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FIRE PERFORMANCE EVALUATION OF A COMPOSITE CONCRETE WALL ASSEMBLY TESTED IN ACCORDANCE WITH NFPA 285, 2006 EDITION, *STANDARD FIRE TEST METHOD FOR EVALUATION OF FIRE PROPAGATION CHARACTERISTICS OF EXTERIOR NON-LOAD-BEARING WALL ASSEMBLIES CONTAINING COMBUSTIBLE COMPONENTS*

FINAL REPORT
Consisting of 34 Pages

SwRI® Project No. 01.13537.01.406
Test Date: February 7, 2008
Report Date: March 31, 2008

Prepared for:

Composite Technologies Corporation
1000 Technology Drive
Boone, IA 50036

3/31/08

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ABSTRACT

Southwest Research Institute's (SwRI) Fire Technology Department, located in San Antonio, Texas, conducted an intermediate-scale multistory fire performance evaluation test for Composite Technologies Corporation, located in Boone, IA. Testing performed on February 7, 2008, was conducted on a concrete sandwich wall assembly. Testing was performed in accordance with the National Fire Protection Association 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components,* 2006 Edition. The wall assembly ***meets*** the acceptance criteria stated in the standard.

This report contains a description of the test procedure followed, assembly tested, and the results obtained. 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.

1.0 INTRODUCTION

Southwest Research Institute's (SwRI) Fire Technology Department, located in San Antonio, Texas, conducted an intermediate-scale multistory (ISMA) fire performance evaluation test for Composite Technologies Corporation, located in Boone, IA, on February 7, 2008. Testing was conducted on a concrete sandwich wall assembly with a rigid cellular Polystyrene Thermal insulation complying with ASTM 578 Type IV classification combustible core. The test was conducted in accordance with the National Fire Protection Association 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, 2006 Edition. The Test Notification Number from Miami-Dade County Florida for this test program is SwRI 08006.

This report contains a description of the test procedure followed, assembly tested, and the results obtained. 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.

2.0 SCOPE

NFPA 285 provides a method of determining the flammability characteristics of exterior, non-load-bearing wall assemblies which contain combustible components.

The test method is intended to simulate the “full-scale” fire performance of the wall assembly being evaluated. The primary performance characteristics evaluated in this test are the capability of the test wall assembly to resist the following:

1. Flame propagation over the exterior face of the system;
2. Vertical flame spread within the combustible core components from one story to the next;
3. Vertical flame spread over the interior (room side) surface of the panels from one story to the next;
4. Lateral flame spread from the compartment of fire origin to adjacent spaces.

The above are assessed through visual observations and temperature data obtained during the test.

3.0 TEST ASSEMBLY

SwRI received two preassembled concrete composite panels from Composite Technologies Corporation on February 1, 2008. Mr. Juan Flores of SwRI’s Listing, Labeling, and Third-Party Inspections Section witnessed the manufacture of the selected panels by Redondo Manufacturing, LLC in San Antonio, TX, on November 28, 2007. The inspector’s markings were verified upon receipt of the panels. Copies of the surveillance report are on file at SwRI. The two concrete wall panels were constructed of a 2-in. layer of a rigid cellular Polystyrene Thermal insulation complying with ASTM 578 Type IV classification sandwiched between a 2-in. and a 4-in. concrete layer. Composite Technologies

Corporation's Fiber Composite Connectors were used to secure the layers together. Each wall panel had dimensions of 14 × 9 ft, whereby the finished wall dimensions were 18 × 14 ft. See client-provided drawings in Appendix A for more construction details.

The test wall assembly for the ISMA was placed onto the face of the test apparatus and secured using fastening and construction details representative of actual field conditions. Figure A-1, in Appendix A, provides a sketch of the location of the test wall assembly when mounted on the test apparatus.

4.0 CALIBRATION

NFPA 285, Section 7-2, requires the apparatus to be calibrated (a) initially, prior to the first wall assembly test, (b) when significant changes to the gas flow system are made, (c) within one year prior to the test on an actual product wall assembly, or (d) whenever ceramic blanket covering more than 50% of the wall or ceiling surface in the burn room is replaced.

SwRI conducted an ISMA calibration test on November 20, 2007, with the burner regime shown in Table 1. This calibration confirmed the burner regime necessary to reach the required temperatures and heat flux levels. Table 2 compares the average temperature data obtained during the calibration test with the allowable temperature range specified in Table 7-1.8 of NFPA 285 for the indicated time period. The allowable temperature range is ± 10% of the temperature values specified in Table 7-1.8. Table 3 compares the average heat flux data obtained during the calibration test with the allowable heat flux ranges specified in Table 7-1.8 of NFPA 285 for the indicated period.

Table 1. Burner Regime.

Time Interval (Min:S)	Room Burner SCFM	Room Burner kW (Btu/min)	Window Burner SCFM	Window Burner kW (Btu/min)
0:00-5:00	35.3	620 (35,255)	0.0	0 (0)
5:00-10:00	41.6	731 (41,556)	5.0	89 (5,050)
10:00-15:00	43.4	764 (43,418)	7.7	136 (7,731)
15:00-20:00	48.1	846 (48,103)	9.7	170 (9,666)
20:00-25:00	48.4	851 (48,418)	10.8	189 (10,761)
25:00-30:00	48.3	849 (48,284)	14.9	262 (14,881)

Table 2. Average Temperature Values for ISMA Calibration.
(Avg. Values for Time Period Indicated)

Time (Min:S)		0-5	5-10	10-15	15-20	20-25	25-30
Burner Room Avg. of 5 TCs (°F)	Range	1036-1266	1211-1481	1334-1630	1440-1760	1437-1757	1483-1813
	Actual	***978***	1260	1361	1470	1530	1545
Interior Wall Surface Avg. of 3 TCs (°F)	Range	959-1172	1168-1428	1290-1576	1420-1736	1418-1734	1490-1821
	Actual	1110	1335	1428	1542	1596	1621
1 ft above Window (°F)	Range	542-662	782-957	857-1047	893-1091	941-1151	970-1186
	Actual	617	838	897	975	1010	1061
2 ft above Window (°F)	Range	611-747	914-1117	1009-1233	1065-1301	1121-1370	1166-1426
	Actual	627	931	1015	1101	1144	1211
3 ft above Window (°F)	Range	581-711	874-1068	986-1206	1057-1291	1121-1370	1183-1445
	Actual	625	986	1050	1139	1187	1258
4 ft above Window (°F)	Range	519-635	772-944	884-1080	957-1169	1022-1249	1102-1346
	Actual	534	873	931	1019	1071	1127
5 ft above Window (°F)	Range	469-573	689-842	788-963	854-1044	906-1108	995-1217
	Actual	499	853	902	999	1067	1117
6 ft above Window (°F)	Range	425-519	621-759	708-866	770-942	822-1004	909-1111
	Actual	460	783	826	920	992	1034

Notes: Window Burner placed 1 in. away from face of wall assembly. Values in bold-italics are lower than required range.

Table 3. Heat Flux Values for ISMA Calibration.
(Avg. Values for Time Period Indicated)

Time (Min:S)		0-5	5-10	10-15	15-20	20-25	25-30
Calorimeter 1 (2 ft above Window, W/cm²)	Range	0.7-1.1	1.5-2.3	2.0-3.0	2.3-3.5	2.7-4.1	3.0-4.6
	Actual	***1.4***	***2.5***	2.9	3.4	3.6	4.1
Calorimeter 2 (3 ft above Window, W/cm²)	Range	0.8-1.2	1.6-2.4	2.1-3.1	2.6-3.8	3.0-4.4	3.2-4.8
	Actual	1.1	2.1	2.3	2.7	2.9	3.3
Calorimeter 3 (4 ft above Window, W/cm²)	Range	0.6-1.0	1.2-1.8	1.6-2.4	2.0-3.0	2.4-3.6	2.7-4.1
	Actual	0.8	1.5	1.6	1.9	2.1	2.4

Notes: Window Burner placed 1 in. away from face of wall assembly. Values in bold-italics are higher than required range.

In summary, the calibration test provides documented evidence that SwRI's ISMA successfully demonstrated the ability to achieve the fire exposure conditions specified in NFPA 285, and that the facility can perform the fire evaluation described in NFPA 285.

5.0 INSTRUMENTATION

The instrumentation for this test consisted of thermocouples (TCs) at the following locations:

- Exterior and interior face of test wall assembly as shown in Figure A-2 and Figure A-3, respectively.
- Burn room ceiling area as shown in Figure A-4.
- Within the combustible core, air cavity and/or insulation as shown in Figure A-5.

The temperature measurements were made using 18-ga,Type "K" TCs in the burn room and 20-ga, Type "K" TCs in all other locations. All data were recorded at intervals not exceeding 15 s. Flow rate of natural gas to each of the burners was monitored and recorded using calibrated turbine meters and frequency converters.

6.0 TEST PROCEDURE

Testing was conducted on February 7, 2008, in accordance with NFPA 285. Instrumentation connections were verified, and the window burner was positioned outside the room such that the vertical centerline of the window burner is offset 1 in. from the exterior face of the test wall assembly. The test conditions were recorded as an ambient temperature of 59.5 °F and a relative humidity of 39.5%. The airflow across the exterior face of the test assembly was less than 4 ft/s as determined by an anemometer placed at right angles to the exterior face.

Documentation for the test consisted of digital photographs taken of the test wall assembly during construction, during the test, and after the test to include dissection of the test assembly. Color video of the exterior face of the test wall assembly was taken prior to, during, and post test. Color video of the test wall/floor intersection in the second-floor level was taken during the test period. Information from the second-floor video is used to assist in determination of flame penetration and/or smoke development.

7.0 TEST RESULTS

The ISMA performance evaluation test for Composite Technologies Corporation was performed on February 7, 2008. Present to witness the test were Venkatesh Seshappa and Darryl Dixon representing Composite Technologies Corporation and Jason Krohn representing PCI. Visual observations made during the test appear in Tables 4 and 5. Flame propagation observations are based on sustained flames on the surface of the wall. Intermittent flaming above the sustained flames is not considered for

estimation of the extent of flame propagation. The following sections outline the performance of the wall assembly with respect to the conditions of acceptance detailed in NFPA 285.

Table 4. Test Observations of Front Wall.

Time (Min:S)	Observations of Front Wall
0:00	Start of test.
1:00	No change.
1:30	First drip of foam with small aggregates attached.
2:00	Start of flame licking out of window.
3:30	Slag (concrete) falling off frame at window.
4:00	Foam retracting into wall.
5:00	Increase in foam dripping out of wall at window. Window burner in place.
7:00	Most of slag is out at window.
8:00	More foam dripping out.
9:20	Spalling sound from wall – no visible spalling.
13:00	More spalling sounds.
15:00	Spalling visible on the inside at the top of the window.
20:00	Some spalling and foam drips.
30:00	Fire off.
31:00	Spalling on front above window.
40:00	No additional noticeable observations.

Table 5. Test Observations of Second-Floor Room.

Time (Min:S)	Observations of Second-Floor Room
0:00	Start of test.
30:00	End of test. No flame, smoke, or other reportable observations.

7.1 Flame Propagation Shall Not Occur beyond the Area of Flame Plume Impingement on the Exterior Face of the Wall Assembly:

1. TCs 11 and 14–17 did not exceed 1000 °F at any time during the test.
2. Flames emitting from the surface of the exterior face did not reach a vertical elevation of 10 ft above the top of the window opening at any time during the test.
3. Flames emitting from the surface of the exterior face did not reach a lateral distance of 5 ft from the vertical centerline of the window opening any time during the test.

