TEST REPORT

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EVALUATION CENTER
16015 Shady Falls Road
Elmendorf, TX 78112
Phone: (210) 635-8100
Fax: (210) 635-8101
www.intertek.com

RENDERED TO

Canadian Wood Council
99 Rue Bank Street
Suite 400
OTTAWA ON K1P 6B9
CANADA

PRODUCT EVALUATED: Cross-Laminated Timber Panels
EVALUATION PROPERTY: Fire Resistance

Report of Testing Cross-Laminated Timber Panels for compliance with the applicable requirements of the following criteria: *ASTM E119–14 Standard Test Methods for Fire Tests of Building Construction and Materials, October 2014 Edition, and CAN/ULC-S101-07 Standard Methods of Fire Endurance Tests of Building Construction and Materials.*

1 Table of Contents

2 Introduction

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for the Canadian Wood Council, on Cross-Laminated Timber Panels, to evaluate their fire resistance. Testing was conducted in accordance with the applicable requirements, and following the standard methods, of **ASTM E119–14 Standard Test Methods for Fire Tests of Building Construction and Materials, October 2014 Edition, and CAN/ULC-S101-07 Standard Methods of Fire Endurance Tests of Building Construction and Materials.** This evaluation took place on November 12, 2014.

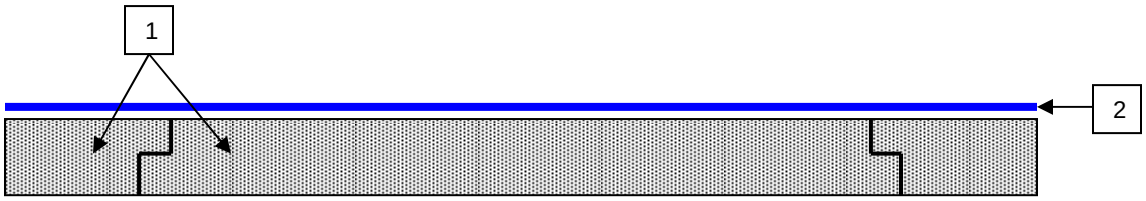
3 Test Samples

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 8, 2014 and assigned Intertek I.D. No. SAT1410081051-001.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

An asymmetrical, 10’ x 10’, load-bearing wall was constructed of gypsum board and Cross-Laminated Timber Panels (see Appendix A).



1. Wood Panels – Three (3) Cross-Laminated Panels with 1-15/16” (49mm) half lap joints; panels secured to each other using one bead of Loctite® PL® 400® construction adhesive and Wurth 6 x 100 mm long self-tapping screws spaced 12” (300mm) o.c. along the joint. The first fastener spaced 2-1/4” (60mm) from the bottom and the next spaced 7” (174mm) from the bottom, then 12” (300mm) thereafter (See Appendix A).

2. Cladding – 4’ x 10’ x 5/8” FIREBLOC® Type X Gypsum Board (American Gypsum), installed with the long edge parallel to the panels, using 1-5/8” coarse thread screws spaced 16” o.c. around the perimeter and in the field; exposed seams and fasteners received a Level 2 finish.

4 Testing and Evaluation Methods

4.1. INSTRUMENTATION

The unexposed surface of the assembly was instrumented with a total of ten (10), 24 GA, Type K, fiberglass jacketed thermocouples: TCs #1 - #9 were evenly distributed across the wall as described in the standard, and TC #10 was installed on the vertical joints of the CLT. Three finish rating thermocouples were install on the fire side of the wall between the interior gypsum board and CLT panels. An additional roving thermocouple was prepared for use if necessary. For additional information**,** see Appendix A. The output of the thermocouples and the furnace probes were monitored by a 100-channel Yokogawa, Inc., Darwin Data Acquisition Unit. The computer was programmed to scan every 6 seconds and save data every 30 seconds. Following the test, the files were imported into MS Excel for tabular and graphical display (presented in Appendix C).

4.2. TEST STANDARD

Testing was conducted in accordance with the applicable requirements, and following the standard methods, of **ASTM E119–14 Standard Test Methods for Fire Tests of Building Construction and Materials, October 2014 Edition, and CAN/ULC-S101-07 Standard Methods of Fire Endurance Tests of Building Construction and Materials.**

4.2.1. Deviation From Standard Method

Per the client request, no hose stream was conducted on the wall assembly after achieving the 60 minute rating. The test was continued until structural failure in order to gather information for research purpose.

The assembly was secured to the full-scale vertical furnace with the 5/8” thick Type X gypsum board exposed to the fire and was tested to the standard time-temperature curve described in the CAN/ULC S101 standard.

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The test was initiated November 12, 2014. Steve Craft, representing CHM Fire Consultants, Ltd., and Ineke Van Zeeland representing the Canadian Wood Council were present to witness the test. The ambient temperature at the time of the test was 54°F and the relative humidity was 40%. A superimposed load of 13,600 plf (total load of 136,000 lbs) was applied to the wall assembly and held for 30 minutes prior to testing, as specified by CAN/ULC-S101-07. Based upon these calculations (see Appendix B), it was determined by the client that this was 100% of the maximum design load for this specimen.

Observations made during the test are listed below:

Time (min:sec)	Observations
0:00	The test was initiated at 12:21 P.M.
2:15	Gypsum paper ignites
2:50	Gypsum paper consumed
14:00	Joint tape and compound flaking and falling
18:42	Joint tape and compound consumed
19:30	Small flames developing on exposed surface left joint
20:30	Small flames developing on both exposed surface joints
23:00	Popping sounds from wall
30:00	Flaming increases from exposed surface joints and popping sounds continue
45:00	Gypsum board shifting out of plane approximately 1" on left exposed surface joint
48:00	Gypsum board continue shifting out of plane and cracking
58:00	Flame continues to increase on joints; gypsum board continues to crack and begins to pull away from wall
60:00	Load maintained and thermocouples within allowable limits
62:00	Gypsum board begins to fall
64:00	Unexposed surface joint of CLT beginning to open approximately ¼"
65:00	Gypsum board has fallen on exposed surface
66:00	Structural failure; test terminated

The assembly withstood the effects of the fire test without passage of flame or gasses hot enough to ignite cotton waste. The heat conducted through the assembly did not cause the temperatures measured by the thermocouple to exceed the 250°F rise in average temperature or 325°F rise in individual temperatures over the initial starting temperatures. During the test, no suspected hot spots developed, meeting the requirements of section 5.3.1.1 of the CAN/ULC S 101 test method. At 66:00, the wall assembly was unable to maintain the load at which point it was deemed to have failed structurally. There was no hose stream test conducted.

Assembly drawings, the test data and photographs documenting the test are located in the Appendices of this test report.

5.2. EXAMINATION OF RESULTS

5.2.1. Correction Factor for the Fire Endurance Test

In accordance with the E119 test standard, a calculation for any correction to the indicated fire resistance period was done. The correction factor was then mathematically added to the indicated fire resistance period, yielding the fire resistance period achieved by this specimen:

Correction Factor for the Fire Endurance Test

ITEM	DESCRIPTION	TEST VALUE
C	correction factor	0.07 minutes -4 seconds
I	indicated fire-resistance period	66 minutes
A	area under the curve of indicated average furnace temperature for the first three fourths of the indicated period	65291 (℉•min)
As	area under the standard furnace curve for the same part of the indicated period	65403 (℉•min)
ITEM	**DESCRIPTION**	**TEST VALUE**
L	lag correction	3240
	FIRE RESISTANCE PERIOD ACHIEVED BY THIS SPECIMEN ==>	66 minutes

Note: The standard specifies that the fire resistance be determined to the nearest integral minute. Consequently, if the correction factor is less than 30 seconds, and the test specimen met the criteria for the full indicated fire resistance period, no correction is deemed necessary.

5.2.2. Surface Deflection

The deflection of the unexposed surface was measured at 3 equidistant locations, 30”, 60”, and 90” from left to right, across the horizontal midline, during the span of the test. The amount of that deflection is presented in the table below.

Time (min)	Position 1 (in)	Position 2 (in)	Position 3 (in)
No load	0	0	0
Load Applied	0	0	0
10:00	0	0	0
25:00	0	0	0
37:00	0	0	1/8
49:00	1/4	1/4	1/8
55:00	1/2	3/8	3/8
60:00	7/8	3/4	1/2

6 Conclusion

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for the Canadian Wood Council, on Cross-Laminated Timber Panels, to evaluate their fire resistance. Testing was conducted in accordance with the applicable requirements, and following the standard methods, of **ASTM E119–14 Standard Test Methods for Fire Tests of Building Construction and Materials, October 2014 Edition, and CAN/ULC-S101-07 Standard Methods of Fire Endurance Tests of Building Construction and Materials.** This evaluation took place on November 12, 2014.

