TEST REPORT

REPORT NUMBER: 103187223SAT-001
ORIGINAL ISSUE DATE: November 20, 2017
REVISED DATE: N/A

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

RENDERED TO

Sagiper North America
13179 156 Street NW
Edmonton AB T5V 1V2, CANADA

PRODUCT EVALUATED: SAGIWALL System
EVALUATION PROPERTY: Flame Spread

Report of Testing SAGIWALL System for compliance with the applicable requirements of the following criteria: *NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012.*

1 Table of Contents

2 Introduction

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for Sagiper North America, on their SAGIWALL System, to evaluate its flame spread. Testing was conducted in accordance with the applicable requirements and following the standard methods of **NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012**. This evaluation took place on November 3, 2017.

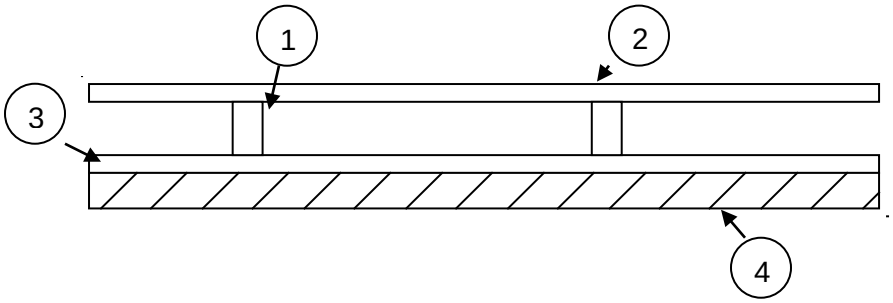
3 Test Samples

3.1. SAMPLE SELECTION

Samples of Sagiper North America, SAGIWALL System samples were not sampled by Intertek. The test specimen identification is as provided by the client and Intertek accepts no responsibility for any inaccuracies therein. The Sagiper North America, SAGIWALL System panels were received on October 18, 2017. The SAGIWALL System panels were installed by Intertek personnel on October 24, 2017.

3.2. SAMPLE AND ASSEMBLY DESCRIPTION

The 18 ft. high X 14 ft. wide ISMA test wall was constructed of metal studs, gypsum board interior cladding, exterior gypsum sheathing and PVC lap siding panel system.



1. Studs – 3-5/8 in., 20 GA galvanized steel studs, 24 in. o.c., secured with #8 ½ in. long, modified truss head framing screws to 20 GA top and bottom track; stud cavity insulation optional.

2. Interior Cladding – One layer of 4 ft. x 10 ft. x 5/8 in. thick type X gypsum was installed with the long dimension parallel to the studs, fastened to the framing with #6 x 1-1/4 in. self-drill, zinc-plated Bugle head screws spaced 8 in. o.c. around the perimeter and 12 in. o.c. in the field; joints and fasteners received a Level 2 finish.

3. Exterior Sheathing – 4 ft. x 8 ft. x 10 ft., DenseGlass Gold exterior sheathing was installed with the long edge perpendicular to the studs, and held in place using #8 x 1-7/8 in. long self-drilling screws.

4. Exterior Panels – Sagiper North America, SAGIWALL System Panels – 6 in. wide (150mm) 14 ft. long panels were attached to the exterior sheathing with 1-7/8 in. long self-drilling screws as per installation instructions.

11 GA aluminum flashing covered the perimeter of the window fastened and secured to the substructure by #6 x 1-1/4 in. self-drill, zinc-plated Bugle head screws spaced 12 in. o.c.

4 in. thick, 4pcf, Thermafiber® mineral wool was compression-fit in the stud cavity at the floor lines.

4 Testing and Evaluation Methods

4.1. INSTRUMENTATION

Thirty-One (31) 24 GA, Type K, fiberglass jacketed thermocouples were installed in compliance with the standard (see Appendix A). The output of the thermocouples was monitored by a 100-channel Yokogawa, Inc., Darwin Data Acquisition Unit. The computer was programmed to scan and save data every 30 seconds. Following the test, those files were imported into MS Excel for tabular and graphical display (presented in Appendix B).

The Maximum TC Limits, established by the initial thermocouple temperatures and the test standard, are presented in the following table:

Location	TC #s	Maximum Allowed Temperature
Exterior Surface	11, 14 - 17	1000ºF
2nd floor Interior Surface	49 - 54	500ºF rise

4.2. TEST STANDARD

Testing was conducted in accordance with the applicable requirements of, and following the standard methods of **NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012.**

The assembly was secured to the test laboratory's Intermediate-Scale, Multi-story Test Apparatus (ISMA)**,** with ceramic fiber insulation installed between the assembly and the furnace to create an effective seal. The window burner was centered on the vertical centerline of the window, 9" below the top of the opening, and with the longitudinal centerline of the burner 3" from the plane of the exterior wall, consistent with the standard and the calibration of the test

apparatus. The assembly was tested using commercial grade propane gas at the flow rates determined during the calibration of the apparatus (See Appendix B).

5 Testing and Evaluation Results

5.1. RESULTS AND OBSERVATIONS

The test was initiated on November 3, 2017. No representatives from Sagiper North America were present to witness the test. The ambient temperature at the time of the test was 86 °F and the humidity was 93 % R.H.

Observations made during the test are listed below:

Time (min:sec)	Observation(s)
0:00	The test was initiated at 2:18 PM
1:23	Flash over in room; flames out window
2:00	Flashing above window beginning to warp
3:00	Center section of panels above window discolored
5:00	Window burner lit
5:45	Panels begin to flake up to 3 ft. above window, (charring)
9:00	Panels flaming and melting off (center section above window)
10:00	Panels have fallen from 2-1/2 ft. above window
12:30	Flashing continues to warp; panels have fallen up to 4 ft.
15:30	Panels continue to flame and melt off, up to 5 ft. Flashing melting above window
21:00	Panels have fallen off to 7 ft. Panels continue to burn and melt off
25:00	Panels falling off up to 8 ft.
27:00	Panels falling off up to 9 ft.
28:00	Panels falling off up to 10 ft. No longer flaming
29:30	Panels falling off up to 11 ft.
30:00	End of test, start 10 min. observation period.
30:10	No flaming or other affects

Time (min:sec)	Observations from the 2nd Floor Room
3:00	Light smoke
15:00	Light smoke continues
20:00	Light smoke continues
30:00	Test ended

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

6 Conclusion

Intertek Testing Services NA, Inc. (Intertek) has conducted testing for Sagiper North America, on their SAGIWALL System, to evaluate its flame spread. Testing was conducted in accordance with the applicable requirements and following the standard methods of **NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components, 2012**. This evaluation took place on November 3, 2017.

Based on the data from this test, the assembly **met** the conditions of acceptance of the above-mentioned standard.

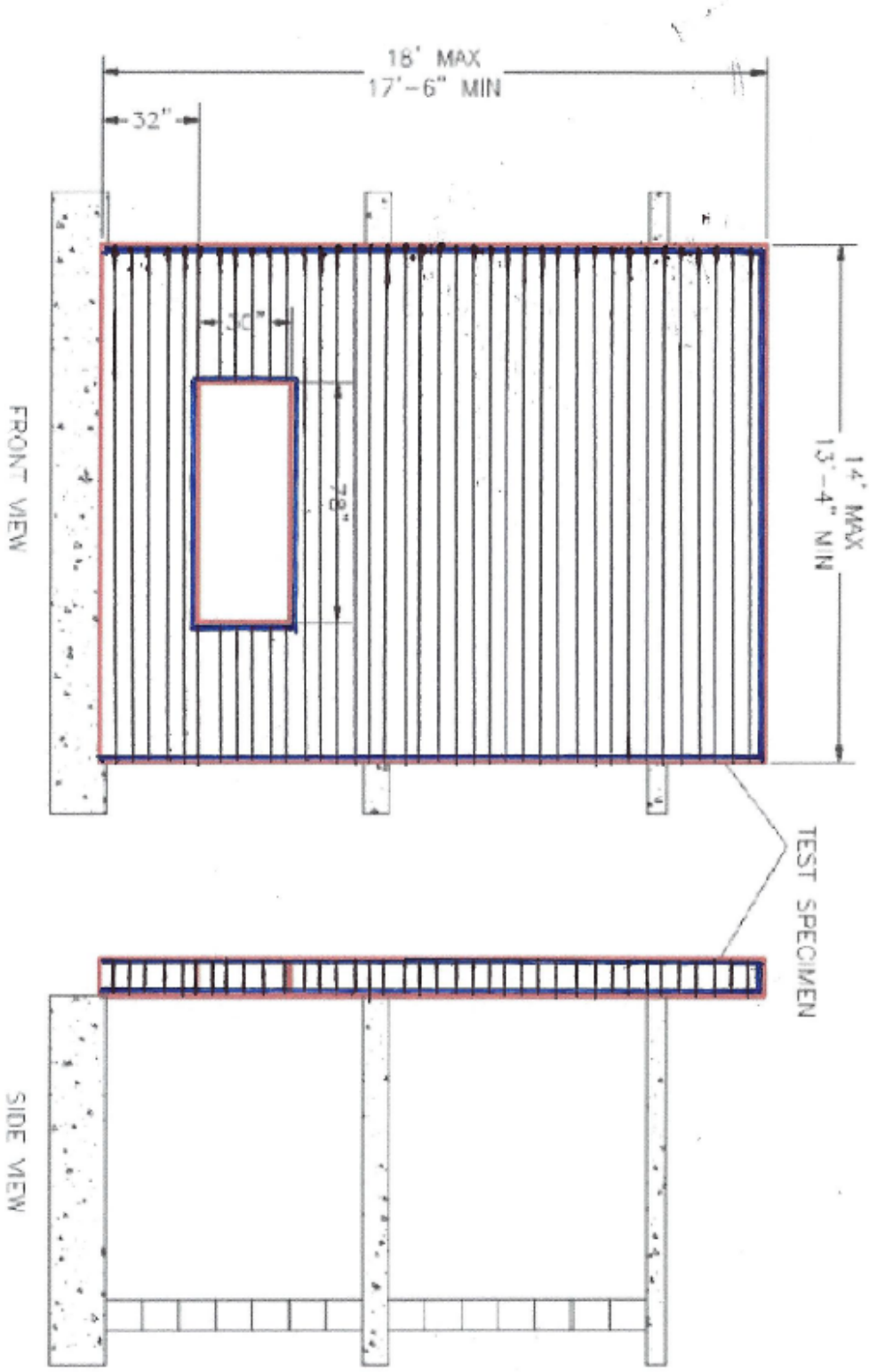
INTERTEK TESTING SERVICES NA, INC.