7.2 Flame Propagation Shall Not Occur Either Vertically or Laterally through the Core Components:

1. TCs 28 and 31–40 did not exceed 750 °F at any time during the test.

7.3 Flame Propagation Shall Not Occur Laterally through the Core Components in the First-Floor Area:

1. Flames did not occur over the surface of the exterior face beyond the concrete block walls or beyond the intersection of the test wall assembly, and the concrete block fixture walls.
2. TCs 18 and 19 did not exceed 750 °F at any time during the test.

7.4 Excessive Temperature 1 in. from the Interior Surface of the Test Wall Assembly within the Second-Floor Area Shall Not Exceed 500 °F above the Initial Ambient Temperature:

1. TCs 49–54 did not exceed 500 °F above the ambient temperature at any time during the test.

7.5 Flame Propagation Shall Not Occur within the Second-Floor Room:

1. Review of the pertinent TC data, second-floor videotape, and post-test inspection indicated that flame propagation did not occur in the second floor at any time during the test.

Appendix A contains application instructions, descriptions of the wall assembly, and client-supplied drawings. See Appendix B for photographic documentation of the test and post-test inspection. Graphical temperature data is located in Appendix C.

8.0 CONCLUSION

Southwest Research Institute's (SwRI) Fire Technology Department, located in San Antonio, Texas, conducted an intermediate-scale multistory fire performance evaluation test for Composite Technologies Corporation, located in Boone, IA. Testing performed on February 7, 2008, was conducted on a concrete sandwich wall assembly in accordance with the National Fire Protection Association 285, *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components*, 2006 Edition.

The results of the fire performance evaluation conducted on the wall assembly described herein indicate that the assembly ***meets*** the acceptance criteria stated in the standard.

APPENDIX A

TEST ASSEMBLY DRAWINGS/

CLIENT-PROVIDED DRAWINGS

(Consisting of 9 Pages)

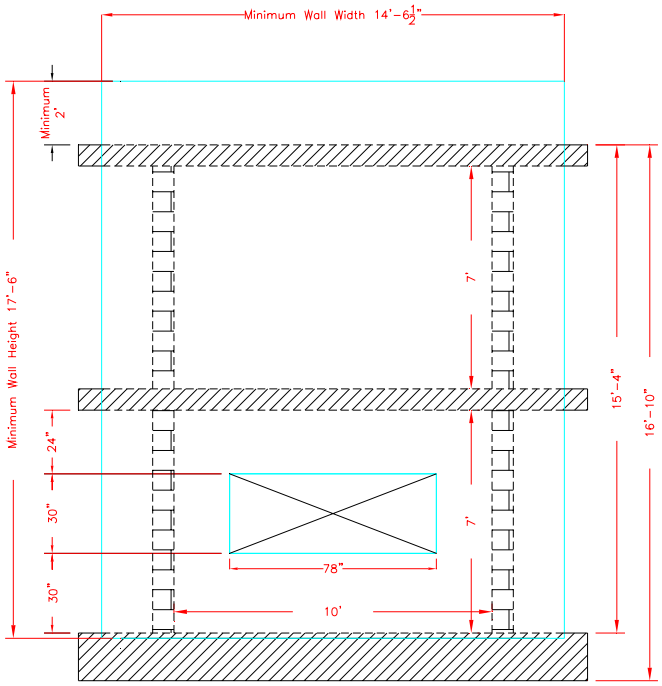

Figure A-1. Front View of Wall System in Place on Test Structure.

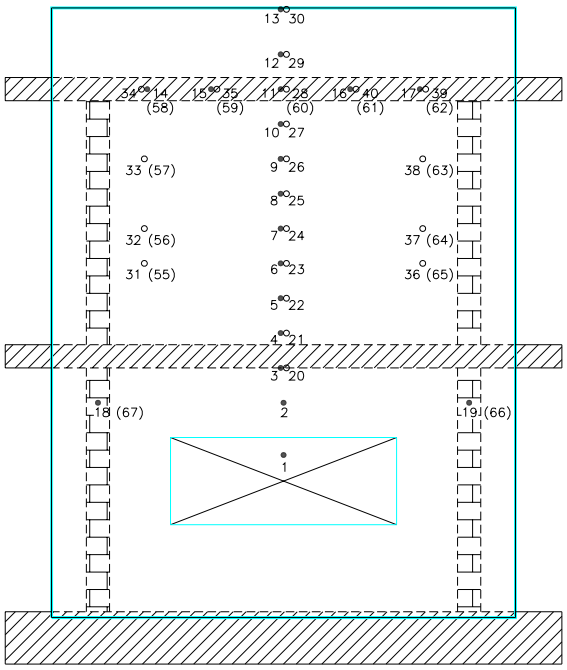

Figure A-2. Instrumentation Arrangement--Part I.

• Surface TCs
o Cavity TCs

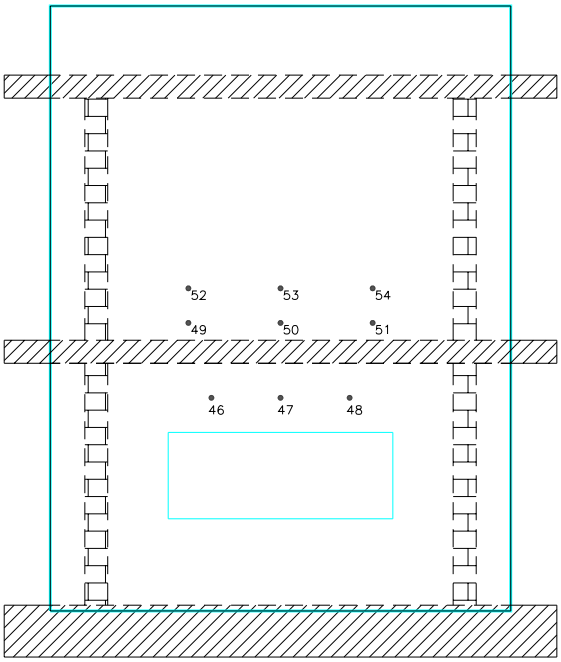

Figure A-3. Instrumentation Arrangement--Part II.

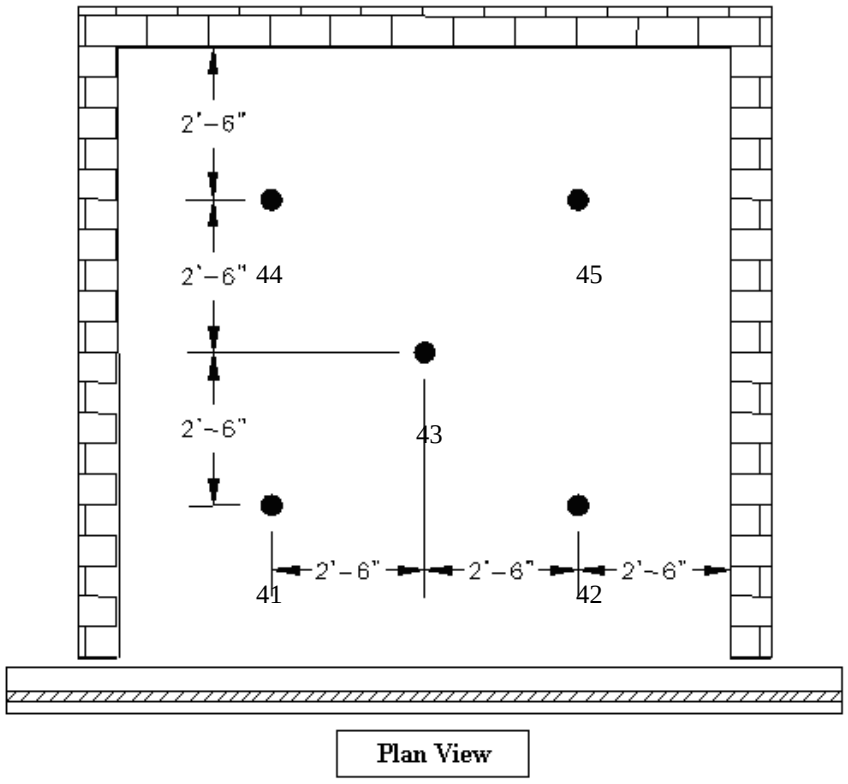

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Figure A-4. Instrumentation Arrangement--Part III.

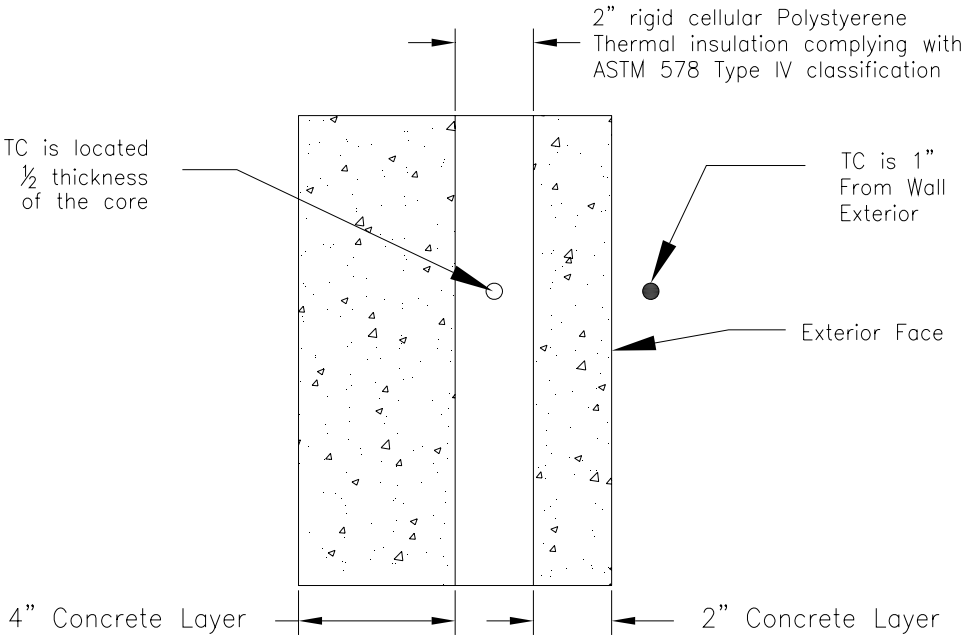
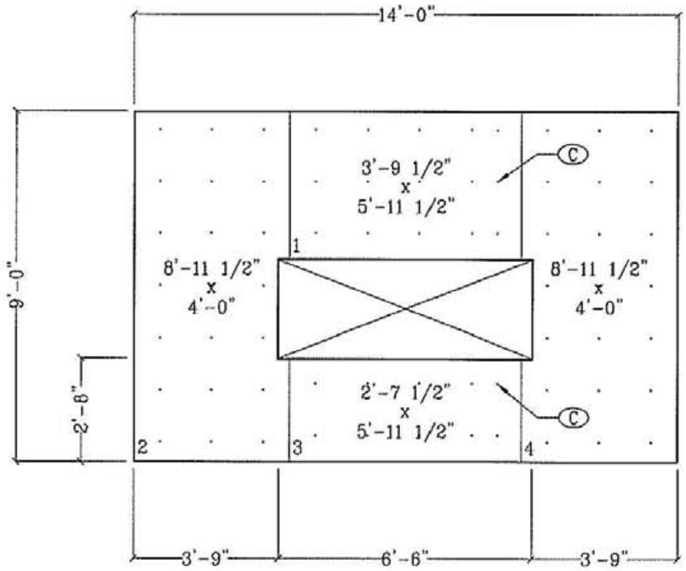


Figure A-5. Instrumentation Arrangement--Part IV.



