



INTERNATIONAL
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NFPA 285
Fire Propagation Characteristics of Exterior Wall Assemblies

TEST REPORT

Rendered to:

CARTER ARCHITECTURAL PANELS INC.

PRODUCT:

Heatlok HFO Pro Spray Foam Insulation (Closed-Cell)
IFTI DC-315 Intumescent Coating
Sher-Cryl HPA Acrylic Coating
3MM EVOPlate coil coated 5052-H32 solid plate
Fusion "Drill Free" MCM Panel attachment system

Report No.:	CAP101920-47
Test Date(s):	08/18/2020
Report Date:	10/21/2020
	45 pages

CAP101920-47
10/21/2020

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Rendered to:

CARTER ARCHITECTURAL PANELS INC.
221 E. Willis Street "A" Unit 18
Chandler, AZ 85286

Report No.:	CAP101920-47
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1.0 General Information

1.1 Product

Heatlok HFO Pro Spray Foam Insulation (Closed-Cell)
IFTI DC-315 Intumescent Coating
Sher-Cryl HPA Acrylic Coating
3MM EVOPlate coil coated 5052-H32 solid plate
Fusion "Drill Free" MCM Panel attachment system

1.2 Project Summary

ICC NTA, LLC was contracted by HUNTSMAN BUILDING SOLUTIONS (DEMILEC (USA) INC.) to evaluate *Heatlok HFO Pro Spray Foam Insulation (Closed-Cell)*, within the wall assembly containing the components listed in **1.1 Product**, in accordance with NFPA 285. Results obtained are tested values and were secured by using the designated test method(s). Testing was conducted at ICC NTA's facility in Bryan, TX.

1.3 Product Description

The wall assembly was constructed with 3-5/8" deep, 20-gauge steel stud framing spaced at 24" On-Center. The studs were fastened to equivalent track using 1/2" pan head, self-drilling framing screws.

Exterior sheathing consisted of 5/8" thick USG SECUROCK Ultralight glass mat sheathing gypsum wallboard secured to the studs with #6 - 1-1/4" bugle head, self-tapping drywall screws. Fastener spacing was 8" O.C around the perimeter and 12" O.C. in the field. Joints were oriented vertically. No joint compound was used on seams or screw heads.

The interior sheathing consisted of 5/8" thick USG Type X gypsum wallboard fastened to framing with #6 1-1/4" bugle head, self-tapping drywall screws. Fasteners were spaced 8" O.C. around the perimeter and 12" O.C. in the field. Joints were oriented vertically and covered with paper joint tape and USG All-Purpose joint compound. All screw heads were covered with joint compound.

The Heatlok HFO Pro Spray Foam Insulation (Closed-Cell) was applied to the inside of the exterior sheathing in between the steel studs at a nominal thickness of 2-1/4".

The Heatlok HFO Pro Spray Foam Insulation (Closed-Cell) was applied on the outside of the exterior sheathing at a nominal thickness of 3-3/4" in between the steel Z-girts.

The exterior spray foam was coated with 18 mils WFT of International Fireproof Technology Inc. DC-315. A volume of 2.9 gallons of coating was applied to 252 sq. ft of wall area, resulting in a theoretical application rate of 87 sq. ft./ gallon. On a 100 sq. ft. basis, this equates to $(100/87) = 1.15$ gallons. The theoretical wet mil for liquids is 16 mil/ gallon, or in this case $1.15 \times 16 = 18.39$ wet mils. The reported volume solids percentage from the manufacturer is 67.1%. The theoretical dry film thickness was $18.39 \times 0.671 = 12.34$ mils. An additional 9 mils WFT with a theoretical application rate of 168 sq. ft/ gallon of Sherwin-Williams Sher-Cryl HPA was applied over the dried intumescent coating per design specifications provided by the client. On a 100 sq. ft. basis, this equates to 0.60 gallons. In this case, the theoretical wet film thickness of the topcoat was 9.52 mils. The reported volume solid percentage of 33%, provided by the manufacturer, the topcoat theoretical dry film thickness was 6.39 mils. The DC-315 and Sherwin Williams Sher-Cryl HPA arrived at the facility on 07/24/2020.

Carter Architectural Panels Inc. contracted their approved fabricator, Pro-Line Panel Systems, LLC to install horizontal Z-girts – 4" depth, 2" legs, 18 ga. steel fastened through the exterior sheathing and 4" deep, 1-1/2" leg, 18 ga. steel C-channel installed around the perimeter of the window opening, with one leg fastened through the exterior sheathing. 3mm EVOPlate 5052-H32, coil coated solid aluminum panels, sourced through Architectural Systems Group, LLC, were installed over the exterior spray foam using the patent Fusion "Drill Free" attachment system by Carter Architectural Panels Inc. Cladding joints were closed with 3MM spline material concealing fasteners so that all panel edges were finished upon completion of installation. Design specifications can be found in **Appendix C - Drawings**.

A window opening was installed 30" above the top of the concrete slab of the first-story test room according to the standard. The final window opening dimensions were 78" wide by 30" tall. The perimeter of the window was covered with 26 ga. aluminum sill flashing, installed by Proline Panel Systems, LLC. Flashing was 11-1/2" deep overlapping exterior of wall by approximately 3-15/16". The flashing was attached to the C-channel using self-tapping screws spaced approximately 15" O.C. The flashing edge protruded beyond the exterior wall approximately 15/16".

