	76	118	N/A	77
6.8	109	87	76	119	N/A	78
6.9	109	87	76	120	N/A	78

ADDITIONAL THERMOCOUPLE DATA (°F) – *Continued*

Time (min)	TC WC #1	TC WC #2	TC WC #3	TC WC #4	TC WC #5	TC WC #6
7	110	88	77	121	N/A	78
7.1	111	88	77	122	N/A	79
7.2	112	89	77	123	N/A	79
7.3	113	89	77	124	N/A	79
7.4	114	90	78	126	N/A	80
7.5	116	91	79	130	N/A	81
7.6	119	94	81	136	N/A	82
7.7	123	98	82	144	N/A	83
7.8	129	102	84	151	N/A	85
7.9	135	108	86	159	N/A	87
8	142	113	88	166	N/A	89
8.1	150	119	90	174	N/A	92
8.2	157	125	92	182	N/A	94
8.3	164	130	94	190	N/A	96
8.4	172	136	96	198	N/A	98
8.5	180	141	97	207	N/A	100
8.6	187	147	100	215	N/A	103
8.7	194	152	101	221	N/A	105
8.8	201	157	103	227	N/A	107
8.9	209	162	105	232	N/A	109
9	216	168	107	237	N/A	111
9.1	224	173	109	243	N/A	114
9.2	232	179	110	248	N/A	116
9.3	238	185	112	254	N/A	118
9.4	244	189	114	260	N/A	120
9.5	249	194	116	265	N/A	122
9.6	254	198	118	270	N/A	124
9.7	260	202	119	275	N/A	126
9.8	266	206	122	279	N/A	129
9.9	272	210	124	283	N/A	131
10	276	215	126	286	N/A	133
10.1	280	219	128	288	N/A	136
10.2	283	223	130	290	N/A	138
10.3	286	228	132	293	N/A	140
10.4	289	232	134	296	N/A	143
10.5	293	237	136	299	N/A	145
10.6	297	240	137	303	N/A	148
10.7	302	244	139	306	N/A	149
10.8	307	248	141	310	N/A	152
10.9	311	251	143	313	N/A	154
11	316	254	145	316	N/A	156
11.1	323	257	147	320	N/A	158
11.2	330	260	149	323	N/A	160
11.3	332	263	151	327	N/A	162
11.4	337	266	153	330	N/A	164

ADDITIONAL THERMOCOUPLE DATA (°F) – *Continued*

Time (min)	TC WC #1	TC WC #2	TC WC #3	TC WC #4	TC WC #5	TC WC #6
11.5	342	268	155	334	N/A	166
11.6	349	271	156	336	N/A	168
11.7	354	272	158	340	N/A	170
11.8	360	275	160	343	N/A	172
11.9	363	277	162	346	N/A	174
12	368	279	164	350	N/A	177
12.1	372	281	166	353	N/A	179
12.2	373	283	168	357	N/A	181
12.3	375	286	169	360	N/A	183
12.4	382	288	171	363	N/A	185
12.5	382	291	173	367	N/A	187
12.6	387	293	174	371	N/A	189
12.7	390	296	176	374	N/A	190
12.8	393	298	178	378	N/A	193
12.9	399	301	179	382	N/A	194
13	399	304	181	386	N/A	196
13.1	401	307	183	391	N/A	198
13.2	408	310	185	395	N/A	200
13.3	407	313	187	399	N/A	202
13.4	411	317	188	403	N/A	204
13.5	415	319	190	406	N/A	206
13.6	420	322	192	411	N/A	208
13.7	423	325	193	416	N/A	210
13.8	426	328	195	421	N/A	212
13.9	432	330	196	426	N/A	214
14	439	331	198	432	N/A	216
14.1	445	334	200	437	N/A	217
14.2	450	335	201	443	N/A	219
14.3	454	338	203	448	N/A	221
14.4	457	340	204	454	N/A	223
14.5	463	342	206	460	N/A	224
14.6	468	344	208	465	N/A	226
14.7	475	346	209	472	N/A	227
14.8	480	348	211	478	N/A	229
14.9	483	350	212	483	N/A	231
15	488	351	214	490	N/A	233
15.1	491	353	215	497	N/A	234
15.2	495	355	217	502	N/A	236
15.3	501	356	218	507	N/A	238
15.4	506	359	220	513	N/A	239
15.5	511	361	221	519	N/A	240
15.6	515	362	223	525	N/A	242
15.7	518	365	224	532	N/A	243
15.8	528	367	226	537	N/A	244
15.9	533	369	227	543	N/A	245