Based on the results of this test, the asymmetrical, load-bearing Cross-Laminated Timber Panel assembly, tested with a single layer of 5/8" thick Type X gypsum board exposed to the fire sustained the applied load of 13,600 plf (total load of 136,000 lbs), calculated by the client to be 100% of the maximum design load) and the effects of the fire for 66 minutes. There was no hose stream test conducted.

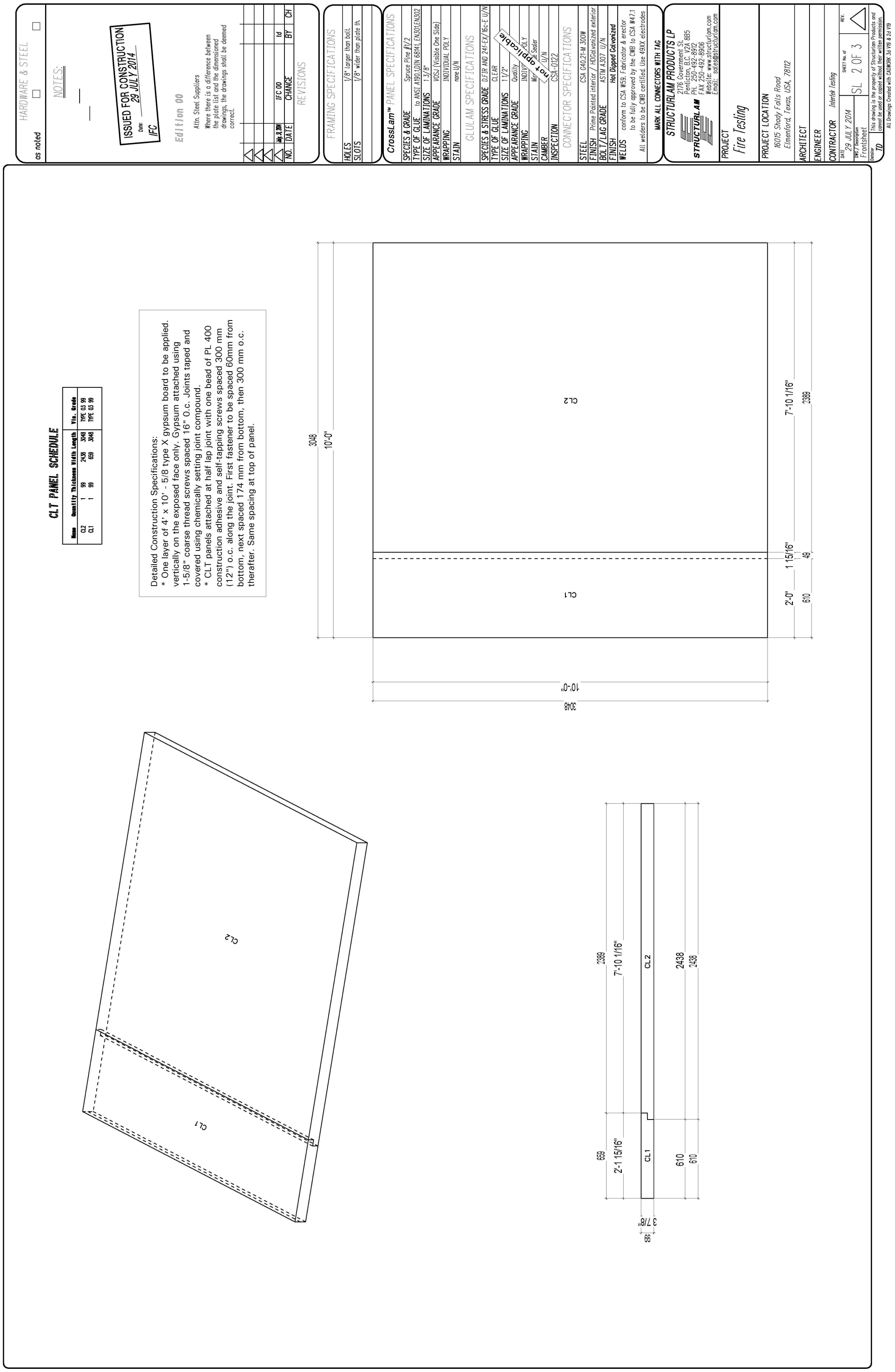
The conclusions of this test report may not be used as part of the requirements for Intertek product certification. Authority to Mark must be issued for a product to become certified.

INTERTEK TESTING SERVICES NA, INC.

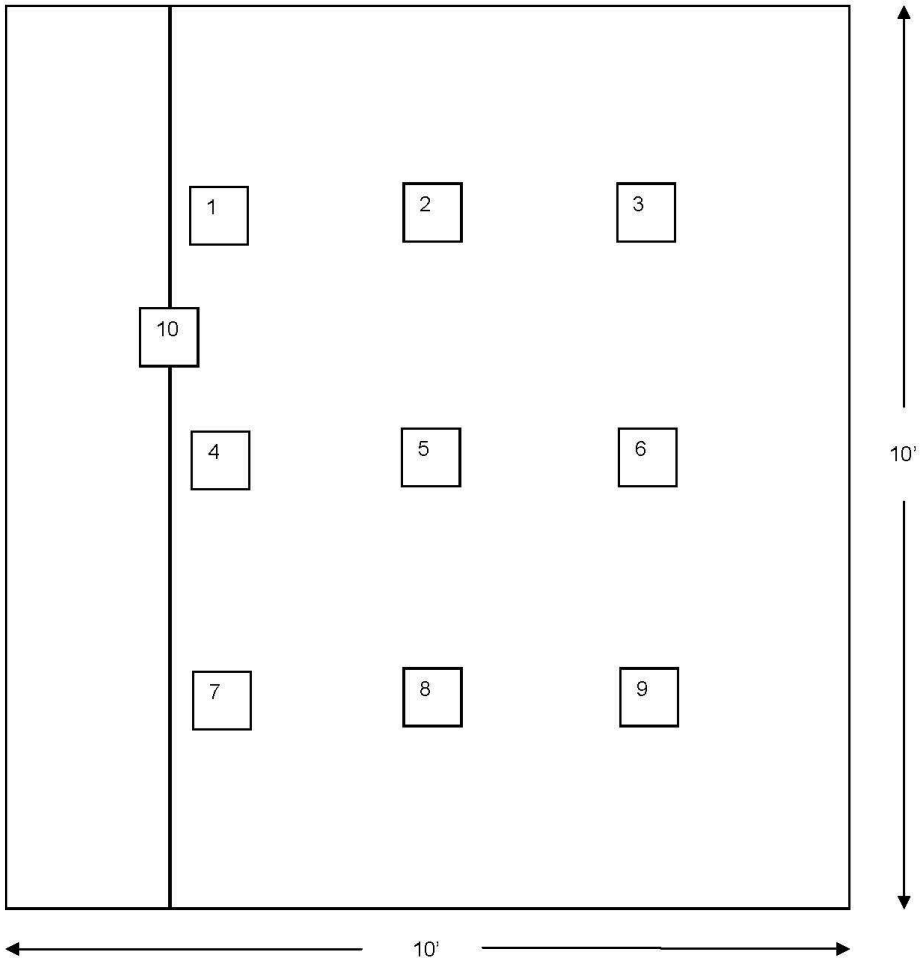
Tested by: _____
Joseph Zatopek
Engineering Team Leader, Fire Resistance