Tested by: _____
Abel de Hoyos
Senior Project Manager, Fire Resistance

Reviewed by: _____
Herbert W. Stansberry II
Engineering Supervisor

APPENDIX A

Assembly Drawings


18' MAX
17'-6" MIN
32"
30"
78"
14' MAX
13'-4" MIN
FRONT VIEW
TEST SPECIMEN
SIDE VIEW

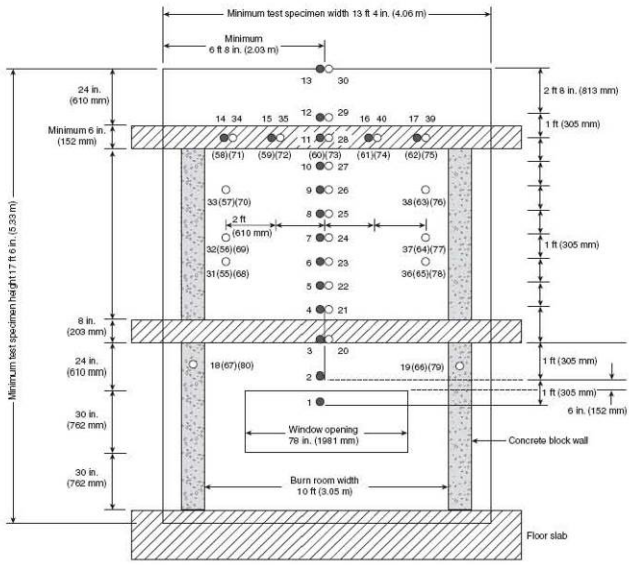


FIGURE 6.1(a) Front View of Test Specimen Superimposed over Test Apparatus Thermocouple Locations.

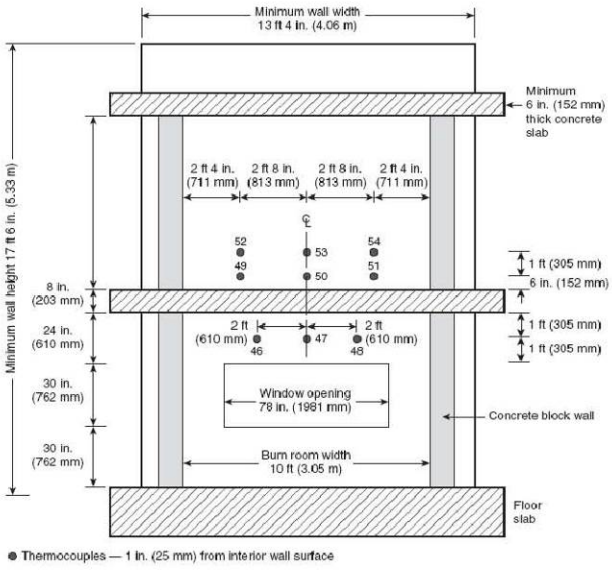
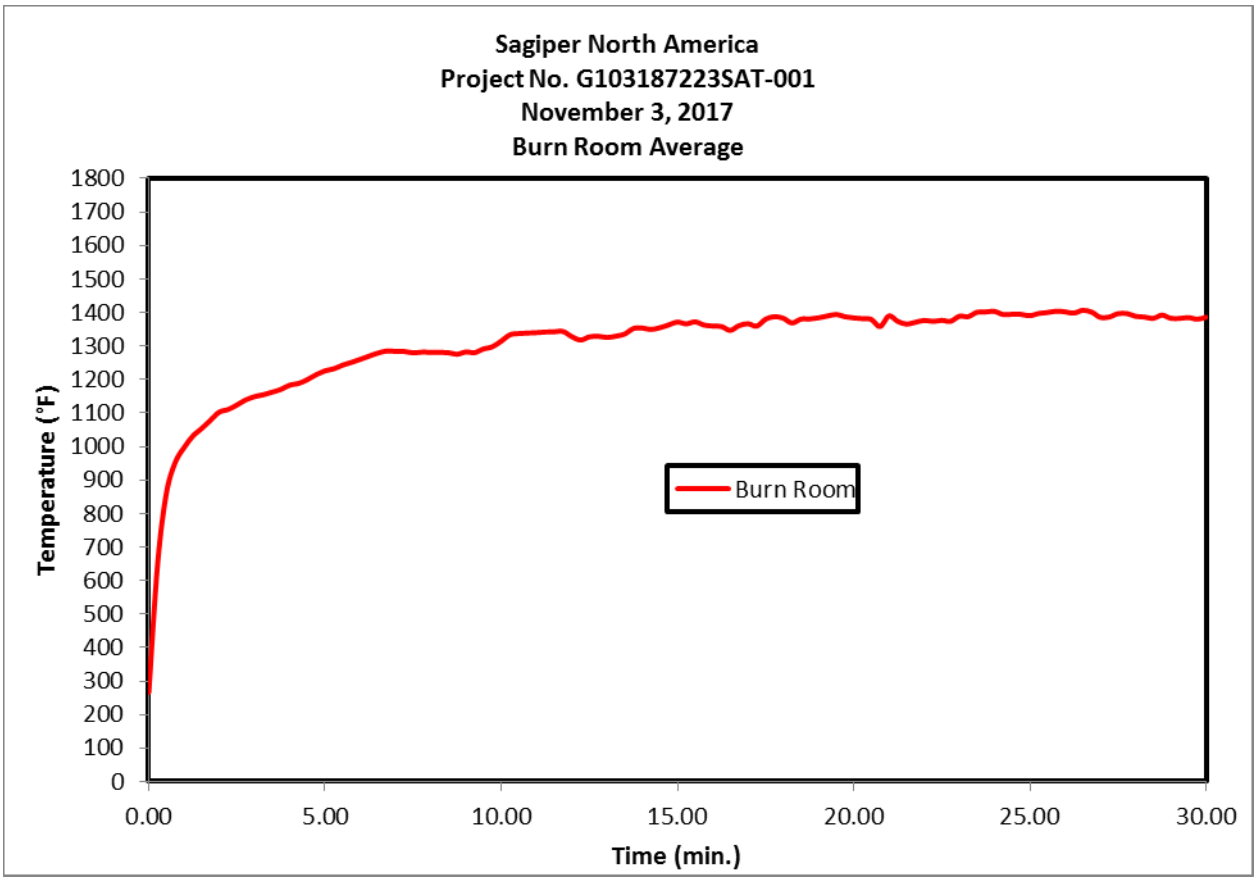