ADDITIONAL THERMOCOUPLE DATA (°F) – *Continued*

Time (min)	TC WC #1	TC WC #2	TC WC #3	TC WC #4	TC WC #5	TC WC #6
16	537	372	229	549	N/A	246
16.1	545	374	231	554	N/A	248
16.2	548	376	232	559	N/A	248
16.3	553	378	233	564	N/A	250
16.4	559	379	235	569	N/A	250
16.5	559	381	236	575	N/A	252
16.6	565	382	238	578	N/A	252
16.7	568	383	239	583	N/A	253
16.8	569	384	240	588	N/A	254
16.9	575	386	241	593	N/A	255
17	580	387	243	596	N/A	256
17.1	586	389	244	598	N/A	257
17.2	590	391	245	602	N/A	257
17.3	593	393	246	606	N/A	258
17.4	597	394	247	607	N/A	258
17.5	598	395	248	606	N/A	258
17.6	596	394	248	603	N/A	258
17.7	592	393	248	598	N/A	258

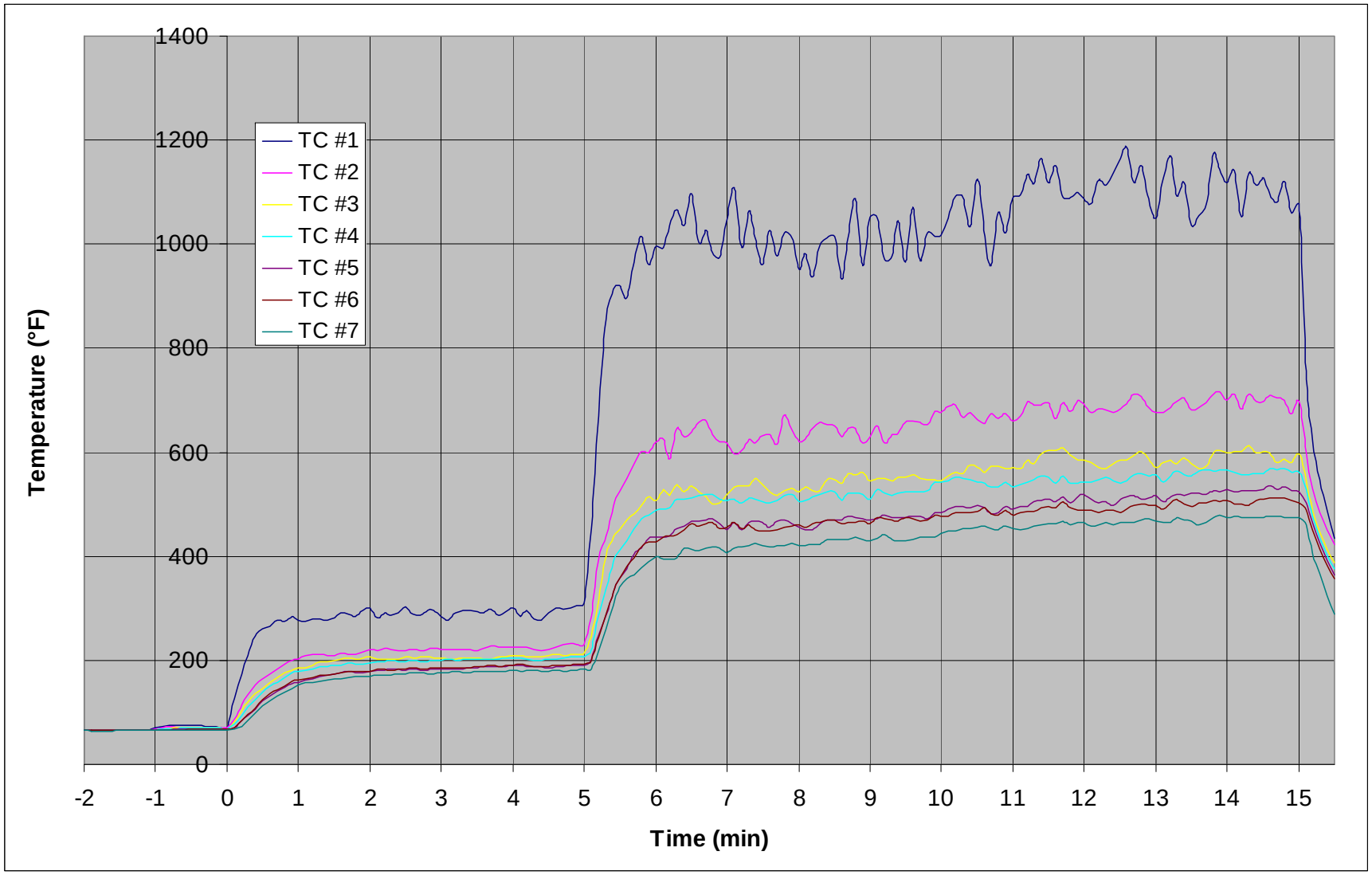
Note: Prior to 2.6 minutes there was no change in temperature (data not included). Thermocouple WC #5 was damaged and did not record.