Reviewed by: _____
Victor M. Burgos
Sr. Project Engineer, Fire Resistance

APPENDIX A
Assembly Drawings


CLT PANEL SCHEDULE
Detailed Construction Specifications:
* One layer of 4' x 10' - 5/8 type X gypsum board to be applied. vertically on the exposed face only. Gypsum attached using 1-5/8" coarse thread screws spaced 16" O.c.. Joints taped and covered using chemically setting joint compound.
* CLT panels attached at half lap joint with one bead of PL 400 construction adhesive and self-tapping screws spaced 300 mm (12") o.c. along the joint. First fastener to be spaced 60mm from bottom, next spaced 174 mm from bottom, then 300 mm o.c. therafter. Same spacing at top of panel.
CL2
CL1
10'-0"
3048
7'-10 1/16"
2389
1 15/16"
49
2'-0"
610
2'-1 15/16"
659
2438
3 7/8"
99
ISSUED FOR CONSTRUCTION
29 JULY 2014
IFC
REVISIONS
FRAMING SPECIFICATIONS
CrossLam™ PANEL SPECIFICATIONS
GLULAM SPECIFICATIONS
CONNECTOR SPECIFICATIONS
not applicable
STRUCTURLAM PRODUCTS LP
PROJECT
Fire Testing
PROJECT LOCATION
16015 Shady Falls Road
Elmendorf, Texas, USA, 78112
CONTRACTOR Intertek Testing
29 JULY 2014
Frontsheet
SL 2 OF 3

Thermocouple Layout



(Drawing Not To Scale)

APPENDIX B
Load Calculations

CHMfire Consultants Ltd

Load Calculation for Wall Assembly

Compressive Resistance Parallel to Grain

Structurlam's product literature specifies an axial capacity of **276** kN/m for a 3.0 m tall 3-ply (99 mm thick) wall. Their product line follows grade V2 in accordance with the product standard PRG-320.

Dead Load of Assembly

Dead load of CLT panels

4300 N/m^3 x 0.10 m thick x 3.048 m = 1.3 kN/m

Dead load of Gypsum Board (1 layer 16 mm type X)

750 kg/m^3 x 0.016 m x 3.048 m x 9.81 m/s^2 = 0.36 kN/m

Therefore, the total Dead Load = 1.66 kN/m

Applied Load (Full Specified Load Condition) on Assembly

$$P_S = {}^{P_r}/_{\alpha} - P_d$$

$$P_S = {}^{(276)}\Big/_{(1.375)} - (1.66) = 199\ kN/m$$

$$\boldsymbol{P_S = 136,000\ lbs}$$

CALCULATION SHEET: PRESSURE IN HYDRAULIC LINES

Force (lbs) = W(bar) + W(blocks) + Design Load/stud or ft
W(bar) = Weight of Load Bar (lbs)
W(blocks) = Weight of Concrete Blocks (pounds)

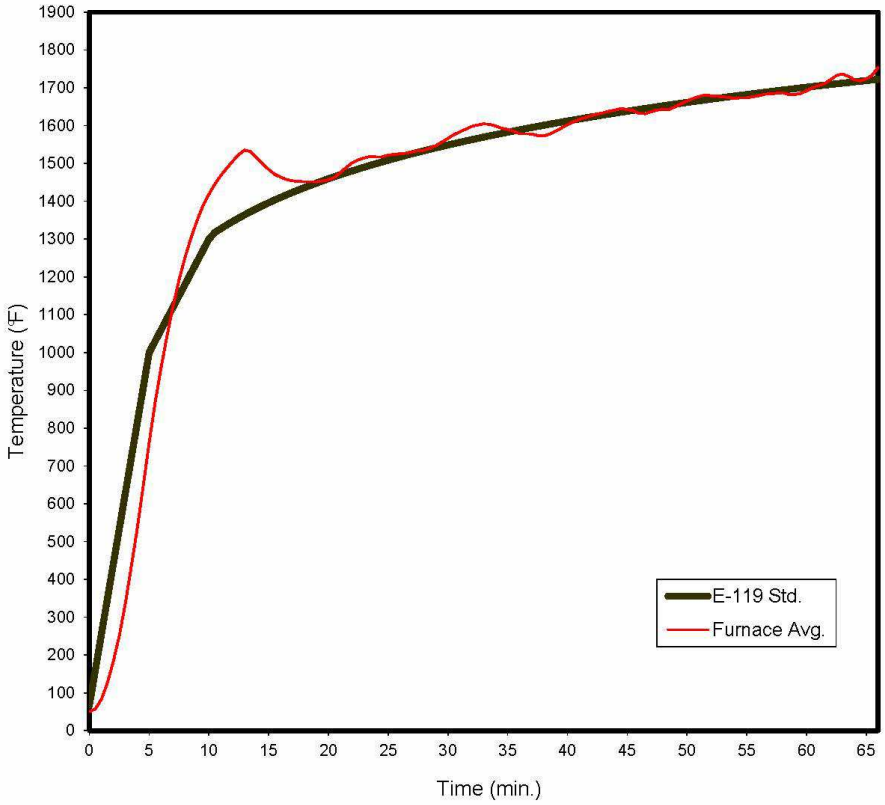
Total Force (pounds) = W(bar) + W(blocks)
+ Design Load x No. of Studs (or No. of Ft)

Pressure in Hydraulic Line (psi) = Total Force (lbs)/(18.665 sq.in.
x No. of Actuators)

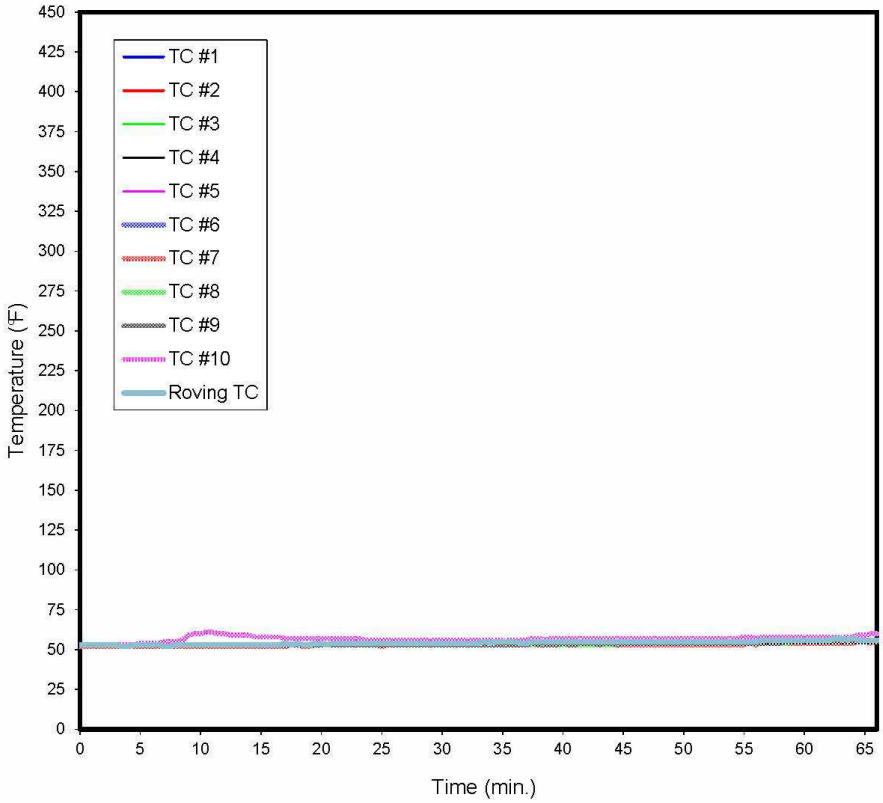
Desired Load per Stud (or foot) =	13600	lbs/stud (or foot)	
Height of Wall:	120	inches	
Width of Wall:	120	inches	
No. of Studs:	10	each	(Or LF)
Weight of Load Bar:	1638	lbs	
Weight of Bottom & Side Blocks:	1187	lbs	
No. of Actuators:	5	(18.665 sq.in. each)	
Required Hydraulic Pressure ===>	**1488**	**psi**	