Nominal 4 pcf, 4" thick Owens Corning Thermafiber Safing insulation installed within the stud cavity at floor line locations filling the full depth of the stud cavity. Mineral wool safing installed at a 4 in. depth flush with the bottom surface of the floor line. Thermafiber safing was supplied by ICC NTA, LLC.

1.4 Qualifications

ICC NTA in Bryan, TX has demonstrated compliance with ISO/IEC 17025 and is consequently accredited as a Testing Laboratory. ICC NTA is accredited to perform all testing reported herein.

1.5 Product Sampling

Heatlok HFO Pro and A-PMDI ISO were sampled by Intertek B&C personnel for the testing reported herein. The specimen(s) were witnessed during production and tagged prior to shipment, (Reference Intertek B&C Test Specimen Selection Report No. L2062.01-801-47, dated 07/13/2020). All test specimens were supplied by CARTER ARCHITECTURAL PANELS INC.. Specimen arrived at ICC NTA, LLC Southwest facility on 07/21/2020.

DC-315 was sampled by QAI Laboratories personnel for the testing reported herein. The specimen(s) were witnessed during production and tagged prior to shipment, (Reference QAI Laboratories Job No. TJ7162-ENG, dated 08/19/2020). The production of DC-315 took place on 06/23/2020. The test specimen was distributed into eighteen 5-gallon buckets after witnessing. Test specimens were supplied by International Carbide Technology Co. Ltd. Specimen and arrived at ICC NTA, LLC Southwest facility on 07/24/2020.)

1.6 Witnessing

Tony Saucedo of Huntsman Building Solutions (Demilec (USA) Inc.) was present for testing reported herein. Brad Glazier of International Fireproof Technology Inc. was present via video conference calling systems.

1.7 Conditions of Testing

Unless otherwise indicated, all testing reported herein was conducted in ambient laboratory conditions.

2.0 Referenced Standards

NFPA 285-19 – *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*

3.0 Summary of Results

Limits of Flame Propagation (Exterior): **Passed**
Temperatures at 10 feet (Exterior) < 1000° F: **Passed**
Flames in Second-Story Test Room: **Passed**

Temperatures 1 in. away from wall (Second-Story Test Room) < 500°F above ambient temperature: **Passed**
Temperatures of Combustible Materials < 1000° F (Wall Cavity air space) TCs 28, 31-40: **Passed**
Temperatures of Combustible Materials < 750°F (Wall Cavity and Stud Cavity) TCs 55-65 and 68-79: **Passed**

4.0 Test Method

The wall assembly was evaluated in accordance with the following:

- **NFPA 285** – *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*

4.1 General

Purpose

The purpose of this test is to provide a standardized test procedure in order to determine the suitability of exterior wall assemblies and panels utilized as components of curtain wall assemblies. These wall assemblies are constructed using combustible materials or that contain combustible elements for installation on buildings.

Fire testing is conducted in order to evaluate the fire propagation characteristics of exterior wall assemblies and panels used as components in building assemblies. Visual observations and data acquisition of temperatures are utilized in this

test method to assess the wall assemblies ability to resist flame propagation over the exterior face of the test specimen, ability to resist the vertical flame propagation within the combustible components from one story to the next, ability to resist flame propagation on the interior face of the wall from one story to the next, and the ability of the wall assembly to resist lateral flame propagation from the compartment of flame origin to adjacent combustible compartment spaces.

4.2 Test Apparatus

The test apparatus is a two-story structure having a height of 15 ft. 8 in. with a test room on each story constructed of 8 in. nominal concrete block. Each test room has an unfinished inside dimension of 10 ft. wide by 10 ft. deep and an unfinished inside height of 7 ft. The test apparatus was constructed in accordance with the standard. The interior walls and ceiling of the first-story test room are protected with one-layer of 5/8 in. thick Type X gypsum wallboard and one layer of nominal 1-1/2 in. thick, nominal 8lb/ft³ density ceramic fiber insulation. The first-story slab is insulated using two layers of nominal 5/8 in. thick gypsum wallboard.

The first-story test room burner is constructed of nominal 2 in. outside diameter steel pipe with nominal 18 in. diameter holes spaced a nominal 1 in. on-center. The burner holes are located on the top surface of the pipe. The first hole on each side of the room burner is located 3-1/2 ft. from the rear window and continued around the front face of the burner. The pipe is wrapped with a single layer of nominal 8 lb./ft.³ density ceramic fiber blanket. The centerline of the burner is positioned 2-1/2 ft. above the floor surface of the test room.

The window burner is a 60 in. length of 2 in. outside diameter steel pipe with a 1/2 in. wide by 44 in. long slot. The burner is wrapped in nominal 8 lb./ft.³ density ceramic fiber blanket. The burner is mounted to a movable trolley in order to position the burner in the center of the window opening. The burner's horizontal centerline is positioned 9 in. below the bottom surface of the window header. The vertical centerline of the burner is positioned within 0-5 in. from the wall assembly based on the calibration procedure.

4.3 Test Specimens

The core components of the test assembly were provided by ICC NTA, LLC. The gypsum wallboard and steel studs arrived at the testing facility on April 3, 2020. The wall was assembled on April 27, 2020. The Denseglass arrived at the facility on July 6th, 2020. The Heatlok HFO Pro Spray Foam (Closed-Cell), provided by the client, arrived at the facility on July 21st, 2020. For product sampling see **Section 1.5, Product Sampling**.