PANEL DIMENSIONS SHOWN REPRESENT THE ACTUAL CONSTRUCTION DIMENSIONS. THE INSULATION DIMENSIONS HAVE BEEN ADJUSTED FOR A 1/4in. TOLERANCE AT ALL PANEL EDGES.

THIS PANEL DRAWING IS BASED ON THE USE OF FULLY FABRICATED INSULATION SHEETS. INSULATION PURCHASED WITHOUT FULL FABRICATION WILL HAVE TOLERANCES OF -1/16in. to +3/4in.

(C) NON-STANDARD HOLE PATTERN

PANEL DESIGN INFORMATION:	
PANEL NO: P 1	QUANTITY: 1
CONFIGURATION: 2 / 2 / 4	
NET INSULATED AREA: 108.42 sq.ft.	

INSULATION SYSTEM DESIGN INFORMATION:	
CONNECTOR DESIGN: THERMOMASS FIBER COMPOSITE CONNECTOR	
CONNECTOR QUANTITY: 67 pcs	
INSULATION SHEET SIZE: 48 x 96	
INSULATION QUANTITY: TOTAL: 4 pcs	FULL: 0 pcs

STATUS: **PRELIMINARY**

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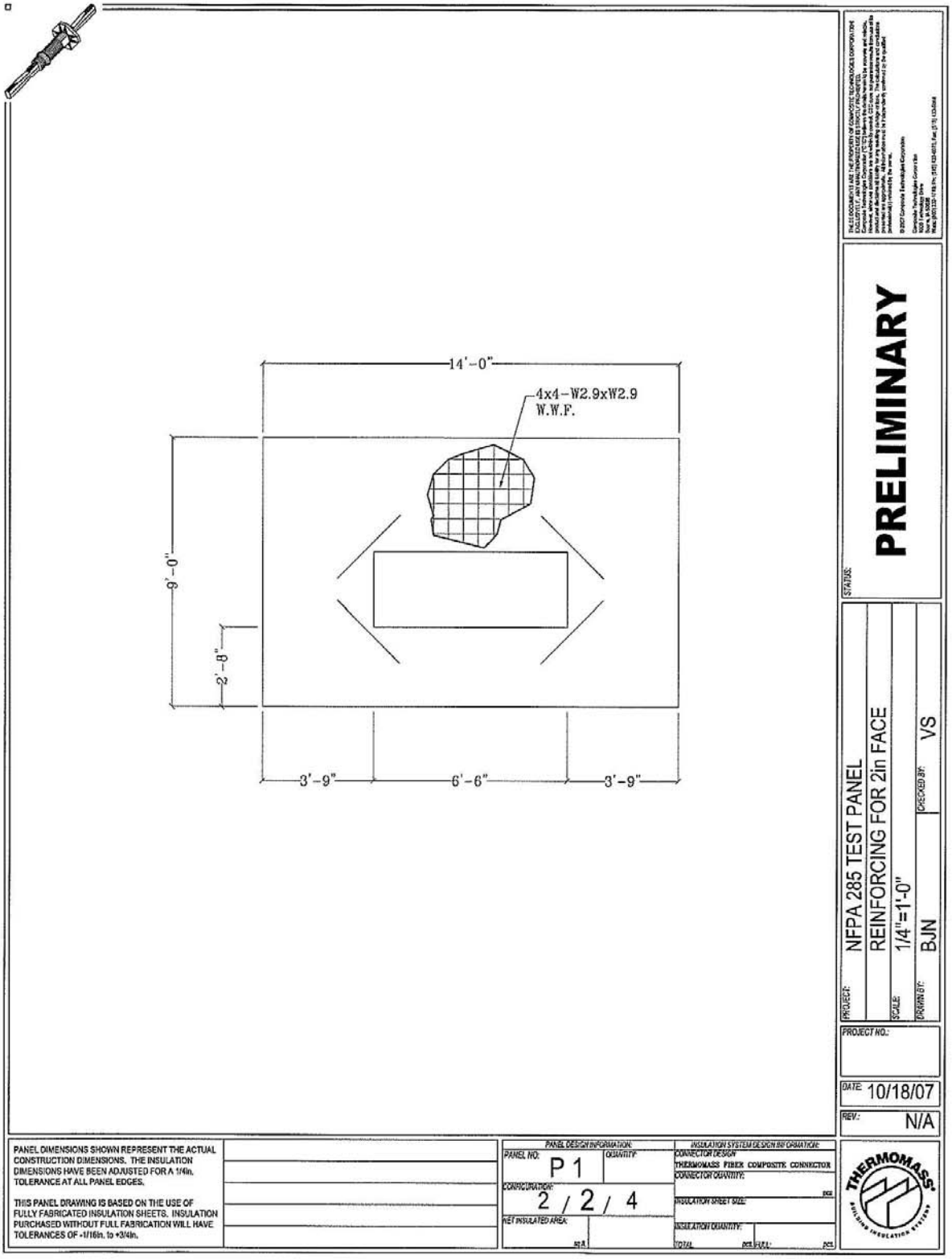
DRAWN BY:	BJN
CHECKED BY:	VS
PROJECT NO.:	14730
DATE:	10/18/07
REV.:	N/A