APPENDIX C
Temperature Data

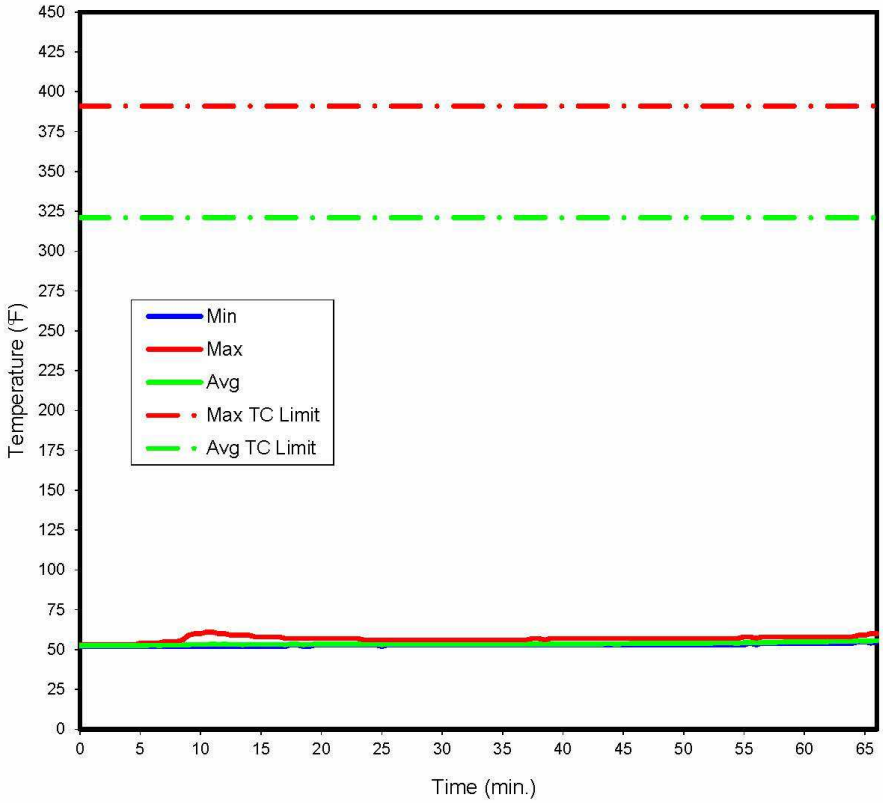
Canadian Wood Council
Project No. 101700231SAT-003
November 12, 2014
Furnace Interior Temperatures



Canadian Wood Council
Project No. 101700231SAT-003
November 12, 2014
Individual Cold Side Temperatures



Canadian Wood Council
Project No. 101700231SAT-003
November 12, 2014
Min, Avg, Max Cold Side Temperatures



Canadian Wood Council | Project No. 101700231SAT-003 | November 12, 2014

Time (min)	E119 Std Average (°F)	Furnace Average (°F)	Integration of Furnace Average (°F•min)	Integration of E119 Std Average (°F•min)	Error (%)	Furnace Probe #1 (°F)	Furnace Probe #2 (°F)	Furnace Probe #3 (°F)	Furnace Probe #4 (°F)	Furnace Probe #5 (°F)	Furnace Probe #6 (°F)	Furnace Probe #7 (°F)
0	68	50	0	0	0.00%	50	50	51	50	50	50	51
0.5	161	57	-7	23	-130.31%	60	56	62	55	55	53	76
1	254	83	-6	93	-106.48%	96	78	107	76	70	66	144
1.5	348	126	12	210	-94.21%	158	120	171	117	100	92	234
2	441	183	55	373	-85.14%	237	176	249	174	146	128	332
2.5	534	250	130	583	-77.73%	325	238	329	245	204	174	431
3	627	335	242	839	-71.14%	429	313	435	335	278	237	546
3.5	720	433	400	1142	-64.95%	536	402	537	447	382	312	656
4	814	534	608	1491	-59.23%	636	491	627	565	478	397	767
4.5	907	647	869	1887	-53.95%	741	589	722	694	598	497	882
5	1000	762	1187	2330	-49.05%	843	701	813	824	720	611	983
5.5	1030	868	1560	2804	-44.34%	929	805	894	936	833	726	1070
6	1060	960	1983	3292	-39.76%	1004	896	966	1030	932	833	1146
6.5	1090	1045	2451	3796	-35.44%	1071	981	1034	1115	1018	932	1219
7	1120	1123	2959	4314	-31.42%	1133	1060	1098	1191	1103	1024	1283
7.5	1150	1192	3503	4848	-27.73%	1187	1130	1158	1256	1179	1105	1336
8	1180	1251	4080	5396	-24.39%	1234	1193	1211	1310	1245	1177	1384
8.5	1210	1303	4684	5960	-21.40%	1274	1243	1259	1355	1299	1237	1432
9	1240	1348	5313	6538	-18.73%	1310	1288	1301	1397	1346	1289	1473
9.5	1270	1388	5963	7132	-16.38%	1343	1323	1336	1436	1391	1332	1505
10	1300	1419	6631	7740	-14.33%	1368	1351	1367	1465	1428	1366	1525
10.5	1317	1445	7313	8360	-12.53%	1390	1376	1395	1489	1458	1397	1542
11	1328	1468	8007	8988	-10.91%	1408	1396	1418	1509	1485	1424	1557
11.5	1337	1488	8712	9620	-9.43%	1424	1415	1439	1525	1505	1448	1571
12	1347	1506	9427	10257	-8.09%	1439	1430	1457	1542	1527	1472	1586
12.5	1356	1524	10150	10898	-6.87%	1453	1446	1475	1556	1546	1495	1600
13	1364	1535	10881	11545	-5.75%	1464	1459	1490	1567	1560	1510	1605
13.5	1373	1531	11614	12195	-4.77%	1462	1457	1492	1562	1561	1511	1583
14	1381	1515	12341	12849	-3.96%	1444	1439	1479	1540	1547	1500	1559
14.5	1388	1499	13060	13507	-3.31%	1426	1421	1465	1522	1533	1486	1538
15	1396	1484	13772	14170	-2.81%	1410	1404	1451	1506	1519	1474	1520
15.5	1403	1471	14477	14835	-2.42%	1397	1389	1438	1492	1507	1464	1506
16	1410	1463	15177	15505	-2.12%	1389	1380	1428	1484	1498	1458	1499
16.5	1417	1457	15873	16177	-1.88%	1383	1373	1421	1477	1490	1452	1495
17	1424	1454	16567	16854	-1.70%	1381	1369	1416	1473	1484	1447	1494
17.5	1430	1452	17259	17533	-1.56%	1380	1366	1413	1472	1480	1446	1493
18	1436	1452	17951	18215	-1.45%	1380	1366	1412	1471	1477	1445	1494
18.5	1442	1452	18643	18901	-1.37%	1381	1367	1411	1472	1477	1445	1494
19	1448	1451	19335	19590	-1.30%	1383	1366	1411	1472	1476	1446	1493
19.5	1454	1454	20027	20281	-1.25%	1388	1370	1413	1475	1478	1448	1496
20	1459	1456	20720	20975	-1.22%	1392	1374	1416	1478	1480	1450	1501
20.5	1465	1463	21416	21672	-1.18%	1399	1380	1422	1486	1485	1455	1511
21	1470	1476	22117	22372	-1.14%	1412	1392	1433	1500	1495	1468	1529
21.5	1475	1490	22824	23074	-1.08%	1427	1407	1446	1515	1508	1481	1543
22	1480	1502	23538	23779	-1.01%	1440	1420	1458	1527	1520	1494	1555
22.5	1485	1510	24257	24487	-0.94%	1447	1427	1465	1533	1528	1502	1561
23	1490	1514	24979	25196	-0.86%	1451	1431	1470	1536	1533	1508	1563
23.5	1495	1518	25703	25909	-0.79%	1454	1435	1473	1539	1538	1513	1566
24	1499	1517	26428	26623	-0.73%	1455	1435	1475	1539	1539	1514	1560
24.5	1504	1517	27152	27340	-0.69%	1455	1435	1476	1539	1540	1516	1559
25	1508	1522	27878	28059	-0.65%	1459	1439	1479	1542	1544	1520	1566
25.5	1513	1524	28605	28781	-0.61%	1462	1442	1483	1544	1547	1522	1565
26	1517	1526	29334	29504	-0.58%	1464	1443	1484	1546	1548	1523	1567
26.5	1521	1527	30063	30230	-0.55%	1466	1445	1487	1548	1549	1525	1567
27	1525	1530	30793	30957	-0.53%	1469	1449	1490	1552	1551	1529	1570
27.5	1529	1533	31525	31687	-0.51%	1473	1452	1493	1555	1553	1532	1573
28	1533	1535	32258	32419	-0.50%	1477	1455	1497	1558	1556	1534	1574