A representative test specimen was constructed and built under representative conditions of those applied in the field during construction in order to assess the materials, workmanship, and details such as dimensions of parts and all components in the assembly. ICC NTA, LLC personnel constructed a 14' 1-1/2" × 18' 2" wall with the window opening. The wall assembly composed of the 20-gauge steel studs and 5/8" thick USG SecureRock Denseglass wallboard was completed prior to the installation of the SPF. The 5/8" thick USG Type X gypsum wallboard was installed after stud cavity SPF was installed.

4.4 Calibration Summary

ICC NTA, LLC conducted an ISMA calibration on June 11, 2020 with the gas flow rates shown below. Both burners used natural gas. Burner gas flow rates were adjusted accordingly in order to achieve the required temperatures and heat flux as specified within the standard.

Burner Fuel Flow		
Time (min)	Room Burner (CFM)	Window Burner (CFM)
0 - 5	31	0
5 - 10	38	7
10 - 15	45	11
15 - 20	48	14
20 - 25	48	16
25 - 30	50	20
Note: Window Burner - 3" from Wall		

Temperatures (°F) During Calibration									
Time (min)		Avg. Room Temp	Interior Wall	1-ft	2-ft	3-ft	4-ft	5-ft	6-ft
0-5	Range	1036 - 1381	959 - 1278	542 - 772	611 - 815	581 - 775	519 - 692	469 - 692	425 - 566
	Actual	1043	1078	667	711	741	606	580	496
5-10	Range	1211 - 1615	1168 - 1558	783 - 1044	914 - 1218	874 - 1165	772 - 1030	689 - 918	621 - 828
	Actual	1448	1444	856	931	962	912	879	768
10-15	Range	1334 - 1778	1290 - 1720	857 - 1142	1009 - 1345	986 - 1315	884 - 1178	788 - 1050	708 - 944
	Actual	1564	1553	972	1052	1109	1059	1016	880
15-20	Range	1440 - 1920	1420 - 1894	893 - 1190	1065 - 1420	1057 - 1409	957 - 1276	854 - 1139	770 - 1027
	Actual	1642	1618	1055	1147	1205	1186	1134	1005
20-25	Range	1437 - 1916	1418 - 1891	941 - 1255	1121 - 1494	1121 - 1494	1022 - 1362	906 - 1208	824 - 1098
	Actual	1675	1649	1076	1175	1240	1234	1175	1044
25-30	Range	1483 - 1978	1490 - 1986	970 - 1294	1166 - 1555	1183 - 1577	1102 - 1469	995 - 1327	909 - 1212
	Actual	1738	1711	1148	1262	1322	1330	1260	1126

Heat Flux (W/cm²) During Calibration				
Time (min)		HF @ 2-ft	HF @ 3-ft	HF @ 4-ft
0-5	Range	0.7 - 1.1	0.8 - 1.2	0.6 - 1.0
	Actual	1.1	1.2	0.9
5-10	Range	1.5 - 2.3	1.6 - 2.4	1.2 - 1.8
	Actual	1.8	2.2	1.6
10-15	Range	2.0 - 3.0	2.1 - 3.1	1.6 - 2.4
	Actual	2.5	3.0	2.3
15-20	Range	2.3 - 3.5	2.6 - 3.8	2.0 - 3.0
	Actual	2.8	3.5	2.7
20-25	Range	2.7 - 4.1	3.0 - 4.4	2.4 - 3.6
	Actual	3.3	3.8	3.0
25-30	Range	3.0 - 4.6	3.2 - 4.8	2.7 - 4.1
	Actual	4.1	4.7	3.7

4.5 Test Setup and Procedure

The product(s) were setup and evaluated in accordance with the most current version of NFPA 285.

The wall assembly was assembled and fastened to a movable test frame. The test frame with test specimen were placed in front of the test apparatus and secured using ratchet straps. The window burner was set in position at 3" away from the wall and 9" below the top of the window header. Testing was conducted at ICC NTA, Inc. Southwest Laboratory. The thermocouple leads were connected to the data acquisition system in the control room and the connection was verified prior to ignition. The ambient air temperature within the lab was 86.5°F, with a relative humidity of 55.1%

Deviations from the standard include: Thermocouple placement in first story ceiling. Deviations can be found in **Appendix C – Drawings** on **Drawing No. 3**.

4.6 Test Results

At 10:12 AM, the burners were ignited, and the gas flow rates for each burner were controlled following the predetermined setpoints for a period of 30 minutes.