THERMOMASS BUILDING INSULATION SYSTEMS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W.W.F.
9'-0"
2'-8"
3'-9"
6'-6"
3'-9"
PRELIMINARY
STATUS:
NFPA 285 TEST PANEL
REINFORCING FOR 2in FACE
PROJECT:
1/4"=1'-0"
SCALE:
BJN
DRAWN BY:
VS
CHECKED BY:
PROJECT NO.:
DATE: 10/18/07
REV.: N/A
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THIS PANEL DRAWING IS BASED ON THE USE OF FULLY FABRICATED INSULATION SHEETS. INSULATION PURCHASED WITHOUT FULL FABRICATION WILL HAVE TOLERANCES OF -1/16in. to +3/4in.
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PANEL NO.
P 1
QUANTITY
CONFIGURATION:
2 / 2 / 4
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INSULATION SYSTEM DESIGN INFORMATION:
CONNECTOR DESIGN
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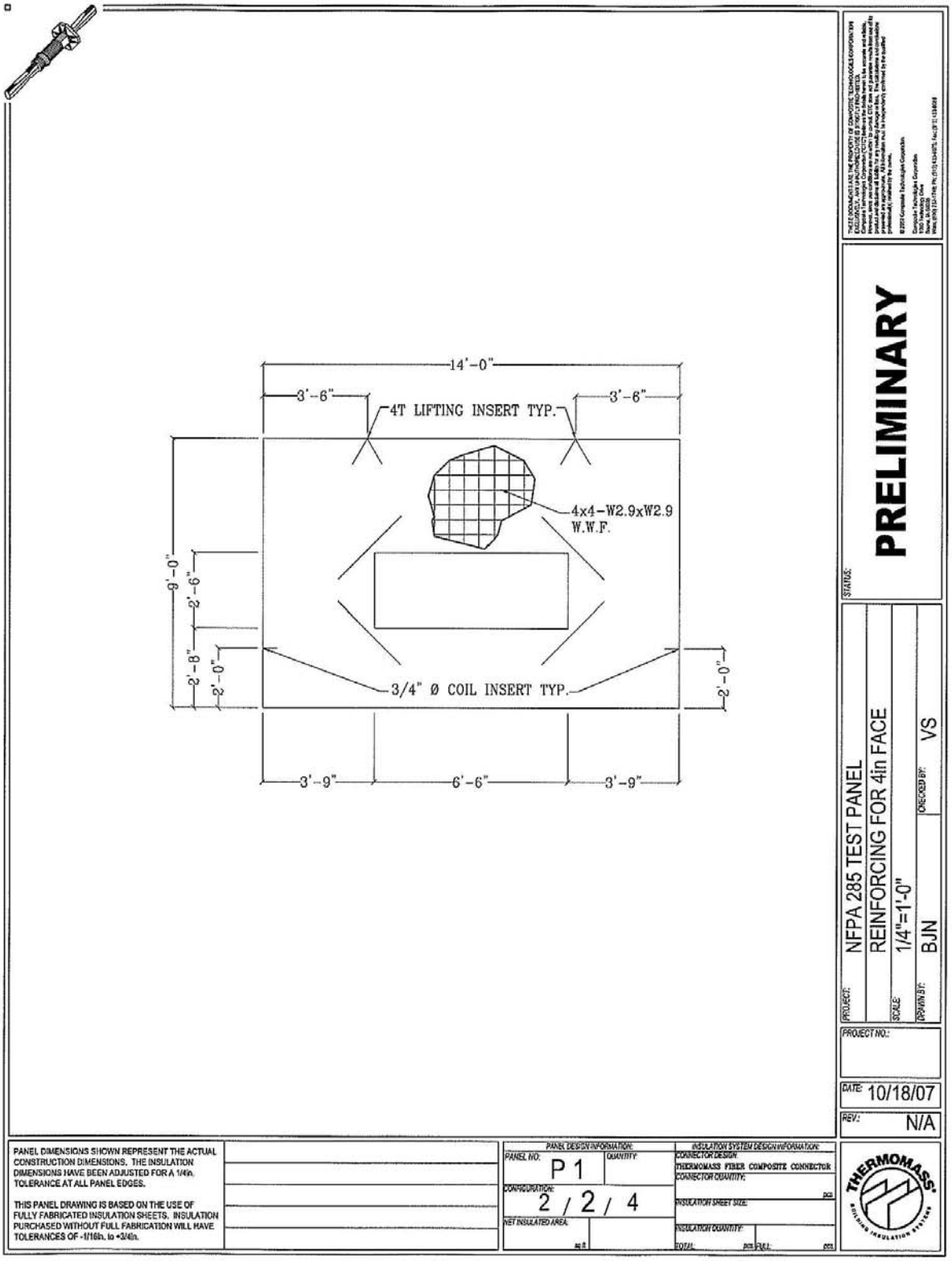
TOTAL
pcs
FULL:
pcs
THERMOMASS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4T LIFTING INSERT TYP.
3'-6"
4x4-W2.9xW2.9
W.W.F.
6'-0"
2'-9"
2'-8"
2'-0"
3/4" Ø COIL INSERT TYP.
2'-0"
3'-9"
6'-6"
3'-9"
PRELIMINARY
STATUS:
PROJECT: NFPA 285 TEST PANEL
REINFORCING FOR 4in FACE
SCALE: 1/4"=1'-0"
DRAWN BY: BJN
CHECKED BY: VS
PROJECT NO.:
DATE: 10/18/07
REV.: N/A
PANEL DIMENSIONS SHOWN REPRESENT THE ACTUAL CONSTRUCTION DIMENSIONS. THE INSULATION DIMENSIONS HAVE BEEN ADJUSTED FOR A 1/4in. TOLERANCE AT ALL PANEL EDGES.
THIS PANEL DRAWING IS BASED ON THE USE OF FULLY FABRICATED INSULATION SHEETS. INSULATION PURCHASED WITHOUT FULL FABRICATION WILL HAVE TOLERANCES OF -1/16in. to +3/4in.
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QUANTITY:
CONFIGURATION: 2 / 2 / 4
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INSULATION SYSTEM DESIGN INFORMATION:
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FULL:
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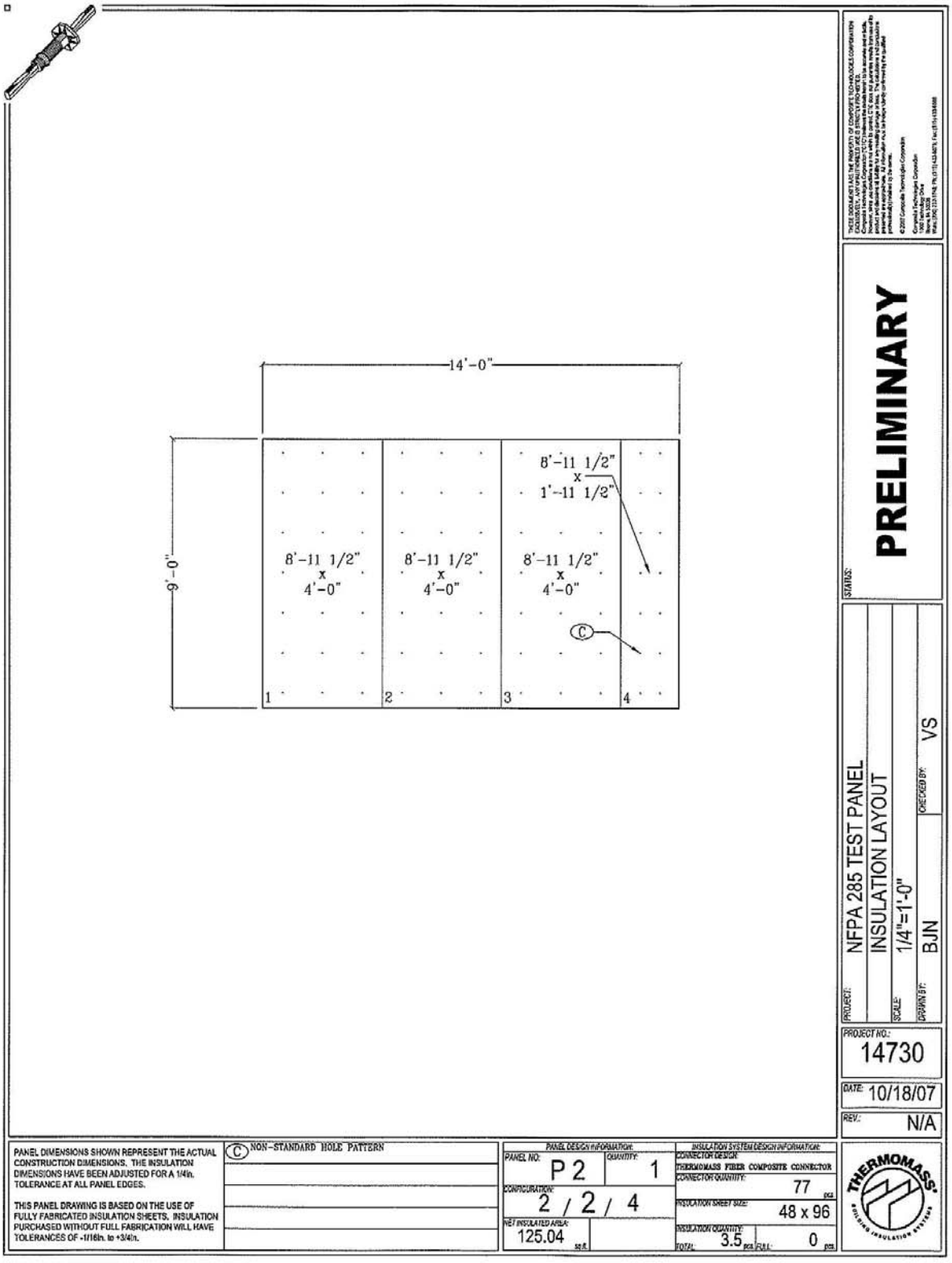
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8'-11 1/2" x 4'-0"
8'-11 1/2" x 4'-0"
8'-11 1/2" x 4'-0"
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C
1
2
3
4
PRELIMINARY
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INSULATION LAYOUT
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CHECKED BY: VS
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THIS PANEL DRAWING IS BASED ON THE USE OF FULLY FABRICATED INSULATION SHEETS. INSULATION PURCHASED WITHOUT FULL FABRICATION WILL HAVE TOLERANCES OF -1/16in. to +3/4in.
C NON-STANDARD HOLE PATTERN
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CONFIGURATION: 2 / 2 / 4
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CONNECTOR QUANTITY: 77 pcs
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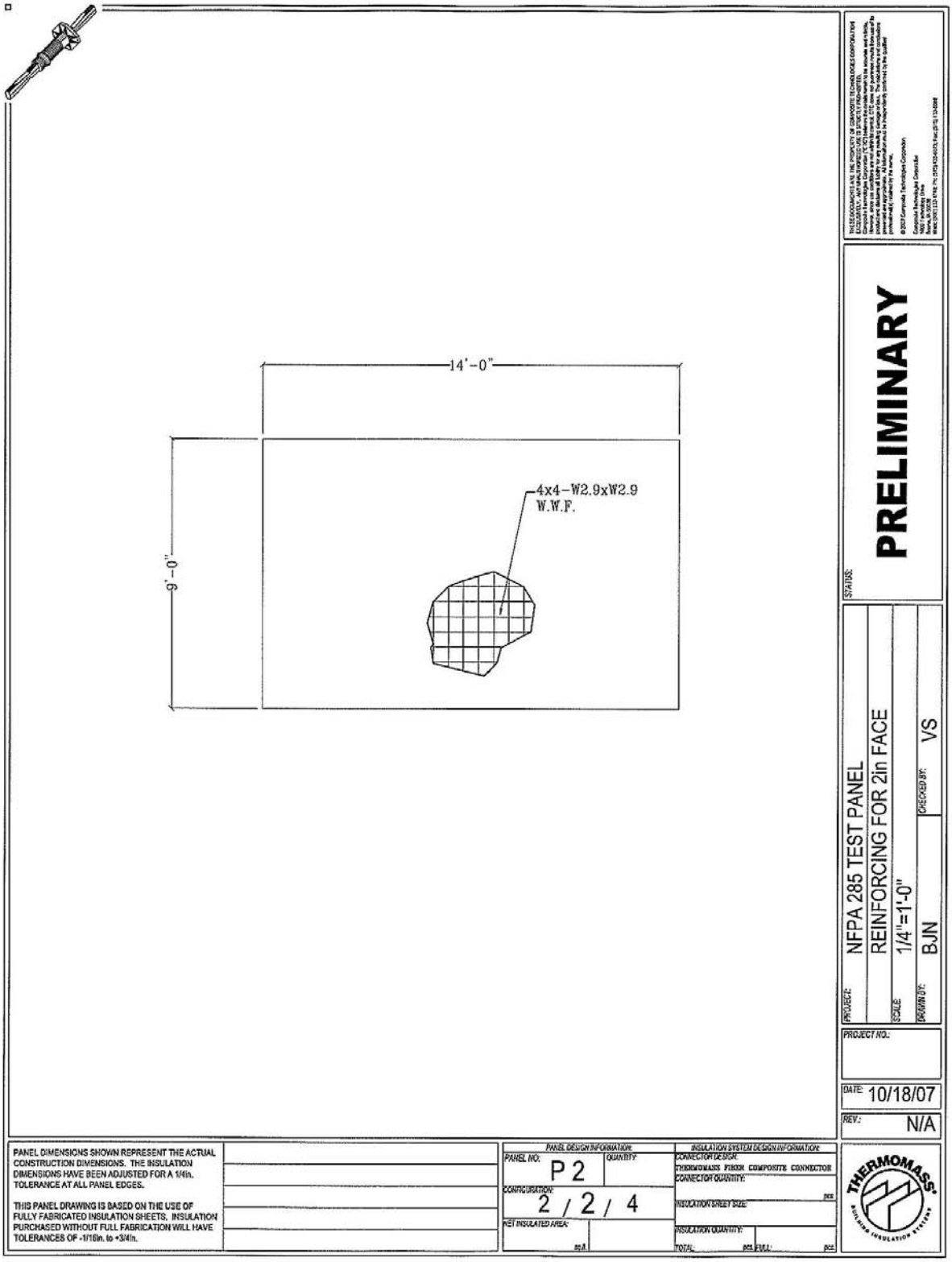
INSULATION QUANTITY: TOTAL: 3.5 pcs FULL: 0 pcs
THERMOMASS BUILDING INSULATION SYSTEMS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NFPA 285 TEST PANEL
REINFORCING FOR 2in FACE
SCALE:
1/4"=1'-0"
DRAWN BY:
BJN
CHECKED BY:
VS
PROJECT NO.:
DATE:
10/18/07
REV:
N/A
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THIS PANEL DRAWING IS BASED ON THE USE OF FULLY FABRICATED INSULATION SHEETS. INSULATION PURCHASED WITHOUT FULL FABRICATION WILL HAVE TOLERANCES OF -1/16in. to +3/4in.
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P 2
QUANTITY:
CONFIGURATION:
2 / 2 / 4
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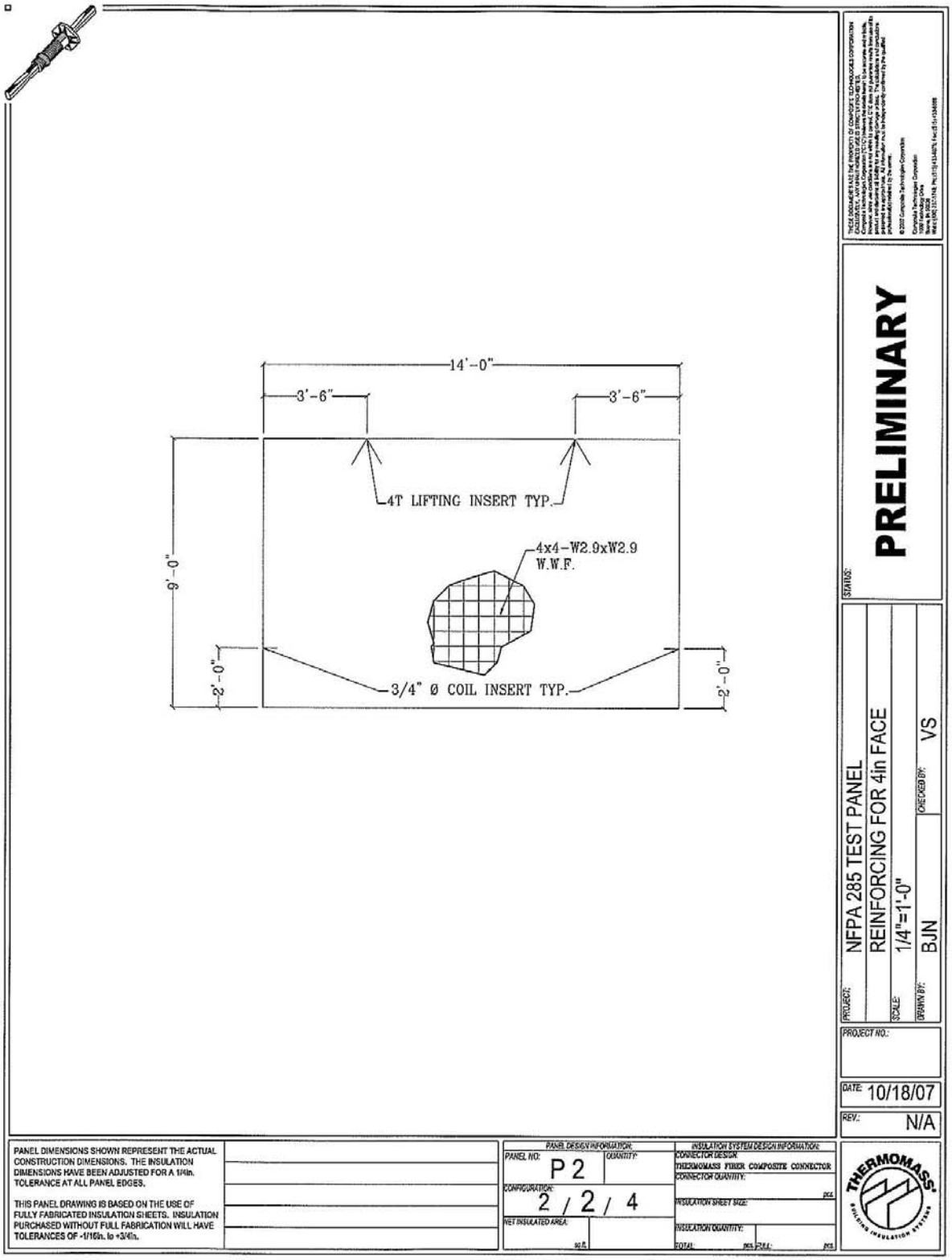
sq ft
INSULATION SYSTEM DESIGN INFORMATION:
CONNECTOR DESIGN:
THERMOMASS FIBER COMPOSITE CONNECTOR
CONNECTOR QUANTITY:
pcs
INSULATION SHEET SIZE:
INSULATION QUANTITY:
TOTAL:
pcs FULL:
pcs
THERMOMASS
BUILDING INSULATION SYSTEMS