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Time (min)	E119 Std Average (°F)	Furnace Average (°F)	Integration of Furnace Average (°F•min)	Integration of E119 Std Average (°F•min)	Error (%)	Furnace Probe #1 (°F)	Furnace Probe #2 (°F)	Furnace Probe #3 (°F)	Furnace Probe #4 (°F)	Furnace Probe #5 (°F)	Furnace Probe #6 (°F)	Furnace Probe #7 (°F)
28.5	1537	1540	32993	33153	-0.48%	1482	1458	1501	1563	1561	1541	1581
29	1541	1547	33731	33888	-0.46%	1490	1465	1507	1571	1567	1547	1589
29.5	1545	1557	34473	34626	-0.44%	1500	1474	1515	1581	1574	1557	1600
30	1549	1566	35219	35365	-0.41%	1510	1484	1524	1591	1582	1566	1611
30.5	1552	1576	35971	36106	-0.38%	1520	1494	1533	1600	1590	1575	1621
31	1556	1584	36727	36850	-0.33%	1529	1503	1542	1607	1598	1583	1627
31.5	1559	1590	37486	37594	-0.29%	1536	1510	1549	1615	1605	1590	1633
32	1563	1598	38250	38341	-0.24%	1542	1518	1557	1622	1611	1598	1642
32.5	1566	1602	39015	39089	-0.19%	1546	1522	1562	1626	1615	1601	1643
33	1570	1605	39783	39839	-0.14%	1549	1524	1566	1630	1618	1604	1645
33.5	1573	1603	40551	40591	-0.10%	1548	1524	1566	1628	1617	1603	1640
34	1576	1599	41317	41344	-0.06%	1543	1519	1562	1623	1614	1600	1632
34.5	1579	1593	42081	42099	-0.04%	1537	1513	1558	1616	1608	1595	1623
35	1583	1590	42843	42856	-0.03%	1533	1510	1555	1613	1604	1593	1620
35.5	1586	1585	43603	43614	-0.03%	1530	1505	1552	1609	1600	1588	1613
36	1589	1579	44360	44373	-0.03%	1524	1499	1546	1602	1595	1582	1608
36.5	1592	1578	45115	45135	-0.04%	1524	1498	1543	1603	1594	1582	1609
37	1595	1578	45870	45897	-0.06%	1524	1497	1542	1603	1593	1581	1609
37.5	1598	1574	46624	46661	-0.08%	1521	1496	1541	1599	1591	1578	1603
38	1601	1573	47376	47427	-0.11%	1521	1495	1539	1598	1589	1577	1604
38.5	1604	1578	48130	48194	-0.13%	1526	1499	1543	1604	1592	1582	1613
39	1606	1585	48887	48963	-0.16%	1533	1505	1548	1611	1597	1589	1623
39.5	1609	1594	49647	49733	-0.17%	1541	1512	1556	1621	1605	1598	1633
40	1612	1602	50412	50504	-0.18%	1549	1521	1564	1629	1613	1606	1642
40.5	1615	1610	51181	51277	-0.19%	1558	1528	1571	1638	1620	1613	1651
41	1617	1616	51954	52051	-0.19%	1564	1534	1577	1643	1625	1618	1656
41.5	1620	1621	52729	52826	-0.18%	1569	1539	1581	1647	1631	1623	1661
42	1623	1626	53507	53603	-0.18%	1574	1543	1585	1653	1636	1628	1666
42.5	1625	1630	54287	54381	-0.17%	1578	1548	1590	1656	1640	1632	1669
43	1628	1634	55069	55160	-0.17%	1582	1552	1593	1660	1644	1636	1672
43.5	1631	1638	55853	55941	-0.16%	1585	1556	1598	1664	1649	1640	1676
44	1633	1641	56639	56723	-0.15%	1588	1559	1601	1667	1653	1644	1679
44.5	1636	1645	57427	57506	-0.14%	1592	1564	1605	1670	1656	1648	1682

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Time (min)	E119 Std Average (°F)	Furnace Average (°F)	Integration of Furnace Average (°F•min)	Integration of E119 Std Average (°F•min)	Error (%)	Furnace Probe #1 (°F)	Furnace Probe #2 (°F)	Furnace Probe #3 (°F)	Furnace Probe #4 (°F)	Furnace Probe #5 (°F)	Furnace Probe #6 (°F)	Furnace Probe #7 (°F)
45	1638	1642	58214	58290	-0.13%	1591	1564	1605	1669	1657	1645	1677
45.5	1640	1640	59001	59076	-0.13%	1590	1563	1605	1666	1656	1643	1672
46	1643	1632	59785	59863	-0.13%	1585	1560	1600	1659	1652	1636	1662
46.5	1645	1631	60567	60651	-0.14%	1583	1557	1598	1658	1650	1636	1664
47	1648	1636	61350	61440	-0.15%	1588	1561	1602	1664	1654	1640	1671
47.5	1650	1641	62135	62230	-0.15%	1592	1565	1605	1669	1657	1645	1678
48	1652	1643	62922	63022	-0.16%	1595	1568	1608	1671	1660	1647	1677
48.5	1655	1643	63709	63815	-0.16%	1595	1568	1609	1671	1661	1648	1678
49	1657	1650	64499	64608	-0.17%	1600	1573	1614	1677	1666	1656	1688
49.5	1659	1658	65291	65403	-0.17%	1605	1578	1621	1686	1673	1664	1697
50	1661	1665	66088	66199	-0.17%	1612	1583	1627	1693	1679	1671	1706
50.5	1663	1671	66888	66997	-0.16%	1619	1589	1633	1700	1685	1677	1712
51	1666	1677	67691	67795	-0.15%	1625	1595	1638	1705	1690	1682	1716
51.5	1668	1681	68496	68594	-0.14%	1630	1601	1643	1708	1694	1686	1718
52	1670	1679	69302	69394	-0.13%	1629	1602	1644	1706	1695	1684	1713
52.5	1672	1678	70107	70196	-0.13%	1627	1601	1644	1705	1694	1683	1711
53	1674	1676	70912	70998	-0.12%	1625	1599	1643	1703	1693	1681	1709
53.5	1676	1675	71715	71802	-0.12%	1624	1598	1642	1701	1691	1680	1706
54	1678	1672	72518	72607	-0.12%	1622	1597	1641	1698	1689	1678	1702
54.5	1680	1673	73320	73412	-0.12%	1623	1598	1643	1700	1690	1679	1705
55	1682	1673	74123	74219	-0.13%	1623	1598	1642	1700	1690	1680	1706
55.5	1684	1676	74927	75026	-0.13%	1626	1600	1644	1704	1692	1682	1709
56	1686	1679	75731	75835	-0.14%	1628	1602	1646	1706	1694	1685	1713
56.5	1688	1683	76538	76645	-0.14%	1631	1606	1648	1711	1697	1689	1717
57	1690	1684	77345	77455	-0.14%	1632	1608	1650	1711	1698	1691	1718
57.5	1692	1685	78154	78267	-0.14%	1634	1611	1652	1711	1700	1692	1718
58	1694	1687	78963	79079	-0.15%	1635	1610	1654	1714	1701	1695	1720
58.5	1696	1682	79771	79893	-0.15%	1632	1609	1652	1708	1699	1690	1713
59	1698	1682	80578	80707	-0.16%	1632	1606	1651	1709	1699	1691	1713
59.5	1700	1685	81386	81522	-0.17%	1634	1609	1653	1712	1701	1694	1716
60	1701	1692	82196	82338	-0.17%	1640	1613	1659	1719	1706	1701	1726
60.5	1703	1700	83010	83156	-0.17%	1646	1622	1666	1726	1713	1710	1734
61	1705	1706	83827	83974	-0.17%	1652	1628	1671	1730	1718	1715	1739
61.5	1707	1711	84648	84793	-0.17%	1657	1634	1675	1737	1723	1720	1744
62	1709	1721	85472	85612	-0.16%	1667	1642	1684	1748	1731	1731	1756
62.5	1710	1732	86301	86433	-0.15%	1678	1651	1695	1761	1741	1741	1769
63	1712	1737	87134	87255	-0.14%	1683	1657	1700	1766	1746	1745	1769
63.5	1714	1730	87967	88077	-0.13%	1676	1651	1700	1756	1743	1738	1757
64	1716	1721	88796	88901	-0.12%	1667	1645	1697	1745	1735	1729	1744
64.5	1717	1718	89622	89725	-0.12%	1663	1640	1696	1741	1732	1726	1743
65	1719	1723	90448	90550	-0.11%	1669	1643	1699	1747	1735	1730	1754
65.5	1721	1733	91278	91376	-0.11%	1679	1651	1709	1758	1743	1739	1766
66	1722	1754	92116	92203	-0.09%	1707	1680	1728	1782	1760	1762	1793
Max Temp												
Max Allowed												