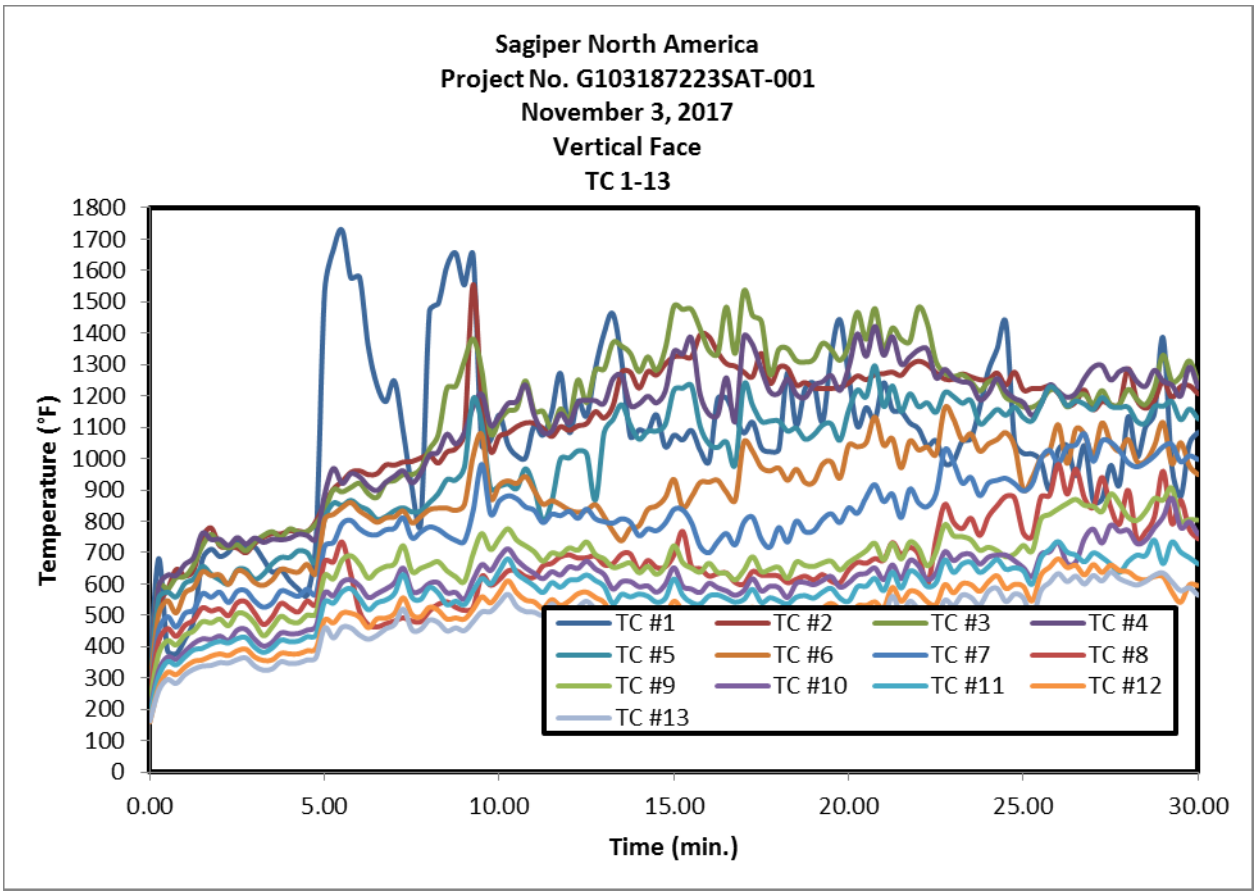
FIGURE 6.1(c) Interior View of the Test Specimen. Instrumentation arrangement.

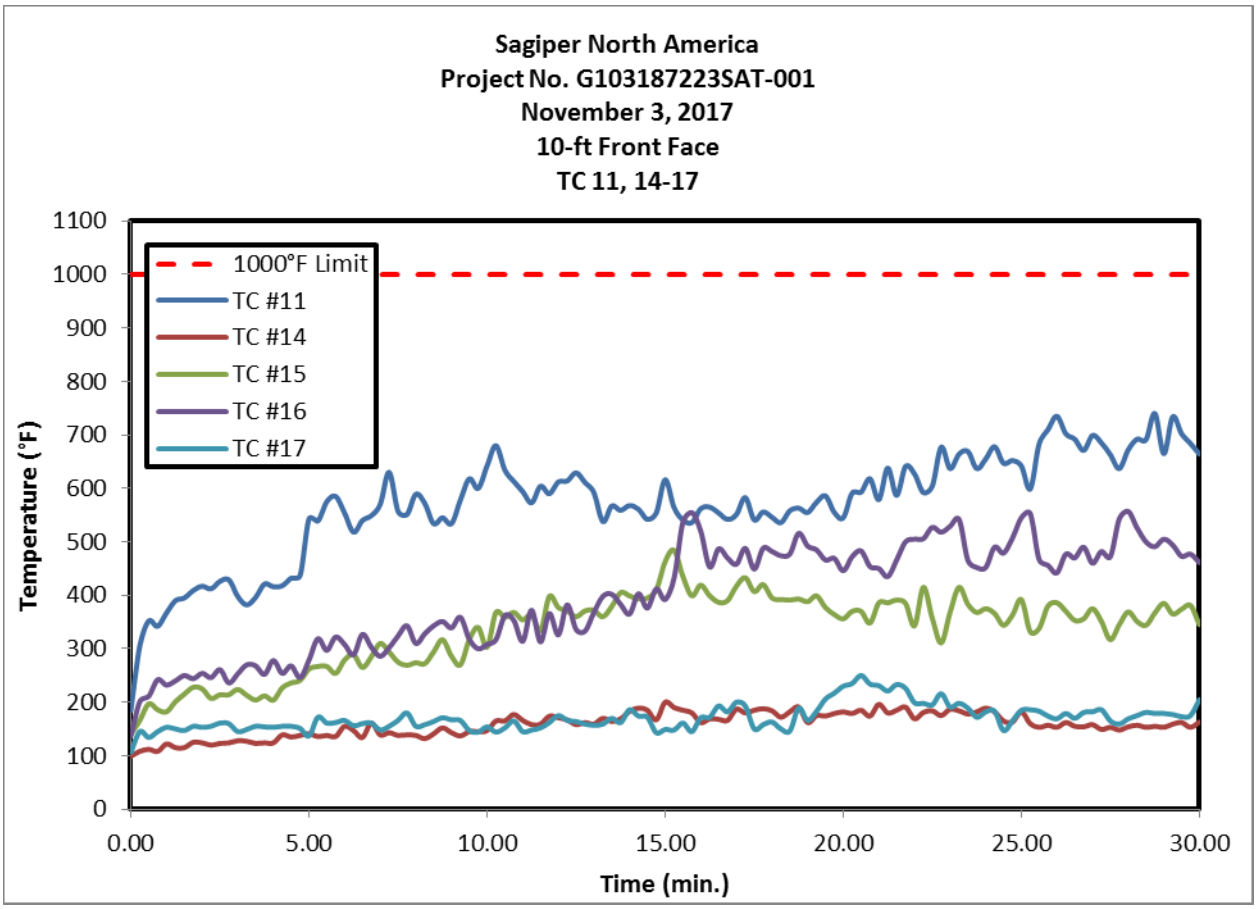
Source: NFPA 285 Standard Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012 Edition, Pgs 10, 14..