14'-0"
3'-6"
3'-6"
4T LIFTING INSERT TYP.
4x4-W2.9xW2.9
W.W.F.
6'-0"
2'-0"
3/4" Ø COIL INSERT TYP.
2'-0"
PRELIMINARY
STATUS:
PROJECT: NFPA 285 TEST PANEL
REINFORCING FOR 4in FACE
SCALE: 1/4"=1'-0"
DRAWN BY: BJN
CHECKED BY: VS
PROJECT NO.:
DATE: 10/18/07
REV.: N/A
PANEL DIMENSIONS SHOWN REPRESENT THE ACTUAL CONSTRUCTION DIMENSIONS. THE INSULATION DIMENSIONS HAVE BEEN ADJUSTED FOR A 1/4in. TOLERANCE AT ALL PANEL EDGES.
THIS PANEL DRAWING IS BASED ON THE USE OF FULLY FABRICATED INSULATION SHEETS. INSULATION PURCHASED WITHOUT FULL FABRICATION WILL HAVE TOLERANCES OF -1/16in. to +3/4in.
PANEL DESIGN INFORMATION:
PANEL NO: P2
QUANTITY:
CONFIGURATION: 2 / 2 / 4
NET INSULATED AREA:
INSULATION SYSTEM DESIGN INFORMATION:
CONNECTOR DESIGN: THERMOMASS FIBER COMPOSITE CONNECTOR
CONNECTOR QUANTITY:
INSULATION SHEET SIZE:
INSULATION QUANTITY:
THERMOMASS

APPENDIX B

PHOTOGRAPHIC DOCUMENTATION

(Consisting of 3 Pages)

Figure B-1. PreTest View.

Figure B-2. Test at Approximately 25 min.

Figure B-3. Post-Test Inspection.

Figure B-4. Interior Face – Post Test Inspection.

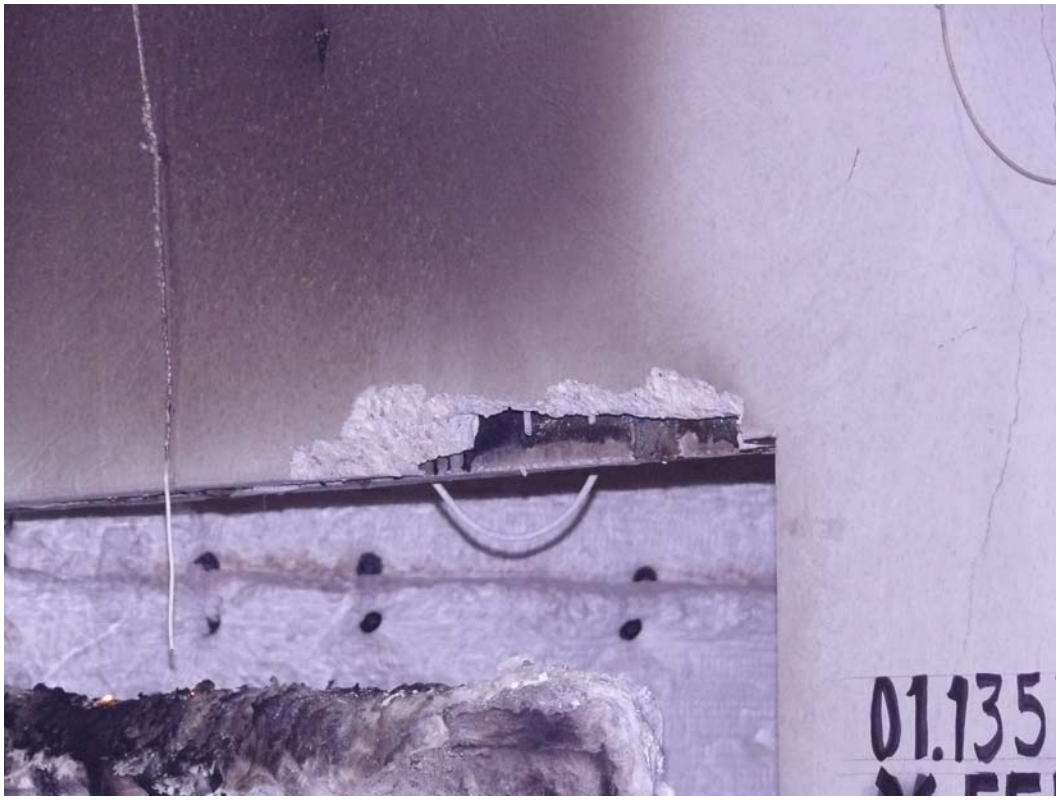
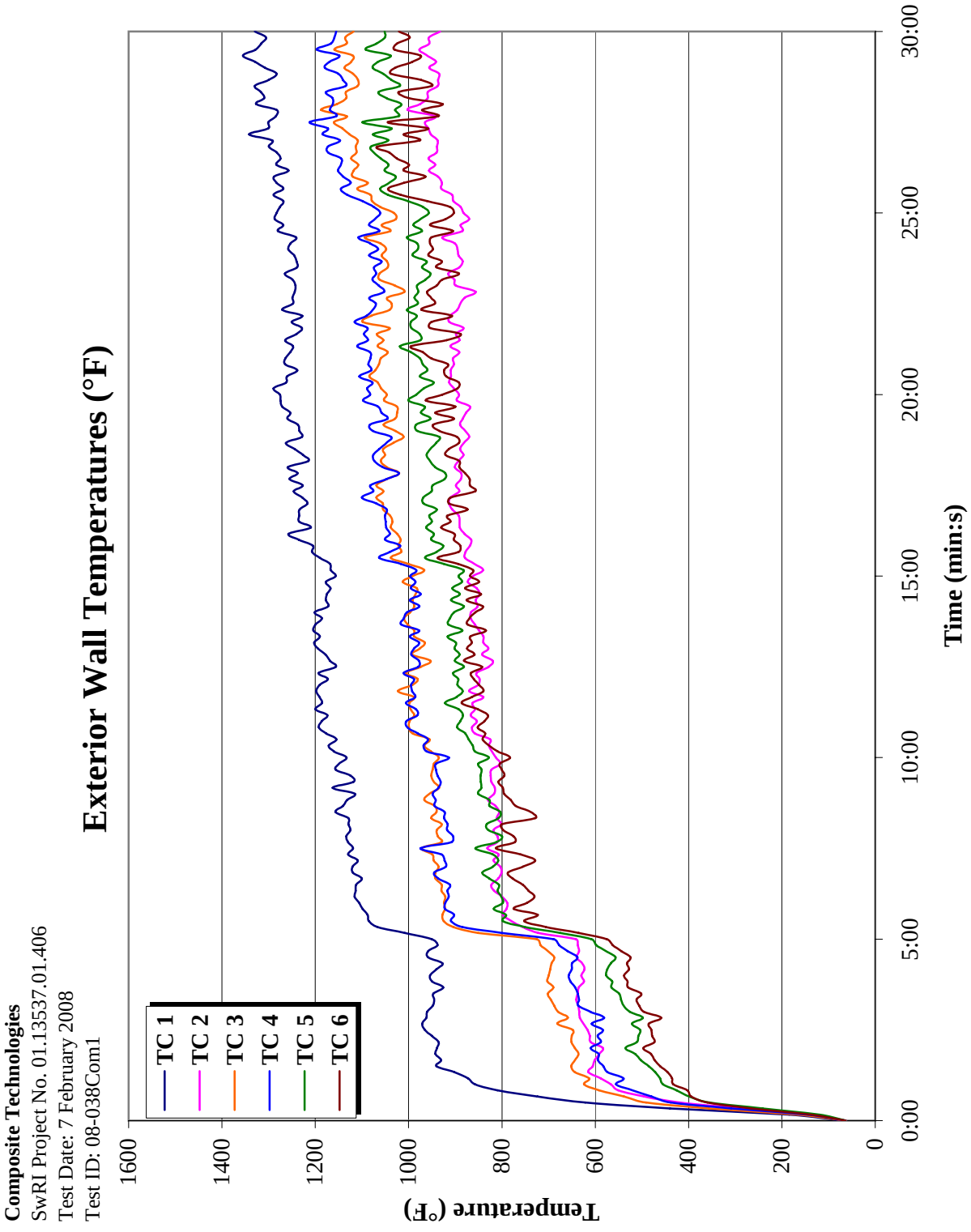


Figure B-5. Exterior Face – Top Right Corner of Window – Post Test Inspection.