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Time (min)	Furnace Probe #8 (°F)	Furnace Probe #9 (°F)	Furnace Probe #10 (°F)	Furnace Probe #11 (°F)	Furnace Probe #12 (°F)	Cold Side TC #1 (°F)	Cold Side TC #2 (°F)	Cold Side TC #3 (°F)	Cold Side TC #4 (°F)	Cold Side TC #5 (°F)	Cold Side TC #6 (°F)
0	51	51	51	50	50	52	52	52	52	53	53
0.5	59	52	53	51	56	52	52	52	52	53	53
1	98	59	61	68	70	52	52	52	52	53	53
1.5	161	77	80	103	99	52	53	52	52	53	53
2	237	106	110	159	142	52	52	52	52	53	53
2.5	320	147	156	231	204	52	52	52	52	53	53
3	423	210	217	321	278	52	52	52	52	53	53
3.5	531	293	299	432	372	52	52	52	52	53	53
4	639	386	396	557	466	52	52	52	52	53	53
4.5	760	494	515	698	568	52	53	52	52	53	53
5	874	614	647	832	677	52	52	52	52	53	53
5.5	976	728	780	949	784	52	52	52	52	53	53
6	1062	829	899	1047	878	52	53	53	52	53	53
6.5	1143	920	1005	1134	967	52	52	52	52	53	53
7	1217	1004	1102	1211	1051	52	52	52	52	53	53
7.5	1279	1083	1185	1275	1128	52	53	52	52	53	53
8	1331	1153	1252	1328	1196	52	52	52	52	53	53
8.5	1376	1214	1316	1377	1253	52	52	52	52	53	53
9	1420	1266	1362	1423	1303	52	52	52	52	53	53
9.5	1458	1312	1408	1463	1349	52	52	52	52	53	53
10	1484	1349	1443	1491	1387	52	52	52	52	53	53
10.5	1508	1381	1474	1515	1420	52	52	52	52	53	53
11	1527	1409	1503	1534	1448	52	52	53	52	53	53
11.5	1544	1434	1526	1550	1471	52	53	52	52	53	53
12	1560	1456	1548	1566	1493	52	53	52	53	53	53
12.5	1575	1478	1565	1580	1513	52	53	52	52	53	53
13	1584	1491	1576	1589	1528	52	52	52	53	53	53
13.5	1574	1493	1565	1583	1530	52	52	52	52	53	53
14	1556	1481	1548	1566	1518	52	53	53	52	53	53
14.5	1539	1468	1532	1551	1505	52	53	53	52	53	53
15	1525	1454	1516	1536	1492	52	53	53	52	53	53
15.5	1513	1440	1503	1525	1481	52	53	53	52	53	53
16	1506	1432	1495	1517	1475	52	53	53	52	53	53
16.5	1500	1426	1492	1511	1469	52	53	53	52	53	53
17	1496	1423	1491	1507	1465	52	53	53	52	53	53
17.5	1495	1422	1490	1505	1463	53	53	53	53	53	53
18	1495	1422	1490	1505	1463	53	53	53	53	53	53
18.5	1495	1423	1490	1504	1463	52	53	53	52	53	53
19	1496	1421	1485	1504	1464	52	53	53	53	53	53
19.5	1498	1423	1484	1505	1465	53	53	53	53	53	53
20	1501	1424	1485	1507	1467	53	53	53	53	53	53
20.5	1508	1429	1491	1513	1472	53	53	53	53	53	53
21	1524	1441	1506	1526	1484	53	53	53	53	53	53
21.5	1538	1454	1519	1539	1498	53	53	53	53	53	53
22	1550	1466	1531	1551	1510	53	53	53	53	53	53
22.5	1557	1476	1542	1558	1518	53	53	53	53	53	53
23	1561	1482	1548	1563	1525	53	53	53	53	53	53
23.5	1565	1487	1552	1567	1530	53	53	53	53	53	53
24	1563	1487	1545	1564	1529	53	53	53	53	53	53
24.5	1564	1486	1543	1563	1530	53	53	53	53	53	53
25	1570	1491	1551	1569	1534	52	53	53	53	53	53
25.5	1570	1495	1551	1569	1536	53	53	53	53	53	53
26	1572	1497	1555	1570	1537	53	53	53	53	53	53
26.5	1572	1499	1556	1571	1538	53	53	53	53	53	53
27	1577	1501	1560	1574	1541	53	53	53	53	53	53
27.5	1581	1505	1562	1576	1543	53	53	53	53	53	53
28	1582	1507	1560	1577	1544	53	53	53	53	53	53

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Time (min)	Furnace Probe #8 (°F)	Furnace Probe #9 (°F)	Furnace Probe #10 (°F)	Furnace Probe #11 (°F)	Furnace Probe #12 (°F)	Cold Side TC #1 (°F)	Cold Side TC #2 (°F)	Cold Side TC #3 (°F)	Cold Side TC #4 (°F)	Cold Side TC #5 (°F)	Cold Side TC #6 (°F)
28.5	1590	1510	1565	1582	1549	53	53	53	53	53	53
29	1598	1516	1572	1588	1555	53	53	53	53	53	53
29.5	1608	1525	1583	1597	1564	53	53	53	53	53	53
30	1619	1535	1593	1606	1574	53	53	53	53	53	53
30.5	1629	1546	1605	1616	1584	53	53	53	53	53	53
31	1637	1554	1611	1623	1591	53	53	53	53	53	53
31.5	1644	1560	1617	1629	1597	53	53	53	53	53	53
32	1652	1568	1626	1636	1604	53	53	53	53	53	53
32.5	1655	1573	1631	1639	1607	53	53	53	53	53	53
33	1657	1577	1635	1641	1608	53	53	53	53	53	53
33.5	1655	1577	1635	1639	1606	53	53	53	53	53	53
34	1651	1574	1633	1635	1602	53	53	53	53	53	53
34.5	1645	1569	1625	1628	1597	53	53	53	53	53	53
35	1645	1565	1622	1624	1594	53	53	53	53	53	53
35.5	1640	1561	1616	1619	1588	53	53	53	53	53	53
36	1632	1555	1608	1610	1581	53	53	53	53	53	53
36.5	1634	1553	1610	1611	1580	53	53	53	53	53	53
37	1634	1552	1607	1610	1580	53	53	53	53	53	53
37.5	1628	1549	1599	1605	1575	53	53	53	53	53	53
38	1627	1547	1597	1603	1573	53	53	53	53	53	53
38.5	1633	1550	1604	1609	1578	53	53	53	53	53	53
39	1641	1556	1611	1617	1585	53	53	53	53	53	53
39.5	1650	1564	1622	1627	1593	53	53	53	53	53	53
40	1659	1572	1633	1636	1602	53	53	53	53	54	53
40.5	1667	1581	1642	1645	1610	53	53	53	53	54	53
41	1673	1587	1649	1651	1617	53	53	53	53	54	53
41.5	1678	1592	1655	1657	1623	53	53	53	53	54	53
42	1682	1597	1661	1662	1627	53	53	53	53	53	54
42.5	1686	1601	1665	1666	1632	53	53	53	53	54	53
43	1690	1605	1669	1670	1635	53	53	53	53	53	53
43.5	1695	1609	1673	1674	1639	53	53	53	53	54	54
44	1697	1613	1677	1677	1641	53	53	53	53	54	54
44.5	1700	1616	1681	1680	1644	53	53	53	53	53	53