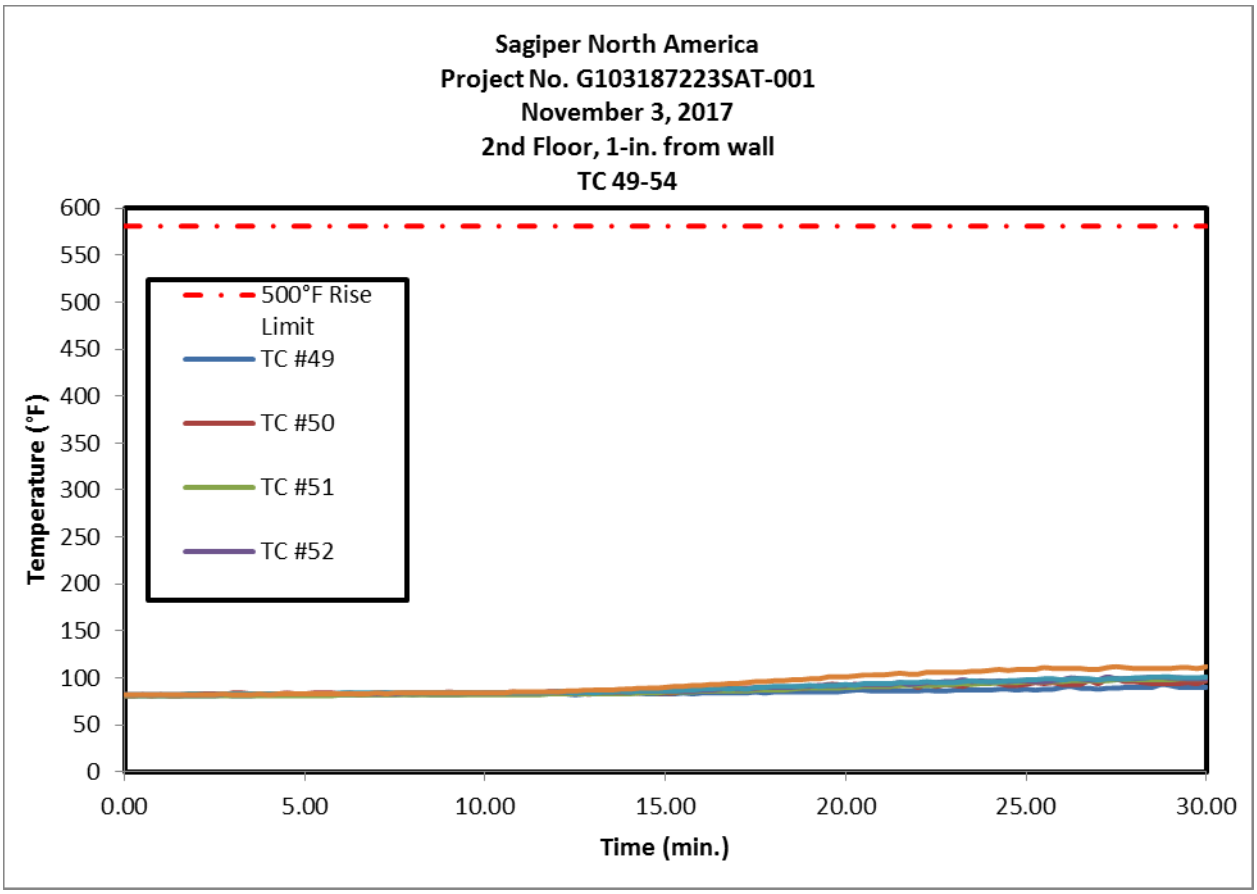
APPENDIX B

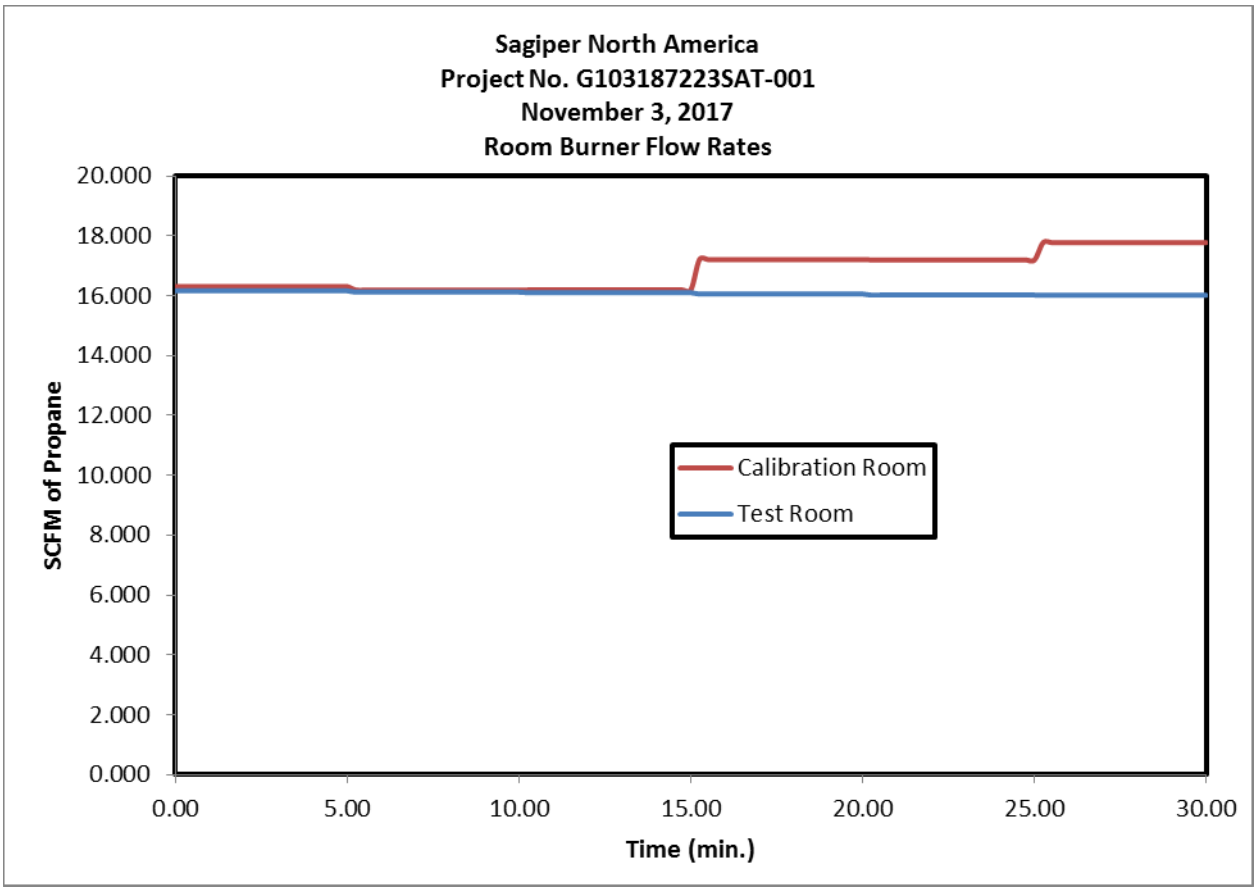
Test Data

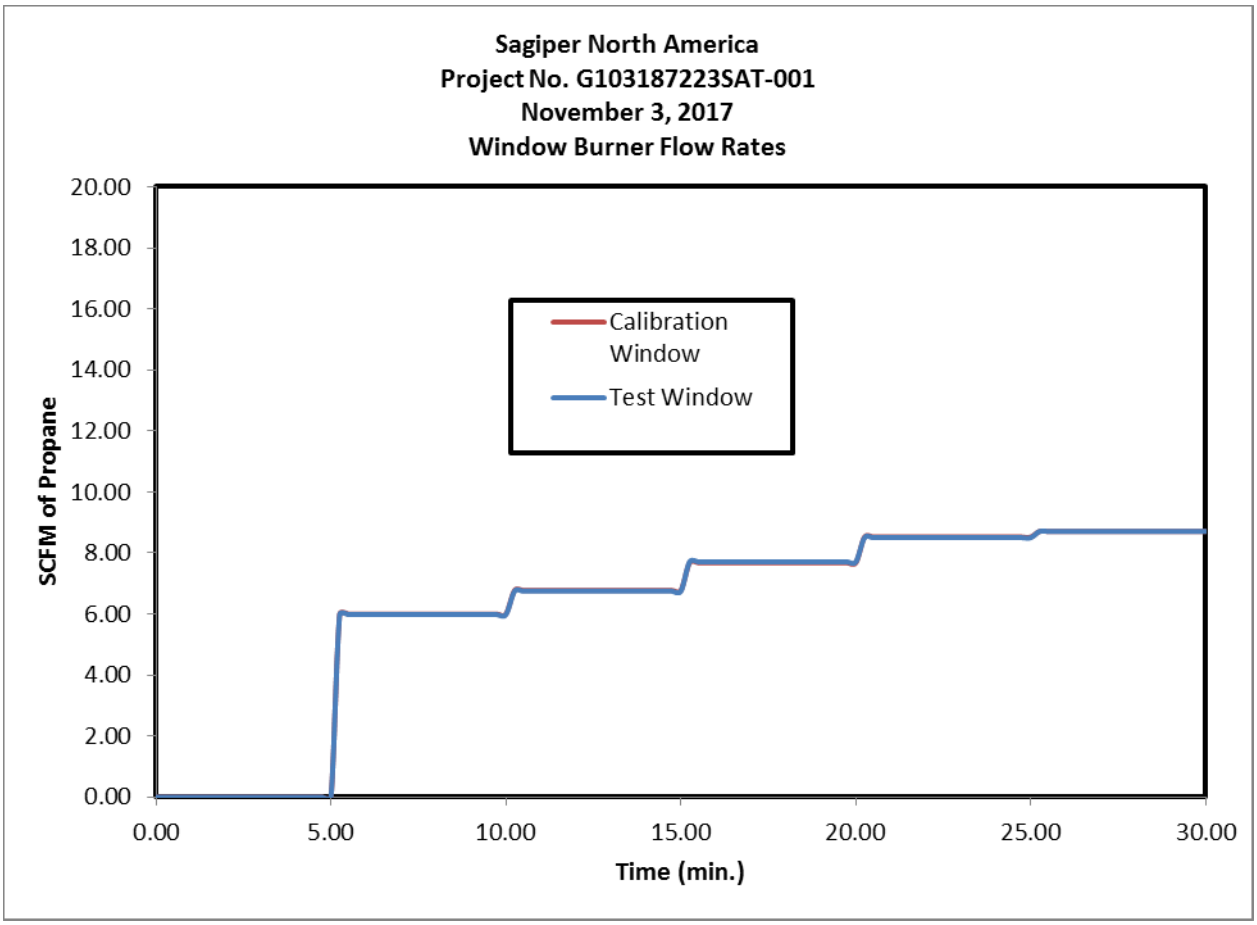

Sagiper North America
Project No. G103187223SAT-001
November 3, 2017
Burn Room Average
Temperature (°F)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Time (min.)
Burn Room


Sagiper North America
Project No. G103187223SAT-001
November 3, 2017
Vertical Face
TC 1-13
Temperature (°F)
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Time (min.)
TC #1
TC #2
TC #3
TC #4
TC #5
TC #6
TC #7
TC #8
TC #9
TC #10
TC #11
TC #12
TC #13


Sagiper North America
Project No. G103187223SAT-001
November 3, 2017
10-ft Front Face
TC 11, 14-17
1000°F Limit
TC #11
TC #14
TC #15
TC #16
TC #17
Temperature (°F)
Time (min.)
0
100
200
300
400
500
600
700
800
900
1000
1100
0.00
5.00
10.00
15.00
20.00
25.00
30.00