First-Story Test Observations	
0:00	Room Burner Ignited, Test Started
2:13	Flames Exiting the window opening
3:00	Interior sheetrock paper beginning to burn/fall, smoke emitting from right side
5:00	Window Burner Ignited
6:30	Discoloration developing at top corners of window header on ext. panels
9:05	Slight off-gassing emitting at second-story floor line, Flame height at 2 ft.
9:54	Increased off-gassing at top left corner of wall
10:49	Flame height at 3 ft., slight discoloration at horizontal joint
11:53	Scorch mark at 2 ft above window on right panel
12:14	Panel discoloration increasing to 4 ft above window
12:20	Scorch mark growing to approximately 8 in. in diameter
12:41	Top right corner of wall is beginning to offgas
12:48	Panel coating at scorch mark has burned away
13:54	Discoloration on panels upwards to 7 ft. Scorch spot-on right-side panel growing to 1.5 ft in diameter
14:25	Scorch spot developing on left side paneling at 2 ft
15:50	Paneling at 3 ft level beginning to warp
16:00	Scorch spot developing on second right-side panel at 3 ft level.
16:55	Scorching of ext. cladding drifting to left side of second panel at 3 ft
17:12	Increased off-gassing from top left corner of wall
17:30	Window header flashing opened, flames developing from b/w header and stud track
18:46	Header still intact, Right side paneling at 4 ft beginning to warp
19:30	Increased off-gassing, increased warping at bottoms of panels at 3 ft
20:24	Flames at 4 ft above window opening, intermittent at 5 ft
20:29	Flames emitting from behind flashing on window jambs
22:30	Increased off-gassing across the entire top of the wall, increased warping in panels, scorch of paneling has reached 6 ft
23:25	Paneling at 2 ft, center above the window has melted away and flames are emitting from hole in cladding
24:30	Cladding paint has burned away at 7 ft above window
26:50	Aluminum cladding on window header melting away
27:03	Cladding scorch has reached 8 ft above window
27:07	Flames at 5 ft above window, intermittent at 6 ft.

27:36	Increased flame growth stemming from wall where paneling melted away at 2 ft
28:50	Popping can be heard across the ext. wall
30:00	Test Completed, Final flame height of 5 – 5.5 ft. Intermittent at 6 ft

Post Test Observations	
30:02	Continuation of flaming at 2 ft where cladding melted away
30:04	Technician pre-maturely extinguishing flames
30:16	SPF reignites, flaming continuance along window perimeter
31:03	Scorch spot developing at 2 ft above the window on the left panel from within the wall
34:09	Flame at center of wall beginning to self-extinguish
37:00	Flames self-extinguish
40:00	Post-Test Observations completed

Second-Story Test Room Observations	
2:09	Smoking beginning to enter on the left side of the wall
2:51	Smoke entering the room in the center at the floor line
5:49	Increased smoke emitting from the second story floor line
7:56	Smoke beginning to collect in the room
11:35	Increased smoke build-up in the room
16:00	More dense smoke filling the room
19:45	Limited visibility in room
22:35	Limited to no visibility in room
24:00	Increased amount of smoke
26:00	No visibility in second story room
27:00	No change in volume, darker smoke
28:00	No change
30:00	End of Test

Tabular and graphical data can be found in Appendix A.

4.7 Summary and Conclusions

The wall assembly as described in this report met the Conditions of Acceptance of NFPA 285-2019 when exposed to the gas flow rates of the window and room burners.

5.0 Closing Statement

This report contains only findings and results arrived at after employing the specific test procedures listed herein. It does not constitute a recommendation for, endorsement of, or certification of the product or material tested. ICC NTA, LLC makes no warranty, expressed or implied, except that the test has been performed, and a report prepared, based upon the specimen specified by the client. Extrapolation of data, from the test data provided herein, to the batch or lot from which the specimens were obtained may not correlate and should be interpreted with extreme caution. ICC NTA assumes no responsibility for variations in quality, composition, appearance, performance, or other features of similar materials produced by the client, other persons, or under conditions over which ICC NTA has no control. ICC NTA has issued this report for the exclusive use of the client to whom it is addressed. Any use or duplication of this report shall not be made without their consent. This report shall only be reproduced in its entirety.

For ICC NTA, LLC:



Joseph Briski 10/21/2020
Test Engineer



Michael Luna 10/21/2020
Sr. Director

Appendix A – Data

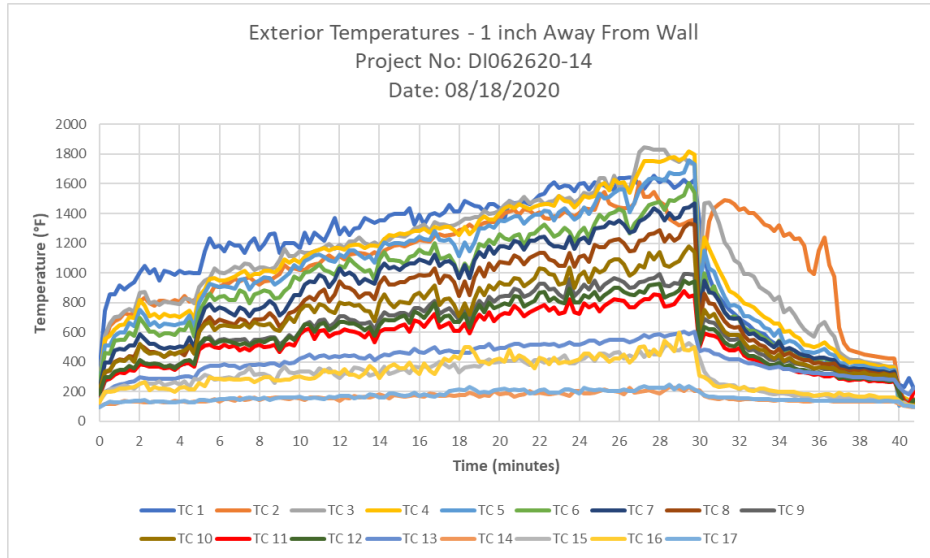


Figure No. 1

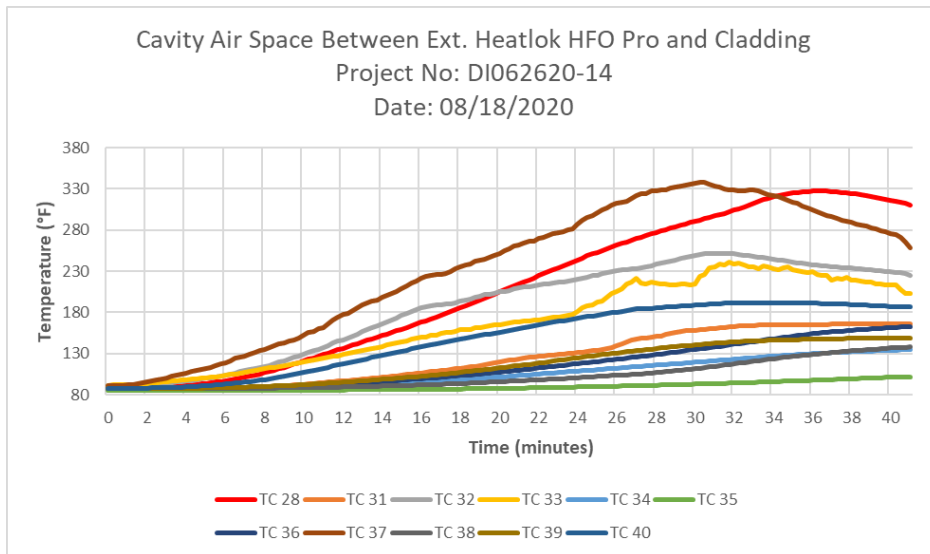


Figure No. 2

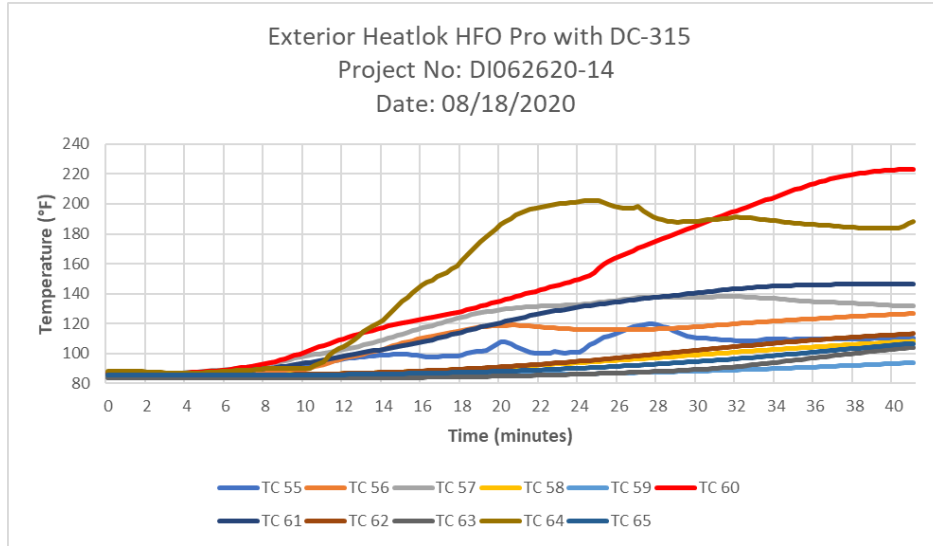


Figure No. 3

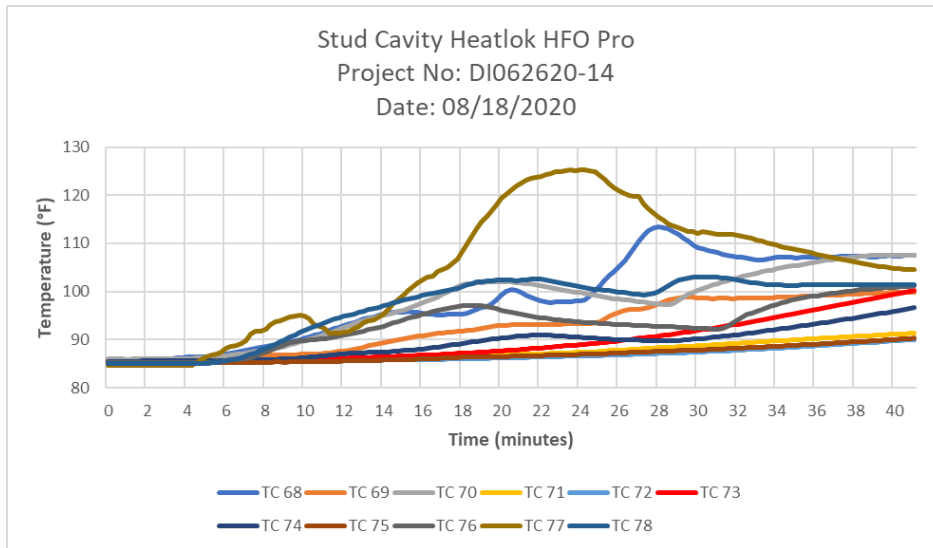


Figure No. 4

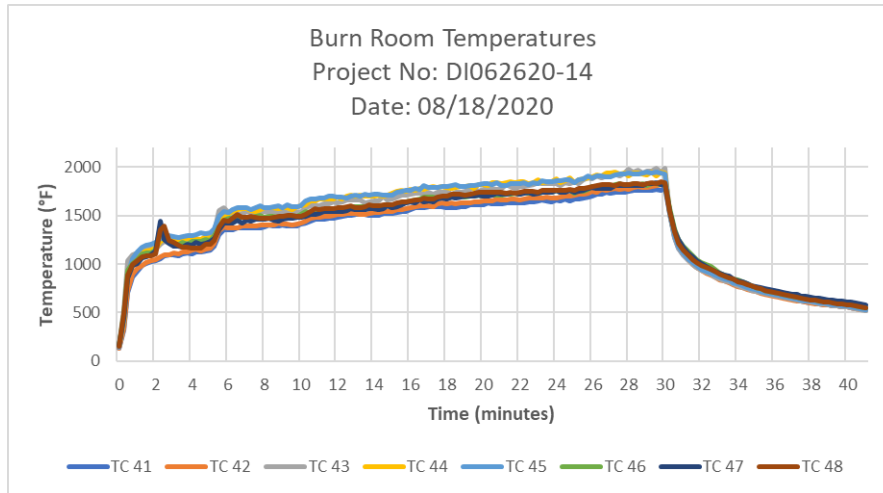


Figure No. 5

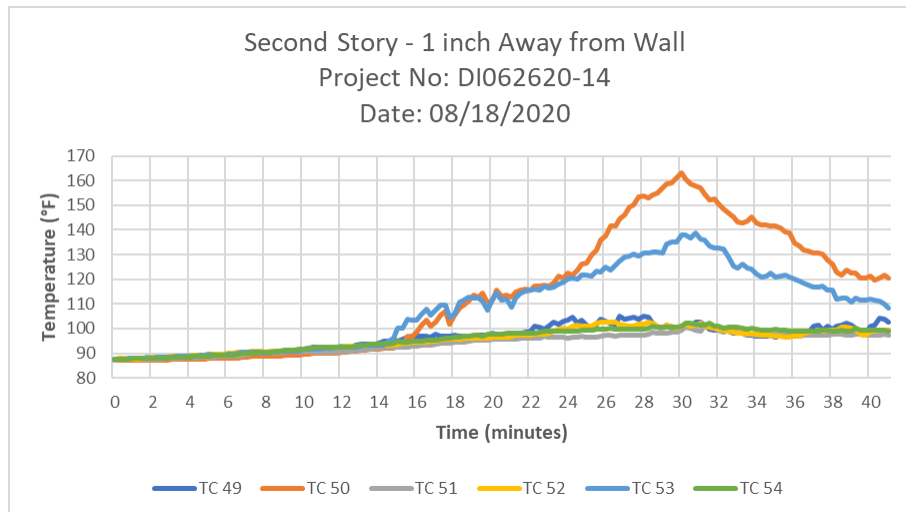


Figure No. 6

TABULAR DATA

Exterior Temperatures - 1 in. Away from Wall																	
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	TC 14	TC 15	TC 16	TC 17
0	91	92	91	91	91	91	91	92	93	92	93	92	94	93	93	93	94
0.25	322	228	244	259	258	250	207	187	167	204	174	179	135	99	133	128	96
0.5	748	539	577	554	508	459	395	330	272	332	279	297	198	118	189	200	117
0.75	854	643	659	578	508	456	397	340	289	349	283	299	213	118	215	200	134
1	853	675	703	622	578	541	475	402	326	397	311	337	234	118	222	205	129
1.25	914	688	706	645	598	549	486	415	341	414	328	347	248	129	230	219	128
1.5	888	727	741	650	600	549	484	409	341	407	324	345	251	136	240	221	131
1.75	916	719	756	701	661	599	509	439	366	431	346	371	264	130	233	225	132
2	935	727	741	699	640	574	510	432	352	400	343	358	268	130	220	230	138
2.25	1004	807	869	818	753	696	587	514	410	520	386	409	297	130	254	255	135
2.5	1048	832	873	780	713	650	556	493	392	479	378	390	289	126	266	262	141
2.75	998	797	796	707	648	604	521	466	386	456	368	383	283	128	253	208	129
3	1026	777	806	725	671	605	524	467	386	459	369	391	285	134	254	232	133
3.25	948	811	786	695	638	577	502	454	379	457	366	382	284	132	269	220	135