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Time (min)	Furnace Probe #8 (°F)	Furnace Probe #9 (°F)	Furnace Probe #10 (°F)	Furnace Probe #11 (°F)	Furnace Probe #12 (°F)	Cold Side TC #1 (°F)	Cold Side TC #2 (°F)	Cold Side TC #3 (°F)	Cold Side TC #4 (°F)	Cold Side TC #5 (°F)	Cold Side TC #6 (°F)
45	1696	1615	1673	1675	1642	53	53	53	53	54	54
45.5	1693	1613	1667	1671	1640	53	53	53	53	54	54
46	1682	1608	1653	1659	1632	53	54	53	53	54	54
46.5	1682	1606	1653	1659	1630	53	53	53	53	54	54
47	1688	1609	1659	1665	1635	53	54	53	53	54	54
47.5	1695	1612	1664	1671	1640	53	53	53	53	54	54
48	1695	1614	1662	1671	1642	53	54	53	53	54	54
48.5	1695	1614	1661	1671	1641	53	54	53	53	54	54
49	1704	1619	1671	1680	1648	53	54	54	53	54	54
49.5	1714	1626	1682	1690	1655	53	54	54	53	54	54
50	1721	1633	1693	1698	1663	53	54	54	53	54	54
50.5	1727	1638	1700	1705	1671	53	54	54	53	54	54
51	1734	1643	1706	1711	1676	53	54	54	53	54	54
51.5	1737	1646	1710	1714	1681	53	54	54	53	54	54
52	1733	1647	1705	1709	1679	53	54	54	53	54	54
52.5	1732	1646	1703	1708	1678	53	54	54	54	54	54
53	1729	1646	1701	1706	1677	53	54	54	54	54	54
53.5	1728	1646	1698	1704	1676	53	54	54	54	54	54
54	1725	1645	1692	1701	1674	53	54	54	54	54	54
54.5	1727	1645	1695	1702	1674	53	54	54	53	54	54
55	1727	1644	1695	1702	1674	54	54	54	54	54	54
55.5	1730	1648	1697	1705	1678	54	54	54	54	54	54
56	1733	1649	1700	1708	1681	54	54	54	54	54	54
56.5	1738	1652	1705	1714	1686	54	54	54	54	54	54
57	1739	1654	1706	1714	1687	54	54	54	54	54	54
57.5	1741	1655	1707	1715	1688	54	54	54	54	54	54
58	1743	1656	1709	1717	1691	54	55	54	54	55	55
58.5	1736	1654	1701	1709	1685	54	55	54	54	55	55
59	1736	1653	1700	1710	1685	54	55	54	54	55	55
59.5	1741	1655	1702	1713	1688	54	55	54	54	55	55
60	1750	1660	1710	1722	1696	54	55	55	54	55	55
60.5	1760	1667	1718	1731	1706	54	55	55	54	55	55
61	1769	1672	1724	1736	1712	54	55	55	54	55	55
61.5	1778	1678	1728	1741	1717	54	55	55	54	55	55
62	1793	1686	1738	1750	1725	54	55	55	54	55	55
62.5	1806	1698	1750	1761	1735	54	55	55	55	55	55
63	1810	1705	1756	1764	1739	55	55	55	55	55	55
63.5	1801	1703	1750	1755	1732	55	55	55	55	55	55
64	1789	1697	1741	1745	1723	55	55	55	55	55	55
64.5	1785	1694	1739	1741	1718	55	55	55	55	55	56
65	1790	1700	1745	1747	1722	55	55	55	55	55	55
65.5	1802	1711	1754	1756	1729	55	55	55	55	55	55
66	1823	1727	1770	1773	1748	55	56	55	55	55	56
Max Temp						55	56	55	55	55	56
Max Allowed						377	377	377	377	378	378

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Time (min)	Cold Side TC #7 (°F)	Cold Side TC #8 (°F)	Cold Side TC #9 (°F)	Cold Side TC #10 (°F)	Cold Side Min (°F)	Cold Side Avg (°F)	Cold Side Max (°F)	Finish Rating TC #1 (°F)	Finish Rating TC #2 (°F)	Finish Rating TC #3 (°F)	Roving TC (°F)
0	52	53	53	53	52	53	53	48	48	48	53
0.5	52	53	53	53	52	53	53	48	48	48	53
1	52	53	53	53	52	53	53	49	49	49	53
1.5	52	53	53	53	52	53	53	52	56	53	53
2	52	53	53	53	52	53	53	65	79	68	53
2.5	52	53	53	53	52	53	53	90	114	95	53
3	52	53	53	53	52	53	53	121	149	132	53
3.5	52	53	53	53	52	53	53	147	171	156	52
4	52	53	53	53	52	53	53	165	183	170	52
4.5	52	53	53	53	52	53	53	179	190	179	53
5	52	53	53	54	52	53	54	199	194	186	53
5.5	52	53	53	54	52	53	54	201	197	193	53
6	52	53	53	54	52	53	54	199	198	196	53
6.5	52	53	53	54	52	53	54	196	198	197	53
7	52	53	53	55	52	53	55	197	197	197	52
7.5	52	53	53	55	52	53	55	197	198	197	52
8	52	53	53	55	52	53	55	197	198	198	53
8.5	52	53	53	56	52	53	56	197	198	199	53
9	52	53	53	59	52	53	59	197	198	199	53
9.5	52	53	53	60	52	53	60	196	197	199	53
10	52	53	53	60	52	53	60	196	197	199	53
10.5	52	53	53	61	52	53	61	196	197	201	53
11	52	53	53	61	52	53	61	196	197	202	53
11.5	52	53	53	60	52	53	60	196	197	204	53
12	52	53	53	60	52	53	60	196	197	205	53
12.5	52	53	53	59	52	53	59	196	197	206	53
13	52	53	53	59	52	53	59	197	197	209	53
13.5	52	53	53	59	52	53	59	197	197	211	53
14	52	53	53	59	52	53	59	197	197	213	53
14.5	52	53	53	58	52	53	58	197	197	215	53
15	52	53	53	58	52	53	58	196	197	219	53
15.5	52	53	53	58	52	53	58	196	198	223	53
16	52	53	53	58	52	53	58	196	198	225	53
16.5	52	53	53	58	52	53	58	196	199	231	53
17	52	53	53	57	52	53	57	196	207	246	54
17.5	53	53	53	57	53	53	57	201	227	280	53
18	53	53	53	57	53	53	57	206	256	321	54
18.5	52	53	53	57	52	53	57	215	296	355	53
19	52	53	53	57	52	53	57	239	331	384	53
19.5	53	53	53	57	53	53	57	289	370	418	54
20	53	53	53	57	53	53	57	337	416	455	54
20.5	53	53	53	57	53	53	57	374	456	490	53
21	53	53	53	57	53	53	57	406	491	526	54
21.5	53	53	53	57	53	53	57	435	522	563	54
22	53	53	53	57	53	53	57	462	553	590	54
22.5	53	53	53	57	53	53	57	487	584	615	54
23	53	53	53	57	53	53	57	512	617	641	54
23.5	53	53	53	56	53	53	56	538	651	664	54
24	53	53	53	56	53	53	56	567	685	687	54
24.5	53	53	53	56	53	53	56	599	714	707	54
25	52	53	53	56	52	53	56	629	737	728	54
25.5	53	53	53	56	53	53	56	654	761	761	54
26	53	53	53	56	53	53	56	674	788	787	54
26.5	53	53	53	56	53	53	56	693	816	810	54
27	53	53	53	56	53	53	56	708	843	781	54
27.5	53	53	53	56	53	53	56	725	868	827	54
28	53	53	53	56	53	53	56	742	891	869	54

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Time (min)	Cold Side TC #7 (°F)	Cold Side TC #8 (°F)	Cold Side TC #9 (°F)	Cold Side TC #10 (°F)	Cold Side Min (°F)	Cold Side Avg (°F)	Cold Side Max (°F)	Finish Rating TC #1 (°F)	Finish Rating TC #2 (°F)	Finish Rating TC #3 (°F)	Roving TC (°F)
28.5	53	53	53	56	53	53	56	761	910	892	54
29	53	53	53	56	53	53	56	779	927	908	54
29.5	53	53	53	56	53	53	56	793	947	933	54
30	53	53	53	56	53	53	56	810	966	951	54
30.5	53	53	53	56	53	53	56	826	985	965	54
31	53	53	53	56	53	53	56	843	1003	979	54
31.5	53	53	53	56	53	53	56	857	1027	989	54
32	53	53	53	56	53	53	56	872	1045	1003	54
32.5	53	53	53	56	53	53	56	887	1057	1018	54
33	53	53	53	56	53	53	56	901	1070	1038	54
33.5	53	53	53	56	53	53	56	915	1083	1056	55
34	53	53	53	56	53	53	56	929	1096	1069	54
34.5	53	53	53	56	53	53	56	942	1106	1079	55
35	53	53	53	56	53	53	56	954	1116	1091	55
35.5	53	53	53	56	53	53	56	965	1125	1102	55
36	53	53	53	56	53	53	56	975	1135	1114	55
36.5	53	53	53	56	53	53	56	983	1143	1122	54
37	53	53	53	56	53	53	56	992	1150	1130	54
37.5	53	53	54	57	53	54	57	1001	1158	1136	55
38	53	53	53	57	53	53	57	1009	1165	1143	55
38.5	53	53	53	56	53	53	56	1017	1171	1148	55
39	53	53	53	57	53	53	57	1026	1177	1154	55
39.5	53	53	53	57	53	53	57	1036	1182	1159	55
40	53	53	54	57	53	54	57	1044	1186	1165	55
40.5	53	53	53	57	53	54	57	1056	1189	1172	55
41	53	53	53	57	53	54	57	1068	1194	1179	55
41.5	53	53	54	57	53	54	57	1082	1199	1185	55
42	53	53	54	57	53	54	57	1095	1203	1190	55
42.5	53	53	54	57	53	54	57	1110	1211	1196	55
43	53	53	53	57	53	53	57	1129	1216	1201	55
43.5	53	53	54	57	53	54	57	1148	1219	1208	55
44	53	53	54	57	53	54	57	1174	1225	1215	55
44.5	53	53	53	57	53	53	57	1200	1232	1224	55