ADDITIONAL THERMOCOUPLE DATA (°F) – *Continued*

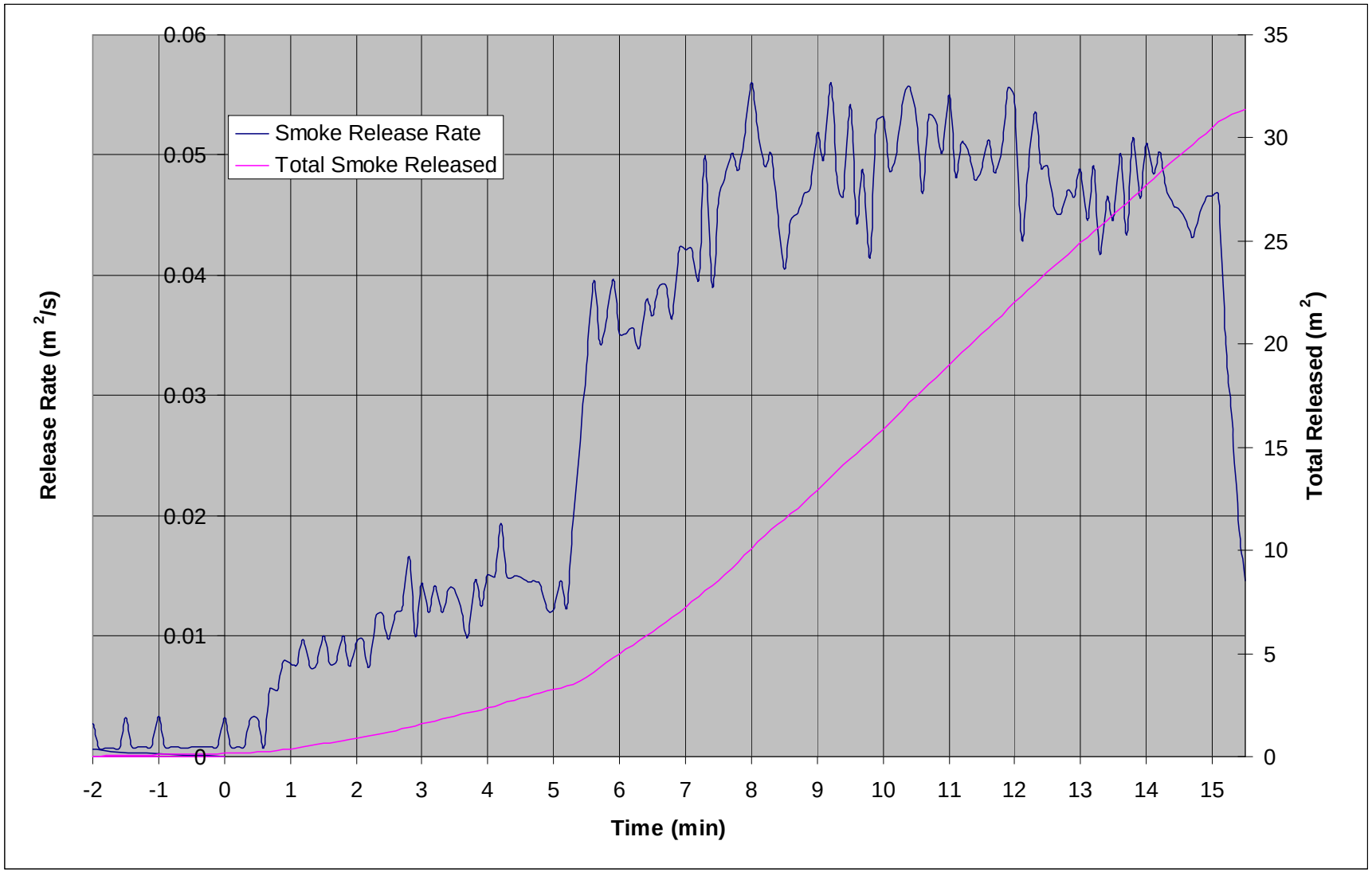
Time (min)	TC A	TC B	TC C	TC D	TC E	TC F	TC G	TC H	TC B Ext	TC D Ext	TC H Ext
14.4	60	60	60	60	60	60	60	60	60	60	60
14.5	60	61	60	60	60	60	60	60	60	60	60
14.6	60	61	60	60	60	60	60	60	60	60	60
14.7	60	61	60	60	60	60	60	60	59	60	60
14.8	60	62	60	60	60	60	60	60	60	60	60
14.9	60	63	60	60	60	60	60	60	60	60	60
15	60	64	60	60	60	60	60	60	60	60	60
15.1	60	66	60	60	60	60	60	60	60	60	60
15.2	60	68	60	60	60	60	60	60	60	60	60
15.3	60	71	60	60	60	60	60	60	60	60	60
15.4	60	74	60	60	60	60	60	60	60	60	60
15.5	60	78	60	60	60	60	60	60	60	60	60
15.6	60	82	60	60	60	60	60	60	60	60	60
15.7	60	86	60	60	60	60	60	60	60	60	60
15.8	60	90	60	60	60	60	60	60	60	60	60
15.9	60	93	60	61	61	60	60	60	60	60	60
16	60	97	60	60	60	60	60	60	60	60	60
16.1	60	101	60	60	60	60	60	60	60	60	60
16.2	60	104	60	60	60	60	60	60	60	60	60
16.3	60	108	60	60	61	60	60	60	60	60	60
16.4	60	111	60	60	60	60	60	60	60	60	60
16.5	60	114	60	61	61	60	60	60	60	60	60
16.6	60	118	60	60	60	60	60	60	60	60	60
16.7	60	121	60	61	61	60	60	60	60	60	60
16.8	60	124	60	61	60	60	60	60	60	60	60
16.9	60	127	60	61	60	60	60	60	60	60	60
17	60	131	60	61	60	60	60	60	60	60	60
17.1	60	135	60	61	61	60	60	60	60	60	60
17.2	60	140	60	61	61	60	60	60	60	60	60
17.3	61	143	60	61	61	60	60	60	60	60	60
17.4	61	147	60	61	61	60	60	60	60	60	60
17.5	60	149	60	61	61	60	60	60	60	60	60
17.6	61	152	60	61	61	61	60	60	60	60	60
17.7	61	154	60	61	61	60	60	60	60	60	60

Note: Prior to 14.4 minutes there was no change in temperature (data not included)