Sagiper North America
Project No. G103187223SAT-001
November 3, 2017
2nd Floor, 1-in. from wall
TC 49-54
Temperature (°F)
600
550
500
450
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.)
500°F Rise Limit
TC #49
TC #50
TC #51
TC #52


Sagiper North America
Project No. G103187223SAT-001
November 3, 2017
Room Burner Flow Rates
SCFM of Propane
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Time (min.)
Calibration Room
Test Room


Sagiper North America
Project No. G103187223SAT-001
November 3, 2017
Window Burner Flow Rates
SCFM of Propane
20.00
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0.00
5.00
10.00
15.00
20.00
25.00
30.00
Time (min.)
Calibration Window
Test Window

Sagiper North America | Project No. 103187223SAT-001 | 3 November 2017

Time (min)	Burn Room (°F)	TC #1 (°F)	TC #2 (°F)	TC #3 (°F)	TC #4 (°F)	TC #5 (°F)	TC #6 (°F)	TC #7 (°F)	TC #8 (°F)	TC #9 (°F)	TC #10 (°F)	Pass/ Fail TC #11 (°F)	TC #12 (°F)	TC #13 (°F)	Pass/ Fail TC #14 (°F)	Pass/ Fail TC #15 (°F)	Pass/ Fail TC #16 (°F)	Pass/ Fail TC #17 (°F)
0.00	265.8	333	267	283	296	292	276	254	252	228	196	185	160	163	99	140	137	106
0.26	650.6	681	531	596	593	555	505	453	418	378	324	305	270	259	108	166	201	145
0.50	861.4	389	580	583	628	574	547	496	458	419	367	352	318	295	112	197	211	134
0.76	952.8	377	646	620	627	559	508	463	433	406	360	342	311	283	108	186	242	145
1.00	996.6	424	626	624	663	602	571	506	468	437	385	367	335	311	122	182	232	153
1.26	1031	483	643	660	685	616	589	518	485	450	410	390	353	328	115	201	240	150
1.50	1054	678	748	721	762	656	639	569	524	480	425	395	358	338	115	215	250	147
1.76	1078	711	779	758	742	631	627	558	514	476	423	409	370	340	125	228	244	155
2.00	1103	688	722	726	743	613	629	574	520	488	434	417	377	349	124	225	254	153
2.26	1111	702	720	715	723	601	599	541	499	457	420	412	372	348	120	207	246	155
2.50	1124	738	715	725	748	645	642	577	540	506	453	426	387	359	123	214	261	161
2.76	1139	719	700	706	728	645	634	578	543	502	455	429	392	364	124	214	236	160
3.00	1149	718	730	735	747	615	604	545	507	474	423	398	367	338	128	224	253	145
3.26	1155	678	749	755	733	632	596	526	471	435	402	382	356	325	127	213	270	149
3.50	1162	638	761	767	743	665	613	539	495	463	414	396	358	329	123	204	268	155
3.76	1171	645	760	749	741	685	647	578	538	497	444	421	379	352	124	212	252	154
4.00	1183	610	770	776	746	685	642	571	523	481	441	416	377	346	124	204	278	153
4.26	1188	584	769	766	759	706	638	561	511	477	442	418	377	348	139	227	254	155
4.50	1200	565	767	768	755	700	663	584	546	501	453	432	387	358	135	236	268	155
4.76	1215	731	800	792	743	670	634	568	535	505	465	437	394	365	138	241	246	151
5.00	1226	1533	856	835	885	808	806	720	672	627	572	543	485	460	141	262	279	137
5.26	1232	1666	903	901	969	858	822	732	670	616	562	539	476	428	136	267	319	172
5.50	1243	1729	927	894	921	851	844	792	734	676	606	575	507	462	138	267	297	161
5.76	1251	1577	956	908	952	867	860	803	631	690	613	585	507	460	136	254	322	162
6.00	1260	1579	961	921	942	848	833	776	513	663	594	554	494	437	155	279	308	166
6.26	1270	1358	949	888	912	835	815	759	470	619	557	518	461	424	147	289	289	156
6.50	1279	1234	952	876	898	806	797	757	463	642	569	540	489	436	134	265	327	160
6.76	1285	1182	980	923	925	815	811	773	473	656	584	549	491	457	161	285	303	161
7.00	1284	1247	979	930	944	834	814	778	482	665	604	570	506	471	139	310	286	148
7.26	1284	1085	989	949	961	843	833	811	492	722	651	630	556	520	143	294	302	155
7.50	1280	906	991	949	923	830	795	747	482	640	577	557	502	454	138	275	324	166
7.76	1282	792	1002	968	954	833	815	766	480	650	579	551	496	455	139	269	343	180
8.00	1281	1470	1012	1031	1011	860	837	782	514	661	602	589	526	485	138	274	310	155
8.26	1281	1494	986	1076	1021	888	842	774	535	671	604	572	516	477	132	272	328	158
8.50	1280	1614	1021	1225	1078	933	842	754	543	642	572	534	488	450	141	294	343	164
8.76	1276	1656	1032	1231	1047	932	835	739	526	623	573	545	492	460	152	317	351	171
9.00	1282	1554	1080	1312	1083	972	853	736	516	608	552	534	488	451	143	286	339	167
9.26	1280	1648	1555	1382	1165	1191	1008	834	525	696	613	578	519	480	137	270	359	166
9.50	1292	1041	1180	1280	1205	1110	1076	982	625	761	662	618	559	511	145	317	318	147
9.76	1298	1059	1023	1080	1107	904	874	824	596	710	643	600	540	512	145	340	300	144
10.00	1315	1139	1071	1121	1136	912	916	865	614	745	685	642	573	540	147	303	308	154
10.26	1334	1044	1082	1153	1176	919	929	881	642	776	712	680	610	567	165	368	317	144
10.50	1337	1009	1102	1161	1183	905	921	872	642	740	677	634	572	528	165	359	362	152
10.76	1339	1003	1114	1248	1235	968	943	846	624	722	652	613	549	512	177	368	353	165
11.00	1340	1106	1113	1152	1139	906	898	835	622	703	634	594	543	510	166	354	314	145
11.26	1342	1075	1097	1151	1084	802	855	796	658	673	617	573	523	501	158	364	372	148
11.50	1342	1149	1071	1095	1088	864	866	823	666	699	639	604	550	536	159	334	313	152
11.76	1344	1272	1102	1159	1143	999	853	818	687	694	629	590	532	508	174	398	366	162
12.00	1328	1084	1090	1128	1114	1002	836	832	693	715	655	612	546	514	171	377	326	175
12.26	1318	1184	1105	1251	1179	1025	829	810	683	708	650	614	569	526	167	371	382	166
12.50	1327	1137	1112	1179	1186	1015	835	839	684	734	673	629	574	545	158	360	336	164
12.76	1329	1288	1150	1283	1185	868	853	808	689	694	648	611	557	520	162	371	333	159
13.00	1326	1401	1130	1286	1177	1084	815	799	661	680	630	592	541	505	159	372	368	157
13.26	1329	1462	1168	1370	1254	1124	769	794	665	653	584	538	496	463	170	360	398	159
13.50	1336	1312	1275	1359	1264	1172	738	808	695	659	607	567	513	484	164	379	402	170
13.76	1352	1071	1276	1336	1170	1108	778	797	696	667	608	559	510	477	169	405	383	162
14.00	1354	1092	1225	1278	1175	1062	786	754	645	636	591	568	507	487	183	399	365	186
14.26	1350	1087	1278	1325	1199	1088	838	776	675	656	594	561	505	479	189	393	403	174
14.50	1354	1140	1267	1282	1178	1088	849	770	653	631	574	542	494	466	185	395	376	172
14.76	1363	1038	1302	1351	1215	1109	876	794	655	658	599	554	499	475	167	410	412	143
15.00	1371	1075	1325	1487	1342	1219	934	838	693	722	652	616	545	523	200	463	392	149
15.26	1366	1060	1327	1476	1334	1225	845	836	768	668	593	564	514	494	190	484	432	148
15.50	1372	1090	1325	1476	1384	1233	878	796	656	651	584	541	492	469	185	435	537	161
15.76	1363	1027	1396	1414	1204	1103	924	720	649	638	573	536	501	472	180	399	555	145
16.00	1360	991	1389	1345	1142	1047	925	700	625	666	602	562	510	484	162	419	520	171