3.5	1013	814	805	722	658	593	487	433	359	432	359	365	288	127	242	221	131
3.75	1001	801	803	710	655	591	500	455	380	468	362	373	288	128	255	213	128
4	987	817	794	710	646	583	493	454	366	453	344	355	283	138	262	198	125
4.25	1012	807	787	700	657	618	507	464	385	465	372	386	294	133	245	223	133
4.5	999	846	830	724	664	612	498	445	384	476	390	405	302	132	268	232	140
4.75	1001	804	822	747	713	669	566	509	410	507	392	410	300	128	231	213	127
5	997	814	794	691	624	569	489	457	381	453	366	383	290	133	286	212	127
5.25	997	832	906	844	802	735	659	604	506	605	485	516	341	132	280	256	143
5.5	1147	848	950	888	867	805	763	669	548	651	512	561	361	134	312	237	145
5.75	1232	849	967	961	929	863	788	701	571	671	514	555	371	137	301	295	138
6	1175	907	1028	964	917	818	746	656	528	612	497	521	371	150	283	288	143
6.25	1183	904	1003	947	902	838	765	683	548	643	494	537	372	134	287	287	146
6.5	1145	924	996	946	913	843	758	673	556	646	517	546	385	148	291	279	150
6.75	1206	933	1015	962	903	817	737	662	545	642	498	535	371	148	298	284	154
7	1182	959	1043	976	892	815	710	655	546	638	511	528	375	140	284	282	156
7.25	1184	943	1031	996	956	885	766	693	547	639	477	514	359	161	318	283	146
7.5	1134	957	1065	1014	957	865	750	679	552	658	492	526	374	142	330	287	156
7.75	1198	973	1060	974	888	798	705	644	517	629	480	511	378	150	365	284	158
8	1233	942	1018	994	933	855	752	685	550	672	507	530	377	160	311	264	155
8.25	1154	923	1035	991	948	868	759	686	551	653	516	541	385	141	317	282	149
8.5	1194	944	1033	1014	968	885	771	692	555	650	497	532	377	157	321	299	159
8.75	1259	950	1025	1013	966	873	812	727	563	660	504	555	389	152	303	299	144