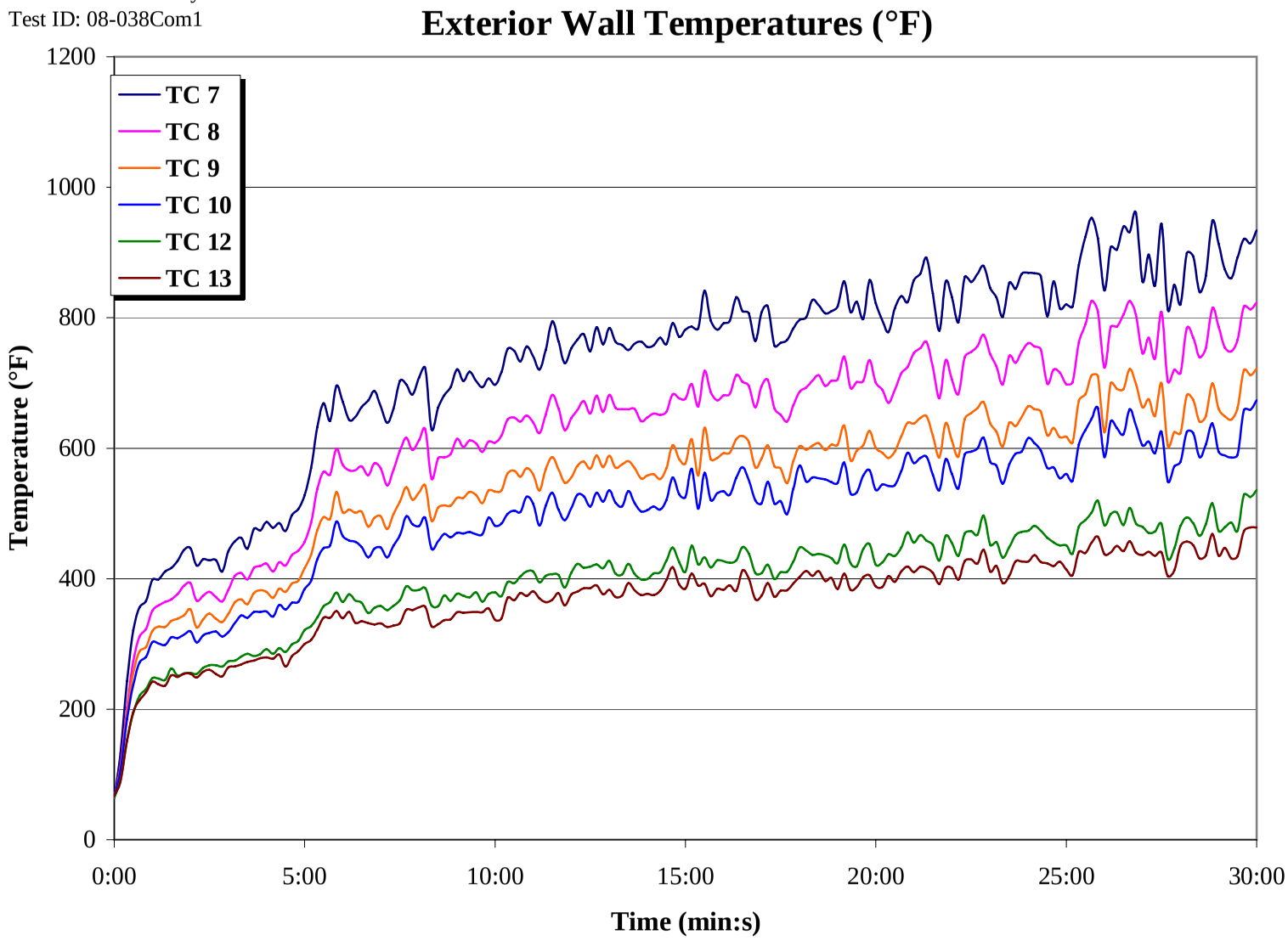
APPENDIX C

GRAPHICAL TEMPERATURE DATA

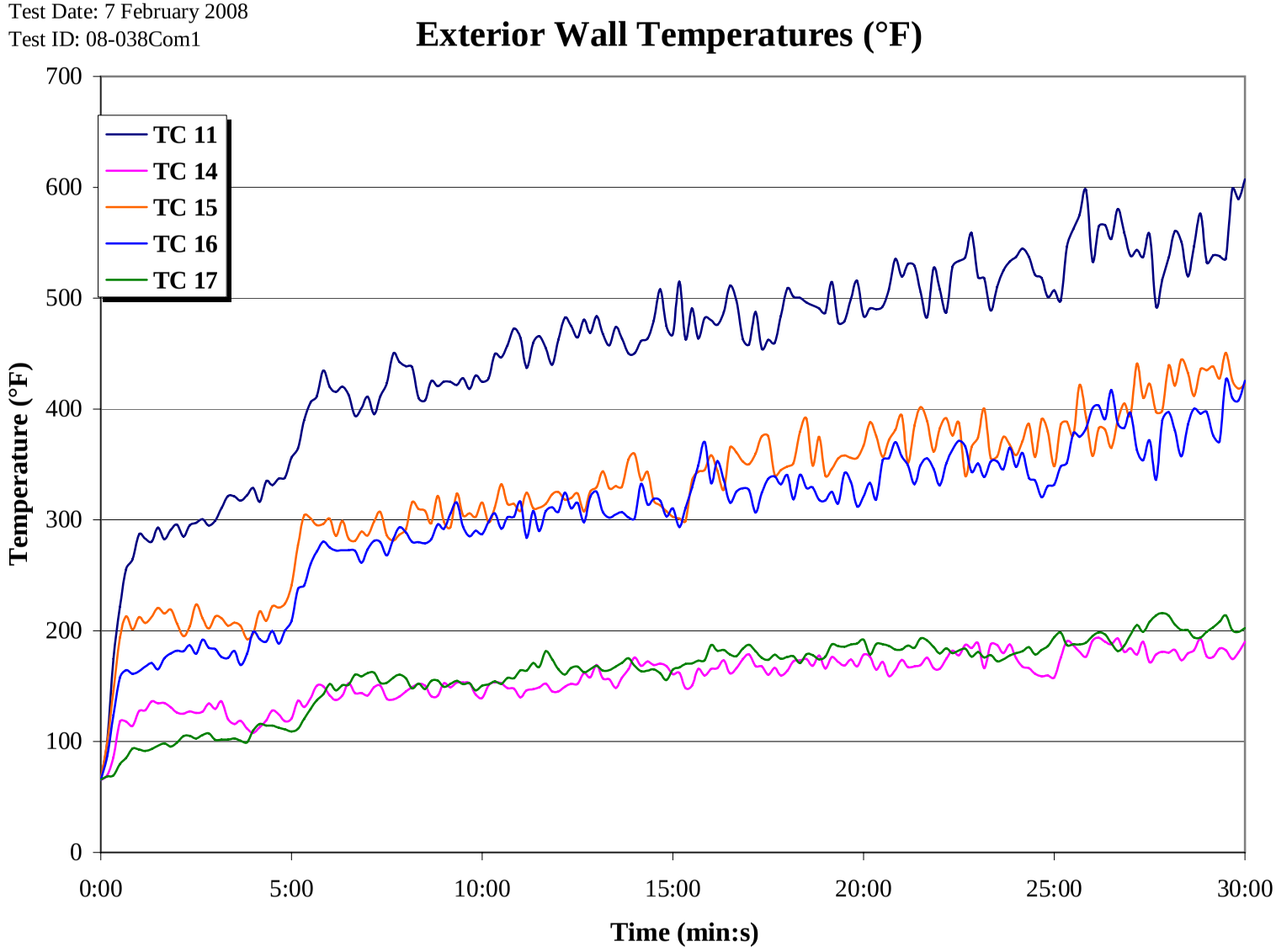
(Consisting of 11 Pages)


Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Exterior Wall Temperatures (°F)
TC 1
TC 2
TC 3
TC 4
TC 5
TC 6
Temperature (°F)
1600
1400
1200
1000
800
600
400
200
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)

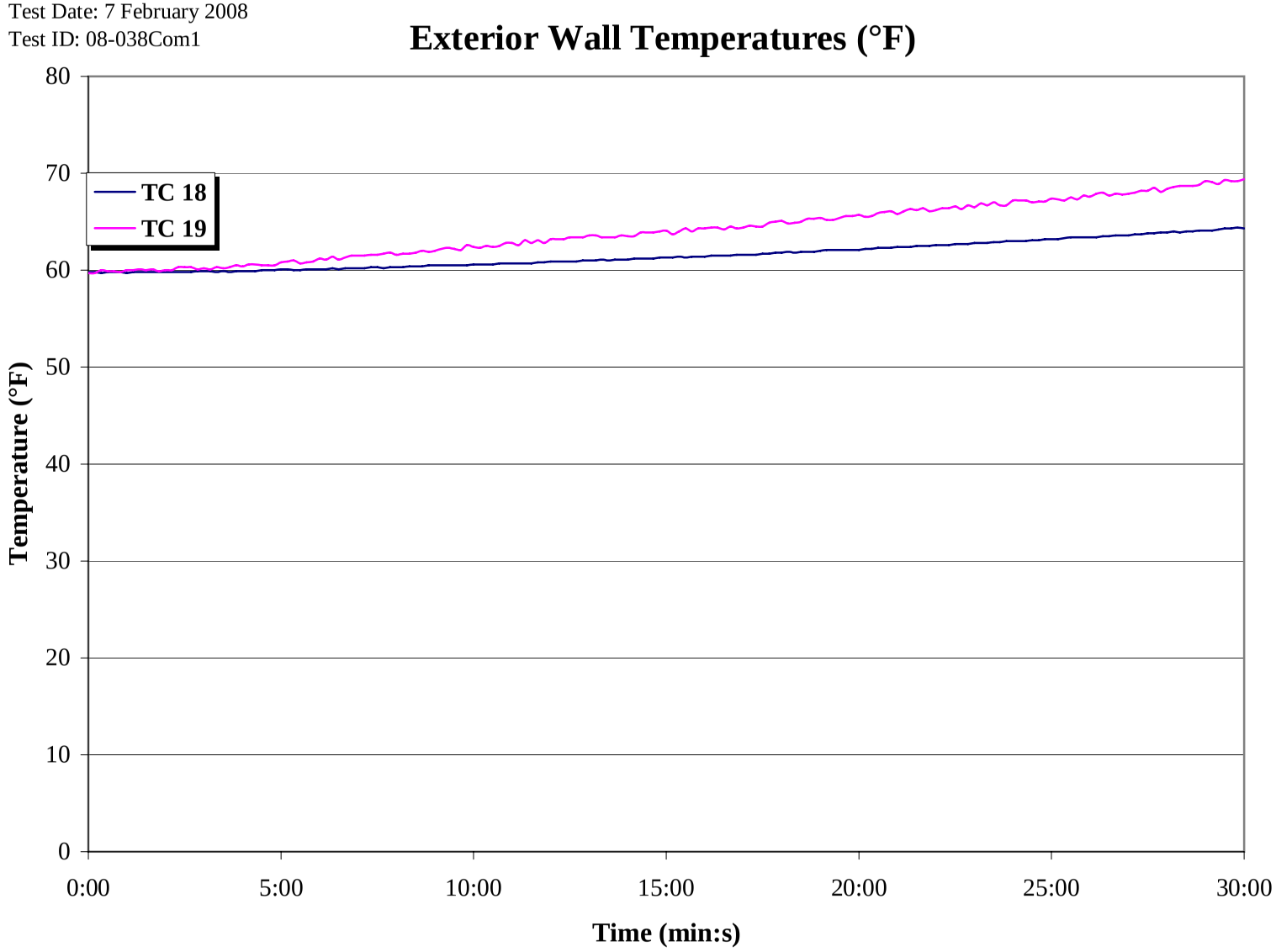
Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1