Sagiper North America | Project No. 103187223SAT-001 | 3 November 2017

Time (min)	Burn Room (°F)	TC #1 (°F)	TC #2 (°F)	TC #3 (°F)	TC #4 (°F)	TC #5 (°F)	TC #6 (°F)	TC #7 (°F)	TC #8 (°F)	TC #9 (°F)	TC #10 (°F)	Pass/ Fail TC #11 (°F)	TC #12 (°F)	TC #13 (°F)	Pass/ Fail TC #14 (°F)	Pass/ Fail TC #15 (°F)	Pass/ Fail TC #16 (°F)	Pass/ Fail TC #17 (°F)
16.25	1358	1191	1339	1334	1139	1036	931	735	633	637	588	565	517	485	169	399	453	172
16.50	1347	1193	1303	1484	1258	1053	893	761	635	634	578	554	500	460	168	387	487	193
16.75	1361	1132	1295	1336	1119	981	867	725	605	613	564	542	499	475	166	390	470	182
17.00	1366	1082	1276	1535	1390	1235	1053	797	600	644	579	551	501	478	187	417	458	200
17.25	1359	1116	1262	1456	1363	1170	1023	813	640	687	617	583	526	494	180	433	488	193
17.50	1380	1034	1336	1438	1284	1119	972	743	628	640	578	541	489	463	185	407	449	150
17.75	1388	1022	1240	1269	1213	1120	961	718	628	647	593	556	497	463	188	420	488	158
18.00	1383	1030	1291	1349	1209	1120	970	780	625	653	588	546	499	470	184	395	482	163
18.25	1369	1274	1288	1351	1254	1088	931	734	604	618	557	536	499	470	172	392	474	150
18.50	1380	1107	1235	1313	1205	1097	966	801	615	670	602	558	506	483	182	391	477	146
18.75	1381	1223	1243	1308	1195	1062	924	767	625	659	605	563	511	478	191	393	516	189
19.00	1384	1239	1226	1317	1234	1076	925	770	613	656	598	555	505	474	162	388	492	166
19.25	1390	1118	1224	1368	1245	1107	982	806	630	667	611	574	523	494	175	399	485	183
19.50	1394	1333	1224	1348	1265	1111	990	824	609	673	624	586	538	506	174	377	466	206
19.75	1388	1443	1227	1314	1218	1059	938	796	604	645	590	555	517	480	179	364	469	217
20.00	1384	1262	1241	1360	1291	1154	1043	843	645	669	604	545	480	441	182	356	446	230
20.25	1382	1103	1264	1467	1398	1219	1038	826	669	687	629	591	529	491	179	370	472	235
20.50	1379	1163	1252	1381	1327	1198	1051	877	666	706	634	593	531	492	185	370	483	250
20.75	1358	1126	1268	1479	1422	1296	1133	917	681	730	651	618	543	512	174	348	454	234
21.00	1390	1242	1271	1351	1330	1167	1043	863	676	677	614	579	524	492	196	386	450	231
21.25	1374	1156	1276	1417	1389	1232	1064	887	732	730	661	638	589	561	180	386	435	221
21.50	1365	1151	1266	1381	1302	1151	971	812	695	680	617	587	545	505	185	391	466	233
21.75	1371	1114	1298	1374	1324	1207	1056	903	717	734	675	641	577	545	191	385	500	226
22.00	1376	1095	1311	1483	1347	1166	1028	859	694	714	658	627	571	520	169	343	505	199
22.25	1374	1041	1300	1431	1349	1178	1037	847	597	658	614	592	543	516	181	415	506	198
22.50	1377	1057	1274	1310	1258	1148	1014	888	744	702	636	604	535	486	184	357	527	195
22.75	1374	985	1254	1273	1285	1211	1162	1028	854	789	703	677	598	548	175	311	518	216
23.00	1389	993	1254	1262	1257	1198	1126	988	797	754	675	637	572	531	187	368	529	191
23.25	1388	1055	1270	1268	1245	1177	1060	922	777	751	694	664	601	565	184	415	542	198
23.50	1401	1065	1261	1246	1238	1185	1079	940	810	741	694	669	598	557	178	383	465	189
23.75	1402	1163	1252	1216	1188	1112	1024	882	755	708	664	637	577	533	182	368	452	172
24.00	1403	1281	1252	1245	1209	1131	1047	922	815	717	686	655	607	577	189	375	452	182
24.25	1394	1350	1273	1246	1256	1157	1061	931	850	706	692	678	626	586	182	366	490	183
24.50	1395	1433	1235	1195	1215	1139	1083	937	880	687	692	647	586	544	165	344	479	147
24.75	1394	1053	1276	1184	1192	1164	1039	920	874	696	674	652	599	568	163	363	507	165
25.00	1391	1017	1219	1165	1179	1131	901	897	762	723	652	642	592	555	182	392	545	186
25.25	1397	1015	1224	1164	1138	1121	939	919	752	705	624	599	546	495	160	332	553	186
25.50	1400	992	1224	1182	1173	1173	1002	999	877	807	694	683	628	578	153	338	467	183
25.75	1404	901	1231	1218	1235	1229	1026	1027	883	822	703	710	654	605	157	380	456	174
26.00	1402	1028	1209	1215	1214	1210	1108	986	982	840	733	735	680	633	153	386	442	169
26.25	1398	1042	1169	1165	1196	1169	985	1036	887	857	666	702	653	608	162	370	477	179
26.50	1407	946	1181	1196	1209	1184	1094	1044	966	870	670	692	659	625	155	353	470	170
26.75	1401	1041	1219	1205	1257	1174	1077	1079	874	851	745	671	629	600	154	356	490	181
27.00	1386	865	1157	1175	1292	1157	1011	992	845	848	775	699	662	627	158	375	460	182
27.25	1387	870	1182	1217	1297	1195	1114	1057	940	831	731	685	637	610	149	351	482	186
27.50	1397	978	1172	1173	1251	1167	1051	1052	844	887	788	663	660	638	153	317	472	165
27.75	1397	917	1172	1174	1278	1163	1024	1025	791	857	768	637	643	617	148	345	543	159
28.00	1389	1134	1287	1221	1285	1164	1061	987	899	813	771	672	639	605	154	369	557	169
28.25	1387	1005	1187	1189	1246	1119	991	974	744	803	729	692	619	597	157	351	526	175
28.50	1383	1102	1161	1173	1231	1114	993	987	767	831	740	691	613	608	153	344	500	181
28.75	1392	1144	1186	1225	1282	1166	1041	1009	814	873	779	740	624	628	155	367	491	179
29.00	1383	1385	1248	1330	1247	1167	1115	1038	960	868	814	665	623	635	153	385	505	179
29.25	1382	974	1196	1248	1235	1182	984	1045	793	906	874	734	575	607	159	365	494	177
29.50	1385	879	1230	1263	1200	1124	1051	990	867	802	780	702	542	579	162	374	473	173
29.75	1380	1047	1233	1312	1292	1158	977	1009	775	806	798	684	597	588	153	381	477	175
30.00	1386	1084	1207	1246	1228	1127	949	997	744	804	759	664	595	564	163	345	461	205
Max Temp												740			200	484	557	250
Max Allowed												1000			1000	1000	1000	1000