Exterior Temperatures - 1 in. Away from Wall																	
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	TC 14	TC 15	TC 16	TC 17
9	1265	969	1037	1004	919	828	782	694	565	620	515	559	390	157	259	275	155
9.25	1133	991	1083	1030	941	834	714	634	515	609	466	485	373	162	328	275	158
9.5	1197	1051	1160	1091	971	875	740	671	544	658	511	536	402	155	370	280	161
9.75	1201	1028	1113	1071	998	905	797	728	582	700	523	568	389	146	329	281	161
10	1198	1028	1112	1089	1051	976	848	739	556	670	508	548	397	158	326	298	158
10.25	1168	1018	1143	1067	1026	952	848	772	602	743	586	604	422	152	335	301	164
10.5	1269	1021	1133	1105	1078	1005	920	819	655	777	616	655	436	145	334	289	153
10.75	1202	1047	1135	1129	1095	1008	940	841	671	777	624	653	449	160	335	287	156
11	1271	1056	1146	1145	1116	1029	938	814	632	733	556	603	423	159	316	290	157
11.25	1244	1063	1159	1156	1122	1057	985	868	681	788	611	653	441	161	359	316	154
11.5	1217	1094	1171	1166	1107	1019	970	886	687	777	612	665	446	156	335	345	149
11.75	1282	1118	1195	1148	1082	1008	905	807	638	745	573	616	428	154	357	328	167
12	1371	1090	1163	1168	1077	985	955	856	663	728	593	636	437	153	312	334	161
12.25	1258	1112	1189	1170	1125	1049	1029	942	705	802	598	666	432	140	289	318	170
12.5	1307	1091	1165	1155	1109	1036	985	905	710	790	622	668	444	158	327	353	170
12.75	1254	1123	1212	1183	1151	1094	1004	902	684	792	607	660	440	153	316	311	169
13	1297	1129	1209	1190	1150	1066	982	878	679	777	604	656	445	170	365	311	152
13.25	1304	1134	1239	1188	1125	1038	927	834	657	786	592	642	428	161	358	296	163
13.5	1371	1127	1197	1165	1096	1010	957	862	657	745	566	612	423	165	342	321	161
13.75	1356	1117	1190	1181	1111	1020	945	862	669	740	604	637	442	160	308	373	180
14	1335	1138	1207	1182	1068	952	929	825	613	677	533	574	413	168	320	348	177
14.25	1354	1108	1184	1180	1155	1090	1022	928	687	799	601	648	434	179	327	291	162
14.5	1354	1150	1227	1229	1207	1139	1064	969	737	855	619	683	450	173	369	336	161
14.75	1388	1169	1224	1257	1189	1084	1028	923	714	798	620	681	447	157	321	365	187
15	1397	1185	1252	1251	1200	1085	1039	923	712	766	622	681	460	174	331	383	189
15.25	1397	1187	1251	1266	1199	1078	1020	937	728	805	640	702	465	173	347	359	177
15.5	1395	1179	1245	1258	1196	1056	1044	936	730	800	650	711	459	165	354	356	171
15.75	1438	1196	1268	1272	1217	1110	1062	962	711	794	604	663	456	168	322	397	176
16	1324	1206	1299	1285	1214	1117	1061	970	763	848	682	740	487	176	370	347	190
16.25	1393	1223	1307	1282	1242	1157	1089	986	763	867	670	722	468	171	364	316	171
16.5	1326	1218	1325	1296	1226	1136	1078	983	741	829	635	694	464	164	367	389	180
16.75	1394	1209	1284	1273	1223	1130	1065	985	784	875	685	744	481	186	364	340	171
17	1404	1250	1340	1308	1280	1201	1124	1028	811	916	723	795	497	180	378	321	163
17.25	1388	1260	1328	1298	1219	1096	1045	933	725	785	631	677	460	171	402	371	180
17.5	1410	1251	1325	1311	1214	1099	1075	979	745	823	645	708	470	172	384	425	176
17.75	1457	1253	1317	1309	1225	1116	1079	977	762	829	661	712	476	175	363	406	203
18	1415	1263	1319	1289	1190	1063	1051	936	722	784	609	668	465	171	382	438	211
18.25	1415	1287	1339	1254	1114	978	963	844	685	706	607	667	465	178	330	422	214
18.5	1484	1297	1364	1308	1204	1066	1051	942	744	794	660	724	463	177	360	499	209