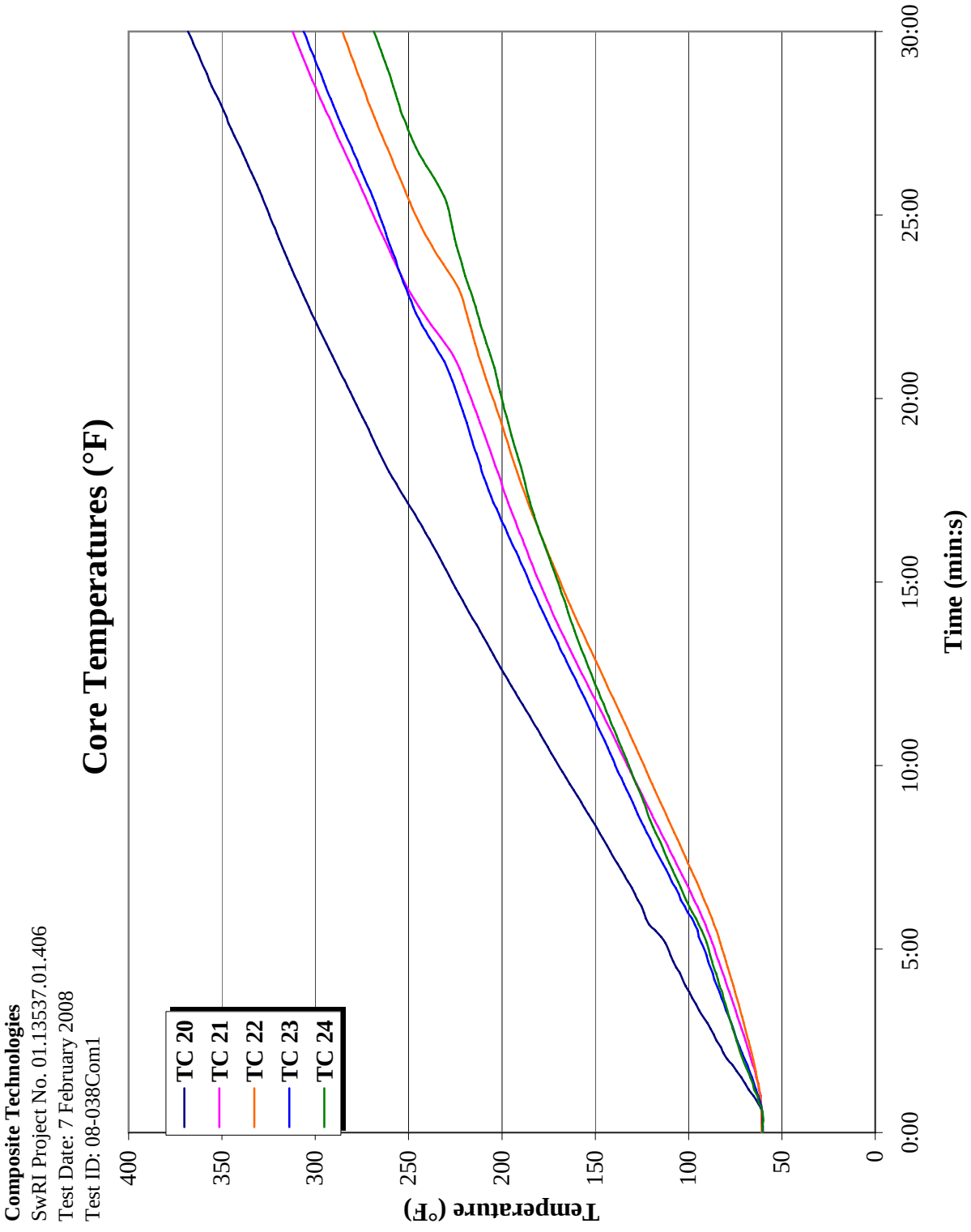


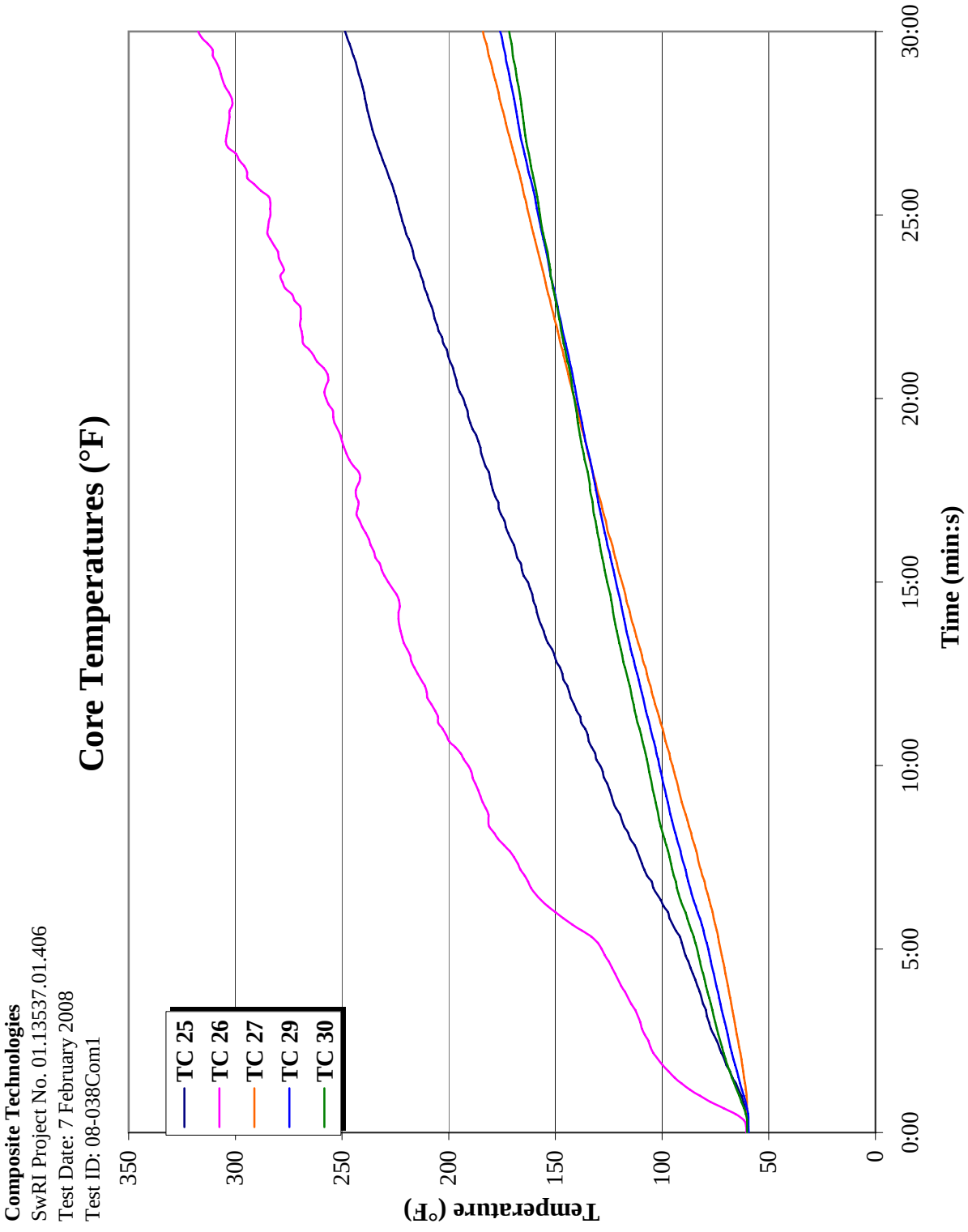
Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1