Time (min)	TC #41 (°F)	TC #42 (°F)	TC #43 (°F)	TC #44 (°F)	TC #45 (°F)	TC #46 (°F)	TC #47 (°F)	TC #48 (°F)	Pass/ Fail TC #49 (°F)	Pass/ Fail TC #50 (°F)	Pass/ Fail TC #51 (°F)	Pass/ Fail TC #52 (°F)	Pass/ Fail TC #53 (°F)	Pass/ Fail TC #54 (°F)
0.00	215	304	323	242	245	146	308	161	81	81	81	82	82	82
0.26	476	832	805	547	593	356	774	301	81	81	81	82	82	82
0.50	680	1029	1006	770	822	468	1031	463	81	82	81	82	82	82
0.76	797	1122	1061	865	919	582	1104	565	81	81	81	82	82	82
1.00	902	1093	1084	926	978	687	1139	648	81	82	81	82	82	82
1.26	968	1132	1101	952	1004	756	1150	697	81	81	81	82	82	82
1.50	1025	1128	1118	973	1025	819	1165	749	81	81	81	82	82	82
1.76	1063	1170	1122	997	1039	886	1196	823	81	82	81	82	83	82
2.00	1118	1183	1139	1021	1053	942	1208	876	81	83	81	82	83	82
2.26	1133	1169	1153	1028	1070	974	1215	895	81	83	81	82	82	82
2.50	1145	1201	1162	1042	1070	1002	1231	918	81	83	81	82	82	82
2.76	1165	1221	1179	1053	1078	1022	1233	938	82	82	81	83	83	83
3.00	1187	1214	1187	1068	1088	1041	1232	964	81	84	81	83	83	82
3.26	1200	1224	1187	1072	1090	1057	1249	979	81	84	81	83	83	82
3.50	1208	1229	1195	1077	1102	1070	1257	994	81	83	81	83	83	82
3.76	1213	1247	1208	1087	1098	1081	1273	1010	82	82	81	83	83	83
4.00	1238	1260	1217	1094	1108	1096	1277	1030	82	82	81	83	83	82
4.26	1241	1255	1227	1099	1119	1108	1259	1042	82	83	81	83	83	83
4.50	1251	1262	1250	1106	1130	1119	1292	1058	82	84	81	83	83	83
4.76	1260	1287	1271	1110	1145	1129	1297	1062	82	83	81	83	83	83
5.00	1272	1295	1285	1119	1159	1140	1303	1081	82	83	81	83	83	83
5.26	1296	1298	1277	1126	1163	1149	1295	1082	82	84	81	83	83	83
5.50	1308	1321	1285	1143	1158	1160	1322	1102	82	84	81	83	83	83
5.76	1309	1316	1303	1158	1170	1168	1321	1108	82	84	81	83	83	83
6.00	1314	1331	1309	1164	1183	1175	1328	1126	82	83	82	83	84	83
6.26	1329	1324	1321	1171	1204	1181	1342	1136	82	84	82	83	84	83
6.50	1329	1343	1337	1179	1207	1193	1341	1161	82	82	82	83	84	83
6.76	1347	1354	1337	1184	1204	1201	1357	1177	82	83	82	83	84	83
7.00	1344	1346	1345	1174	1211	1208	1358	1191	82	84	82	83	84	84
7.26	1345	1349	1336	1182	1206	1214	1352	1216	82	84	82	83	84	83
7.50	1330	1359	1323	1187	1200	1217	1339	1222	82	83	82	83	84	84
7.76	1350	1349	1318	1193	1199	1219	1347	1224	83	83	82	84	84	84
8.00	1346	1357	1313	1192	1197	1224	1347	1224	82	83	82	84	84	84
8.26	1345	1364	1309	1192	1193	1224	1339	1228	83	83	82	84	84	84
8.50	1346	1361	1311	1189	1194	1225	1347	1227	82	83	82	84	84	84
8.76	1335	1342	1315	1188	1198	1225	1332	1224	82	84	82	84	84	84
9.00	1349	1343	1326	1191	1203	1226	1337	1229	82	85	82	84	84	84
9.26	1338	1337	1328	1188	1211	1227	1329	1229	82	84	82	84	84	84
9.50	1332	1357	1353	1192	1224	1230	1336	1222	83	84	82	84	84	84
9.76	1361	1326	1358	1201	1243	1240	1349	1222	83	83	82	84	84	84
10.00	1377	1372	1353	1207	1264	1255	1364	1235	83	84	82	84	84	84
10.26	1407	1428	1368	1206	1259	1277	1363	1239	83	84	82	84	84	84
10.50	1376	1442	1399	1214	1256	1299	1395	1244	83	84	82	84	84	84
10.76	1360	1448	1410	1208	1268	1308	1403	1246	83	85	82	84	84	85
11.00	1355	1428	1422	1209	1286	1306	1399	1245	83	84	82	84	84	85
11.26	1363	1416	1419	1220	1291	1304	1406	1246	83	84	82	84	84	85
11.50	1359	1412	1418	1224	1299	1304	1396	1247	83	83	82	84	84	85
11.76	1361	1409	1420	1228	1300	1308	1398	1251	83	85	83	85	84	85
12.00	1362	1370	1397	1215	1297	1306	1408	1255	83	85	83	85	85	85
12.26	1398	1350	1359	1213	1270	1303	1378	1260	83	84	83	85	85	86
12.50	1369	1351	1405	1207	1304	1312	1431	1268	82	83	83	84	84	86
12.76	1372	1359	1395	1209	1311	1315	1414	1273	83	83	83	85	85	87
13.00	1378	1347	1396	1206	1301	1309	1420	1282	83	83	83	85	84	87
13.26	1375	1369	1395	1209	1299	1310	1412	1288	83	85	83	85	85	87
13.50	1368	1381	1407	1211	1311	1312	1396	1281	83	85	83	85	85	87
13.76	1365	1429	1433	1224	1310	1315	1414	1283	84	85	83	85	86	88
14.00	1369	1433	1428	1230	1309	1318	1420	1278	84	86	83	85	85	88
14.26	1363	1418	1430	1226	1311	1321	1408	1276	84	84	84	86	86	89
14.50	1373	1426	1434	1226	1313	1328	1403	1279	83	86	84	86	86	89
14.76	1389	1448	1439	1233	1307	1331	1414	1279	83	84	84	86	86	89
15.00	1388	1457	1447	1252	1313	1331	1411	1278	83	84	85	86	86	90
15.26	1402	1436	1435	1249	1309	1333	1420	1282	83	84	85	86	86	91
15.50	1402	1460	1441	1249	1309	1338	1426	1283	84	87	85	86	87	91
15.76	1403	1461	1407	1260	1282	1342	1406	1284	83	86	85	86	87	92
16.00	1394	1455	1410	1262	1278	1357	1408	1291	84	87	86	87	88	92

Sagiper North America | Project No. 103187223SAT-001 | 3 November 2017

Time (min)	TC #41 (°F)	TC #42 (°F)	TC #43 (°F)	TC #44 (°F)	TC #45 (°F)	TC #46 (°F)	TC #47 (°F)	TC #48 (°F)	Pass/ Fail TC #49 (°F)	Pass/ Fail TC #50 (°F)	Pass/ Fail TC #51 (°F)	Pass/ Fail TC #52 (°F)	Pass/ Fail TC #53 (°F)	Pass/ Fail TC #54 (°F)
16.26	1425	1436	1387	1249	1294	1366	1413	1288	84	86	86	87	88	93
16.50	1433	1394	1379	1222	1306	1388	1463	1338	84	88	86	88	89	93
16.76	1405	1400	1435	1227	1338	1391	1472	1338	84	87	86	89	88	94
17.00	1399	1405	1445	1233	1350	1396	1459	1325	84	89	86	88	89	94
17.26	1409	1419	1407	1231	1331	1398	1455	1327	84	89	86	88	88	95
17.50	1401	1444	1462	1248	1345	1399	1444	1322	85	89	87	89	90	96
17.76	1390	1442	1491	1256	1360	1396	1436	1312	84	90	87	90	90	96
18.00	1384	1437	1476	1261	1357	1389	1431	1308	85	90	87	90	91	97
18.26	1391	1407	1447	1259	1340	1392	1440	1312	85	90	87	90	91	97
18.50	1391	1439	1467	1257	1347	1393	1439	1308	85	89	88	90	91	98
18.76	1416	1462	1446	1255	1325	1391	1440	1313	85	89	89	91	91	98
19.00	1418	1498	1432	1262	1311	1396	1416	1320	85	90	89	91	92	99
19.26	1424	1497	1448	1265	1314	1444	1430	1315	85	90	89	92	91	99
19.50	1435	1487	1451	1283	1315	1429	1433	1325	85	93	89	92	92	101
19.76	1429	1476	1439	1286	1308	1432	1432	1323	85	93	89	92	92	101
20.00	1450	1450	1428	1293	1298	1435	1449	1323	86	92	90	92	93	101
20.26	1480	1424	1423	1288	1294	1434	1449	1329	87	93	90	93	92	102
20.50	1465	1422	1429	1287	1294	1435	1455	1337	87	92	91	93	94	103
20.76	1440	1381	1401	1259	1310	1436	1456	1341	86	91	91	93	94	103
21.00	1414	1449	1473	1255	1358	1490	1485	1336	86	91	91	93	94	103
21.26	1422	1426	1429	1244	1347	1499	1500	1338	86	91	91	93	94	104
21.50	1432	1412	1407	1243	1333	1474	1486	1348	86	92	92	95	95	105
21.76	1437	1436	1407	1247	1327	1509	1498	1360	86	94	92	93	95	104
22.00	1482	1417	1414	1256	1313	1524	1489	1371	86	90	92	94	95	104
22.26	1448	1421	1427	1256	1316	1499	1481	1366	87	94	92	95	96	106
22.50	1438	1433	1432	1257	1324	1473	1488	1355	86	91	92	95	95	106
22.76	1474	1411	1407	1259	1318	1482	1478	1364	86	93	93	96	95	106
23.00	1510	1424	1424	1277	1310	1481	1452	1366	87	92	93	96	95	106
23.26	1501	1419	1435	1273	1311	1466	1461	1364	87	91	94	98	96	106
23.50	1460	1480	1465	1277	1322	1465	1468	1358	87	94	93	96	97	107
23.76	1451	1480	1470	1277	1331	1457	1463	1350	87	94	94	97	96	107
24.00	1461	1489	1459	1277	1331	1448	1461	1350	87	96	94	96	96	108
24.26	1476	1446	1440	1300	1307	1451	1443	1351	88	94	95	97	96	109
24.50	1485	1439	1448	1292	1310	1452	1451	1356	88	92	95	96	97	108
24.76	1481	1445	1446	1290	1310	1461	1460	1355	87	92	95	97	97	109
25.00	1504	1407	1448	1291	1303	1443	1478	1359	88	93	96	97	98	109
25.26	1511	1423	1445	1300	1307	1450	1461	1357	87	95	96	96	98	109
25.50	1499	1452	1441	1305	1303	1462	1468	1358	88	94	96	96	99	111
25.76	1486	1488	1437	1306	1303	1462	1468	1355	88	95	96	97	99	110
26.00	1482	1477	1442	1297	1312	1445	1458	1356	90	93	96	98	98	110
26.26	1463	1475	1435	1299	1320	1440	1437	1353	91	93	97	100	99	110
26.50	1485	1491	1437	1310	1310	1444	1437	1357	89	93	97	99	99	110
26.76	1472	1483	1434	1309	1309	1460	1453	1355	89	97	97	98	99	109
27.00	1452	1449	1410	1325	1292	1473	1482	1350	88	94	97	98	98	109
27.26	1451	1446	1411	1330	1295	1473	1463	1350	89	99	97	101	99	111
27.50	1451	1470	1436	1325	1301	1467	1457	1351	89	99	98	99	99	112
27.76	1458	1483	1424	1311	1309	1462	1451	1354	90	96	98	99	99	111
28.00	1460	1450	1427	1304	1303	1465	1446	1358	90	96	98	99	100	110
28.26	1453	1441	1431	1304	1304	1448	1453	1356	90	95	98	100	100	110
28.50	1459	1414	1436	1310	1294	1457	1455	1363	90	94	98	101	101	110
28.76	1468	1444	1444	1306	1299	1460	1454	1363	93	94	98	101	101	110
29.00	1481	1415	1425	1300	1292	1450	1434	1365	92	94	98	100	101	110
29.26	1479	1419	1426	1292	1296	1445	1440	1363	90	94	99	100	100	111
29.50	1482	1420	1427	1290	1305	1443	1444	1364	90	95	99	99	100	111
29.76	1478	1408	1418	1288	1308	1429	1435	1365	90	94	99	99	100	110
30.00	1478	1413	1444	1294	1301	1439	1432	1364	90	97	99	99	101	112
Max Temp									93	99	99	101	101	112
Max Allowed									581	581	581	582	582	582