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Time (min)	Cold Side TC #7 (°F)	Cold Side TC #8 (°F)	Cold Side TC #9 (°F)	Cold Side TC #10 (°F)	Cold Side Min (°F)	Cold Side Avg (°F)	Cold Side Max (°F)	Finish Rating TC #1 (°F)	Finish Rating TC #2 (°F)	Finish Rating TC #3 (°F)	Roving TC (°F)
45	53	54	54	57	53	54	57	1222	1240	1232	55
45.5	53	54	54	57	53	54	57	1250	1254	1243	55
46	53	54	54	57	53	54	57	1272	1265	1255	55
46.5	53	54	54	57	53	54	57	1323	1294	1279	55
47	53	54	54	57	53	54	57	1340	1305	1291	55
47.5	53	54	54	57	53	54	57	1380	1328	1313	55
48	53	54	54	57	53	54	57	1409	1358	1343	55
48.5	53	54	54	57	53	54	57	1426	1374	1360	55
49	53	54	54	57	53	54	57	1463	1421	1407	55
49.5	53	54	54	57	53	54	57	1477	1448	1432	55
50	53	54	54	57	53	54	57	1477	1462	1448	55
50.5	53	54	54	57	53	54	57	1505	1494	1486	55
51	53	54	54	57	53	54	57	1509	1504	1500	55
51.5	53	54	54	57	53	54	57	1510	1505	1505	55
52	53	54	54	57	53	54	57	1507	1503	1506	55
52.5	53	54	54	57	53	54	57	1555	1544	1557	55
53	53	54	54	57	53	54	57	1541	1532	1540	55
53.5	53	54	54	57	53	54	57	1534	1517	1521	55
54	53	54	54	57	53	54	57	1516	1503	1504	55
54.5	53	54	54	57	53	54	57	1526	1514	1505	55
55	53	54	54	58	53	54	58	1495	1491	1485	55
55.5	54	54	54	58	54	54	58	1529	1516	1507	55
56	53	54	54	57	53	54	57	1497	1485	1485	55
56.5	54	54	54	58	54	54	58	1505	1489	1487	56
57	54	54	54	58	54	54	58	1476	1468	1471	56
57.5	54	54	54	58	54	54	58	1504	1487	1488	56
58	54	54	54	58	54	55	58	1506	1490	1489	56
58.5	54	54	55	58	54	55	58	1498	1479	1482	56
59	54	55	55	58	54	55	58	1468	1442	1457	56
59.5	54	55	55	58	54	55	58	1479	1453	1470	56
60	54	55	55	58	54	55	58	1457	1427	1446	56
60.5	54	55	55	58	54	55	58	1430	1405	1428	56
61	54	55	55	58	54	55	58	1423	1402	1433	56
61.5	54	55	55	58	54	55	58	1431	1405	1433	56
62	54	55	55	58	54	55	58	1443	1411	1437	56
62.5	54	55	55	58	54	55	58	1450	1420	1438	57
63	54	55	55	58	54	55	58	1463	1431	1441	57
63.5	54	55	55	58	54	55	58	1472	1442	1455	56
64	54	55	55	58	54	55	58	1479	1449	1458	57
64.5	55	55	55	59	55	56	59	1478	1448	1454	56
65	55	55	55	59	55	55	59	1497	1465	1471	56
65.5	54	55	55	60	54	55	60	1497	1468	1494	56
66	55	55	55	60	55	56	60	1755	1761	1701	56
Max Temp	55	55	55	61	55	56	61				
Max Allowed	377	378	378	378	377	303	378				

APPENDIX D
Photographs


11/11/2014 09:20


CL1
CL2
11/11/2014 09:20


11/11/2014 10:26
CWC Fire Testing
Intertek Tire Testing
19880
CL1
99mm x 359mm x 3048mm
1pc.
TOP
11/11/2014 10:25


SUBFLOOR
PL 400
PRO LINE
SUBFLOOR
LOCTITE
True all weather application
11/11/2014 10:35
11/11/2014 10:47


11/11/2014 10:47
11/11/2014 10:47


115 116 117 118 119 10 121 122 123 124
1 2 3 4 5 6 7 8 9 30.0 1 2 3 4 5 6 7 8 9 31.0 1 2 3 4 5 6
11/11/2014 10:47


11/11/2014 12:44


11/11/2014 12:44


11/11/2014 14:22

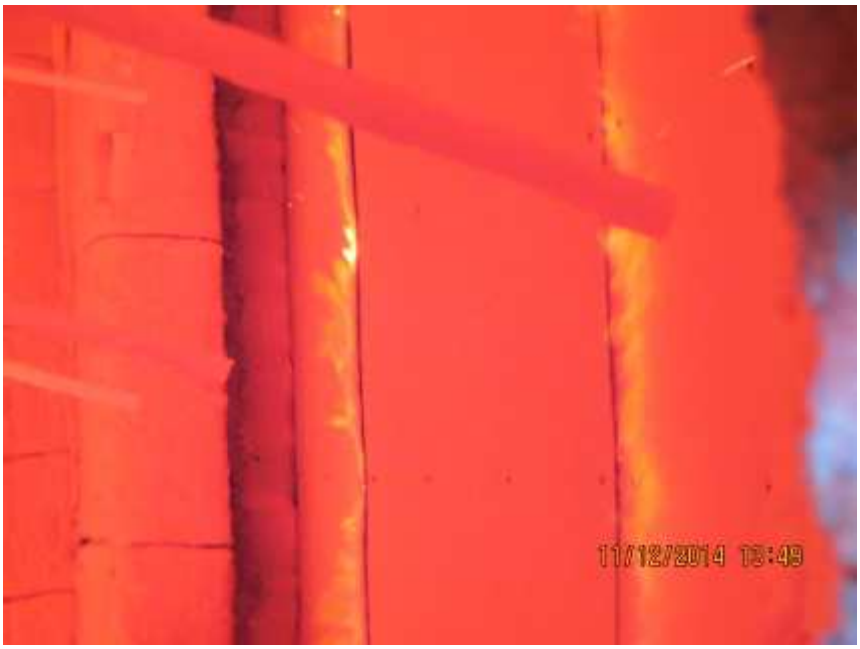

11/11/2014 14:57
11/11/2014 14:57


11/11/2014 17:08


11/12/2014 12:35


11/12/2014 13:28


11/12/2014 13:35


11/12/2014 13:49


11/12/2014 13:56


11/12/2014 14:04


11/12/2014 14:13


11/12/2014 14:13


11/12/2014 14:18


11/12/2014 14:23


11/12/2014 14:23


11/12/2014 14:26


11/12/2014 14:29


11/12/2014 14:29


11/12/2014 14:31


11/12/2014 14:31


11/12/2014 14:31
Intertek
11/12/2014 14:32


11/12/2014 14:34
Intertek
11/12/2014 14:34


Intertek
11/12/2014 14:36
Intertek
11/12/2014 14:36

CALIBRATED INSTRUMENTATION USED FOR TESTING

Description	Serial No.	Calibration Due Date
100-Channel Data Acquisition System	99LE004	3/19/2015
Pressure Gauge 3000psi	07LE012	4-8-15
Thermo/Hygro	130548115	9-19-15
Stop Watch	140192492	03/20/16

REVISION SUMMARY

DATE	SUMMARY
November 21, 2014	Original Issue Date
Revision 1 November 24, 2014	Corrected test data to include finish rating thermocouples, added statement of intent of test in section 4.2.1.