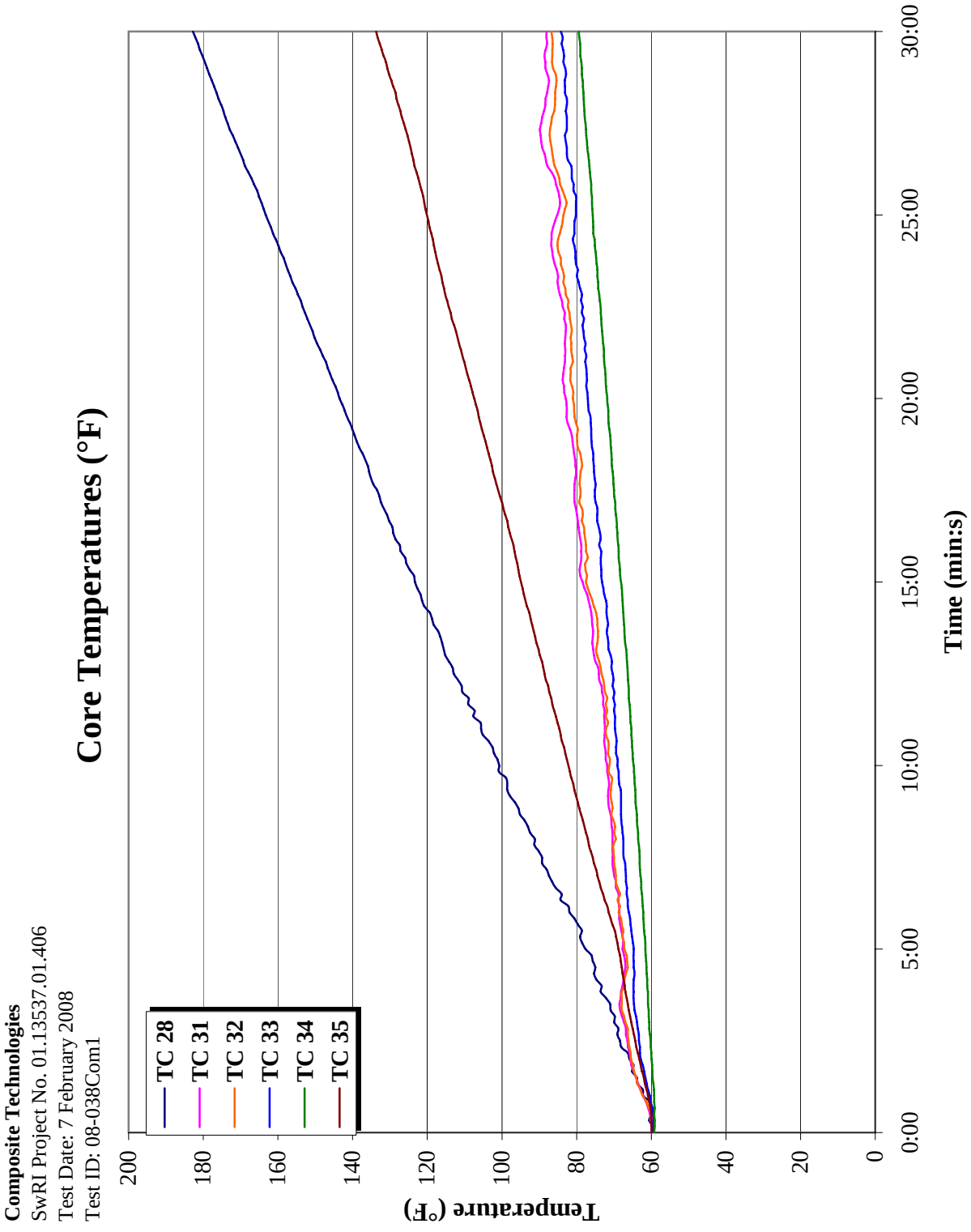


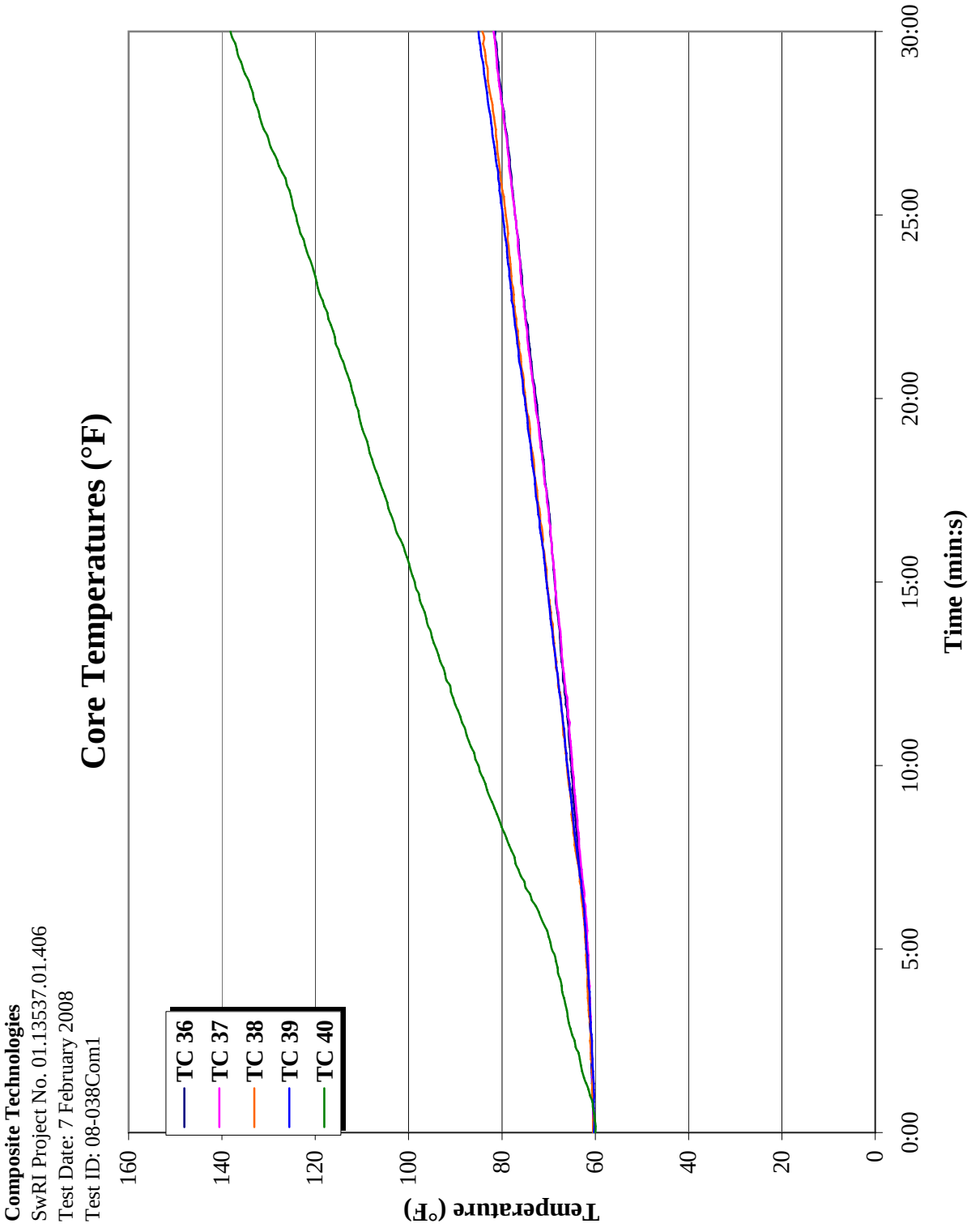
Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1

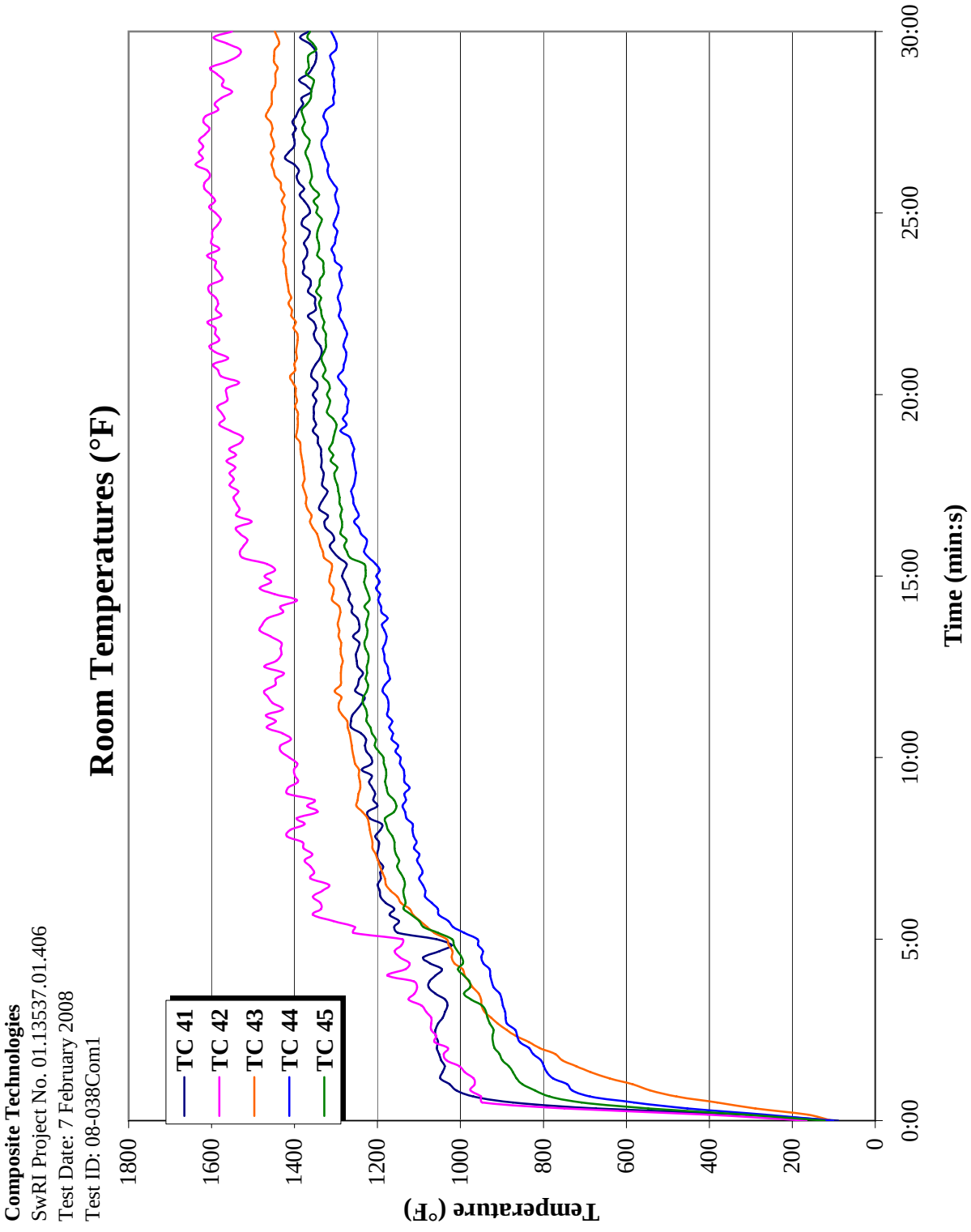


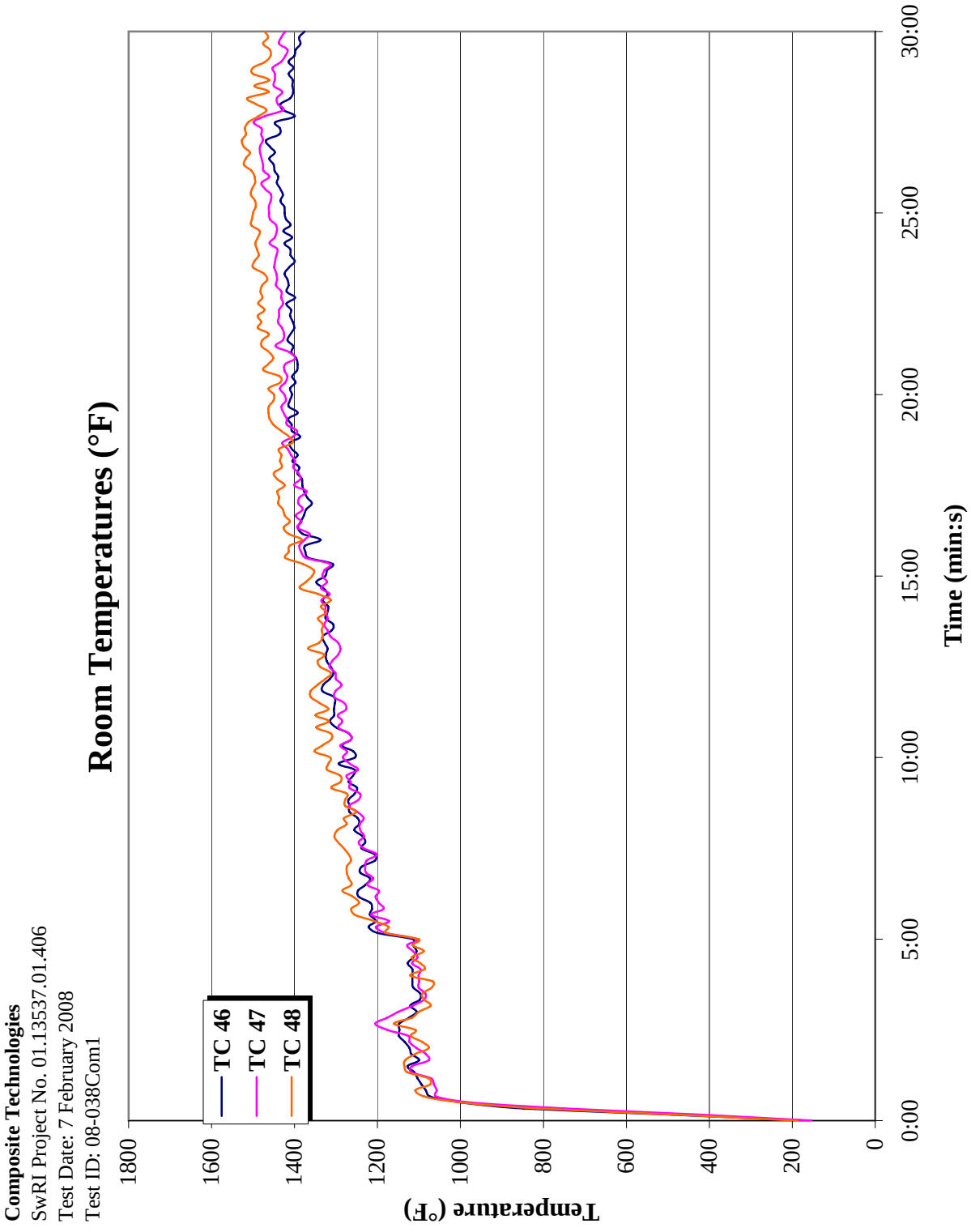

Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Core Temperatures (°F)
TC 20
TC 21
TC 22
TC 23
TC 24
Temperature (°F)
400
350
300
250
200
150
100
50
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)


Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Core Temperatures (°F)
TC 25
TC 26
TC 27
TC 29
TC 30
Temperature (°F)
350
300
250
200
150
100
50
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)


Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Core Temperatures (°F)
TC 28
TC 31
TC 32
TC 33
TC 34
TC 35
Temperature (°F)
200
180
160
140
120
100
80
60
40
20
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)


Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Core Temperatures (°F)
TC 36
TC 37
TC 38
TC 39
TC 40
Temperature (°F)
160
140
120
100
80
60
40
20
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)


Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Room Temperatures (°F)
TC 41
TC 42
TC 43
TC 44
TC 45
Temperature (°F)
1800
1600
1400
1200
1000
800
600
400
200
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)


Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1
Room Temperatures (°F)
TC 46
TC 47
TC 48
Temperature (°F)
1800
1600
1400
1200
1000
800
600
400
200
0
0:00
5:00
10:00
15:00
20:00
25:00
30:00
Time (min:s)

Composite Technologies
SwRI Project No. 01.13537.01.406
Test Date: 7 February 2008
Test ID: 08-038Com1