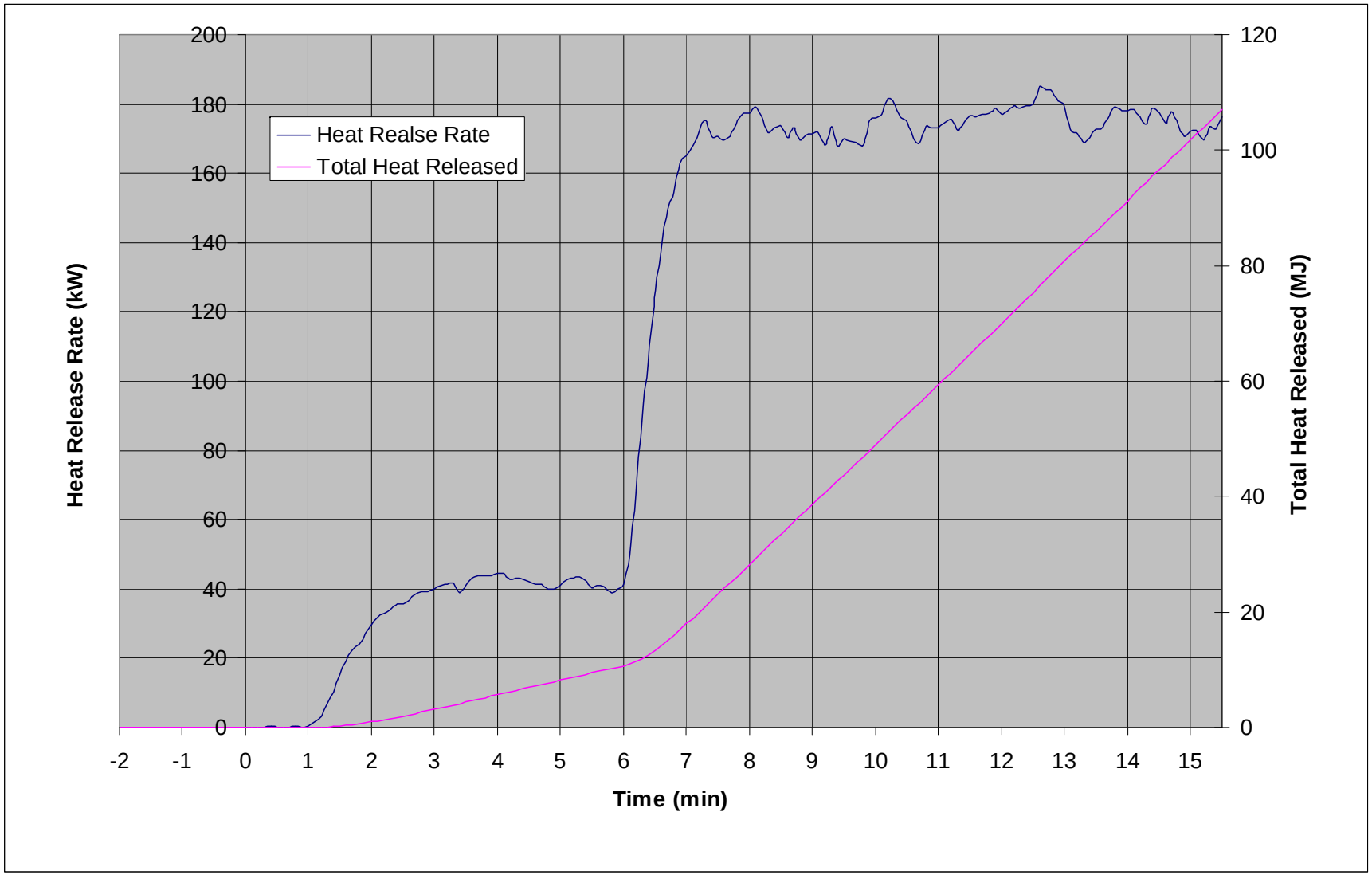
ROOM THERMOCOUPLE TEMPERATURES



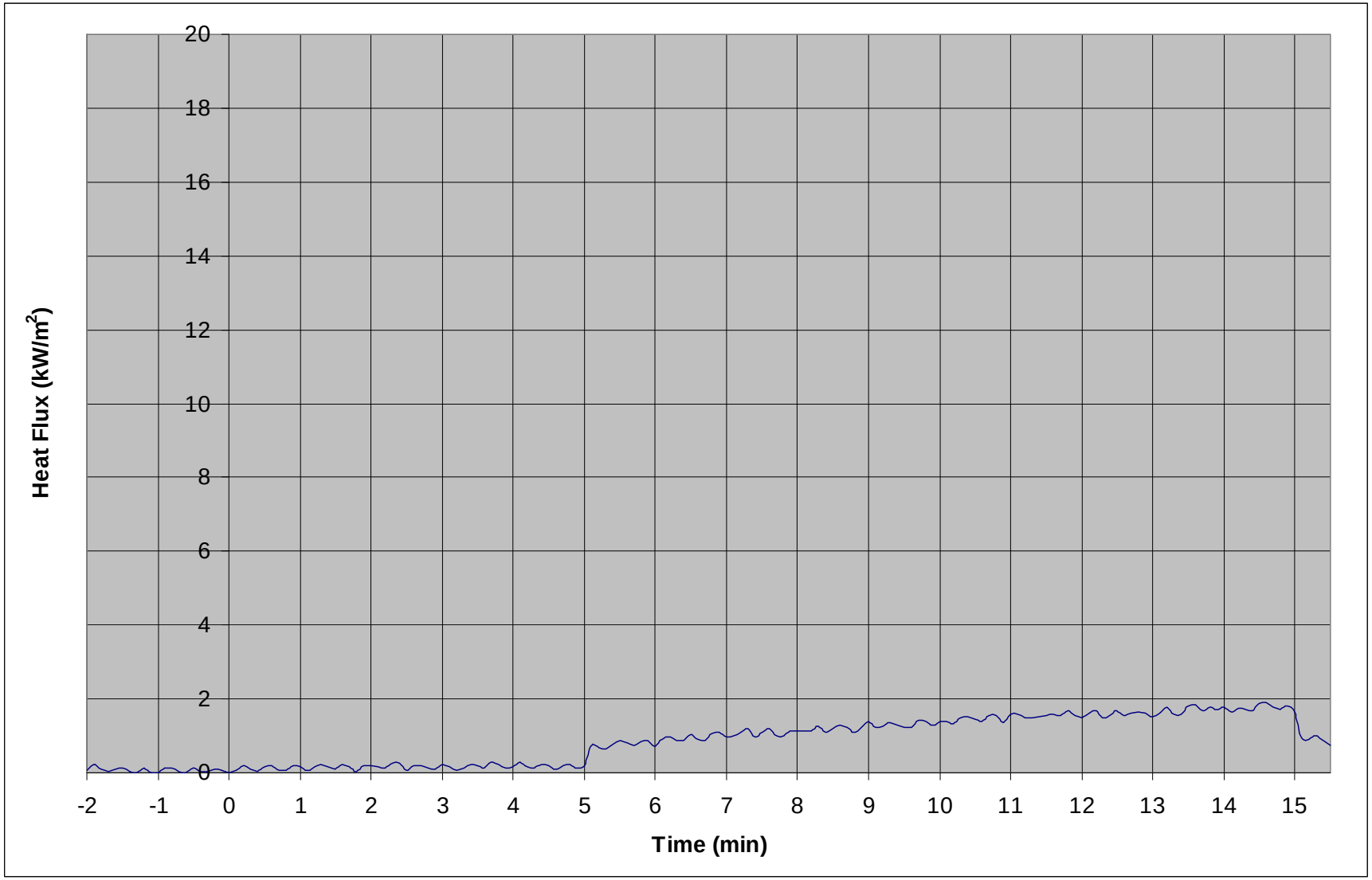
SMOKE


Smoke Release Rate
Total Smoke Released
Release Rate (m 2/s)
Total Released (m 2)
Time (min)
0.06
0.05
0.04
0.03
0.02
0.01
0
35
30
25
20
15
10
5
0
-2
-1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15

HEAT RELEASE



HEAT FLUX TO THE FLOOR



APPENDIX B
Photographs

Pre-test photo

Pre-test photo

Pre-test photo

Pre-test photo

Start of test

160 kW

Post test photo

Post test photo

Post Test Photo with Plaster Removed

Post Test Photo with Plaster Removed

REVISION SUMMARY

DATE	Pages	SUMMARY	Reviewed
May 18, 2010		First issue. No revisions.	
Jun. 7, 2010	1,3	Address Change	
Jun. 7, 2010	1,3,6,8,9	Prooduct name shortened to Plastermax