APPENDIX C

Photographs

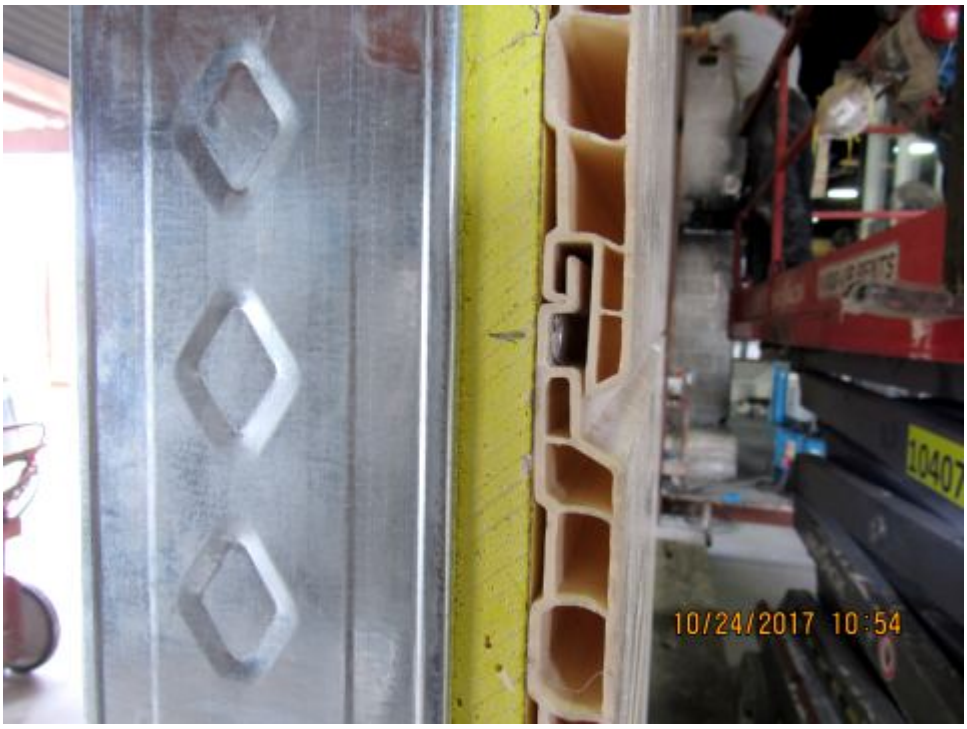
Installation Photos

1. 

2. 

3.

4.



5.

6.

Test Photos

7. 

8. 

9.

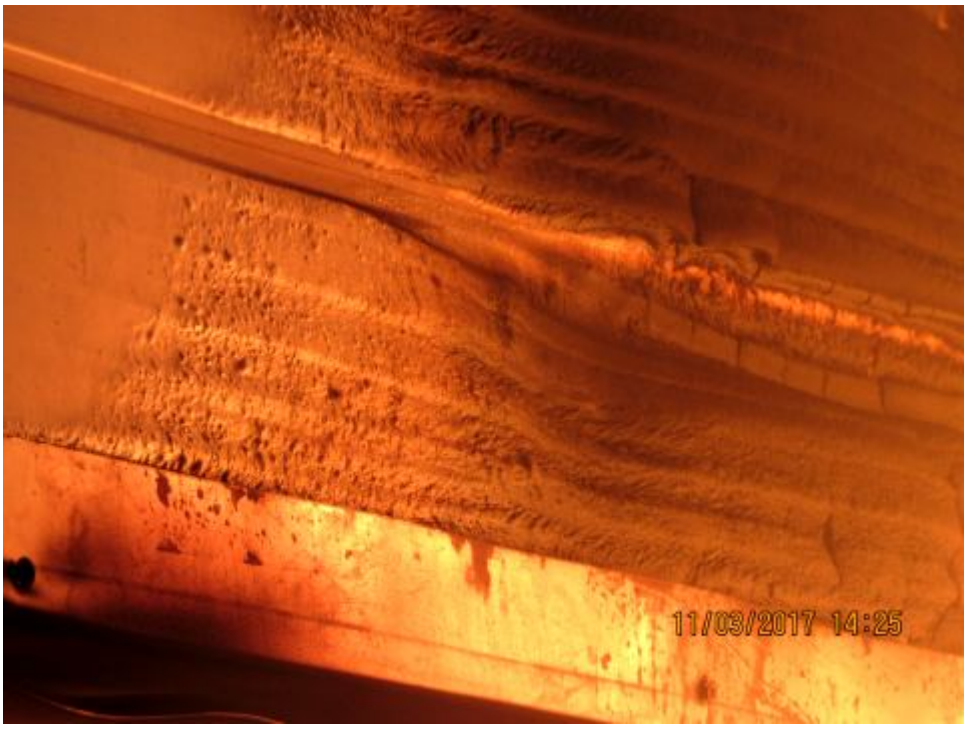
10.

11.

12.

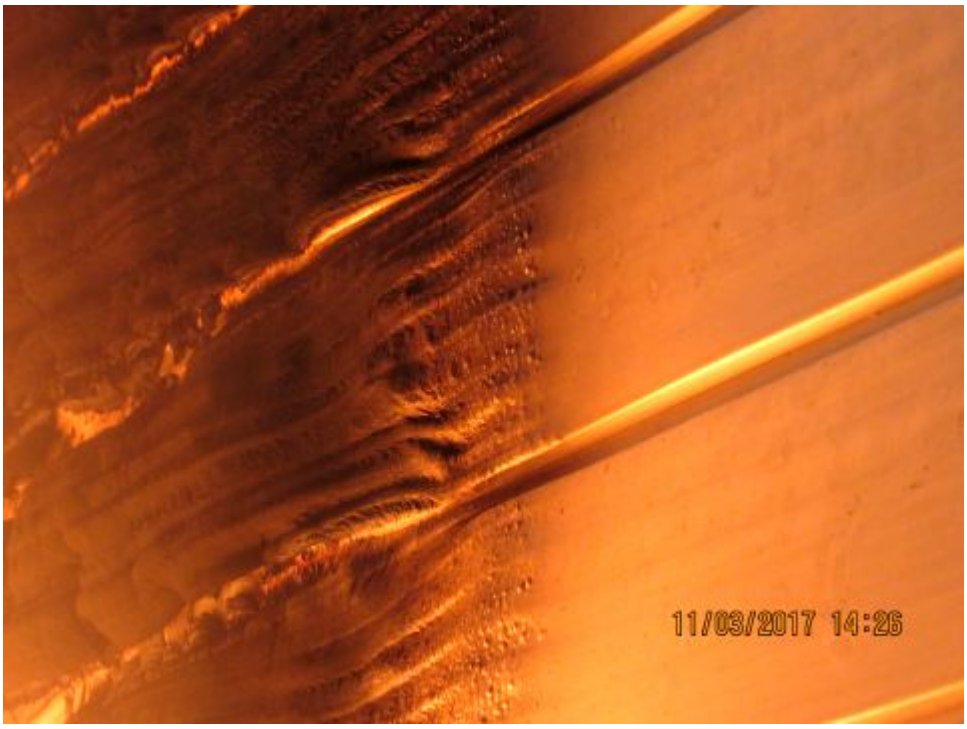
13.

14.



15.

16.



17.

18.

19.

20.

21.

22.

23.

24.

25.

26.

27. 

CALIBRATED INSTRUMENTATION USED FOR TESTING

Description	Serial No.	Calibration Due Date
DAQ	99LE006	3/22/18
Stopwatch	151950635	12/17/17
Stopwatch	160778695	9/21/18
Thermo/hygrometer	170475469	6/28/19

REVISION SUMMARY

DATE	SUMMARY
November 20, 2017	Original Issue Date