Exterior Temperatures - 1 in. Away from Wall																	
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	TC 14	TC 15	TC 16	TC 17
18.75	1468	1325	1367	1263	1144	1017	963	848	667	718	590	633	459	193	366	501	232
19	1454	1298	1374	1295	1205	1098	1083	971	758	820	668	723	488	181	372	463	213
19.25	1447	1320	1376	1355	1301	1195	1139	1037	811	901	719	785	501	163	365	401	191
19.5	1411	1338	1421	1380	1300	1180	1107	977	774	848	686	735	499	175	400	403	198
19.75	1461	1341	1399	1360	1319	1224	1178	1065	841	913	737	803	519	169	416	382	195
20	1462	1340	1403	1360	1305	1195	1131	1019	806	890	675	760	486	203	394	413	208
20.25	1438	1362	1421	1402	1355	1259	1178	1072	838	935	715	781	496	181	399	420	214
20.5	1366	1404	1457	1437	1346	1231	1177	1066	844	921	731	794	491	189	407	403	221
20.75	1484	1413	1486	1453	1364	1220	1168	1061	843	919	721	785	509	185	409	483	208
21	1466	1426	1466	1435	1383	1250	1216	1118	894	964	779	843	522	168	408	413	213
21.25	1474	1394	1472	1464	1383	1260	1207	1104	881	957	754	838	523	177	428	443	207
21.5	1479	1428	1510	1446	1333	1184	1155	1057	837	910	708	773	506	184	399	429	212
21.75	1462	1417	1466	1432	1372	1258	1218	1100	856	936	736	797	515	206	381	397	189
22	1493	1391	1486	1448	1390	1265	1219	1120	883	967	749	809	516	188	413	357	193
22.25	1521	1407	1493	1456	1393	1301	1237	1134	924	1033	769	869	518	193	410	430	208
22.5	1535	1370	1465	1462	1418	1327	1243	1132	927	1025	781	873	520	186	394	415	212
22.75	1584	1363	1480	1463	1414	1290	1200	1088	886	994	746	811	513	182	415	383	191
23	1610	1381	1482	1453	1352	1243	1180	1082	896	985	768	832	522	187	409	430	194
23.25	1571	1381	1517	1519	1406	1258	1178	1046	855	923	726	804	503	192	414	392	191
23.5	1586	1412	1494	1483	1437	1306	1168	1048	828	932	734	792	513	181	446	401	214
23.75	1586	1397	1505	1479	1398	1279	1245	1137	961	1036	824	894	533	172	389	393	212
24	1549	1379	1475	1444	1360	1211	1164	1043	847	901	733	801	514	205	392	406	203
24.25	1599	1404	1493	1472	1380	1272	1220	1106	879	981	723	801	514	202	414	415	189
24.5	1606	1438	1537	1519	1440	1302	1241	1117	922	1009	794	852	527	189	424	456	223
24.75	1561	1430	1529	1508	1395	1239	1200	1072	886	940	767	831	542	187	450	458	213
25	1609	1422	1548	1519	1462	1334	1299	1191	947	1033	790	870	543	192	406	419	208
25.25	1599	1514	1637	1591	1537	1391	1306	1172	883	1004	741	818	520	206	457	457	214
25.5	1590	1543	1637	1607	1499	1357	1308	1171	921	1021	779	847	538	212	455	436	208
25.75	1565	1467	1562	1558	1512	1395	1343	1209	944	1076	801	874	546	201	441	401	206
26	1561	1450	1655	1626	1538	1409	1334	1222	964	1092	820	900	551	206	461	420	202
26.25	1639	1443	1579	1608	1562	1431	1353	1229	952	1088	819	896	547	196	464	420	203
26.5	1637	1437	1591	1609	1560	1414	1324	1200	939	1058	812	873	549	183	423	450	213
26.75	1645	1436	1563	1539	1405	1265	1271	1144	899	979	769	854	535	226	445	395	204
27	1639	1469	1678	1624	1475	1329	1281	1154	903	1004	769	848	541	191	429	429	205
27.25	1585	1609	1816	1686	1555	1365	1350	1214	940	1055	803	879	559	200	475	500	224
27.5	1567	1510	1845	1754	1602	1416	1366	1225	945	1035	822	866	579	201	433	503	235
27.75	1611	1514	1838	1751	1635	1459	1391	1258	958	1134	821	914	565	209	473	441	226
28	1653	1548	1828	1754	1639	1469	1433	1267	966	1091	855	921	583	197	450	483	227
28.25	1612	1479	1830	1748	1631	1482	1407	1290	991	1138	852	924	584	187	450	446	225

Exterior Temperatures - 1 in. Away from Wall																	
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	TC 14	TC 15	TC 16	TC 17
28.5	1631	1458	1827	1756	1621	1423	1355	1213	914	1052	773	836	573	207	502	546	225
28.75	1610	1363	1778	1777	1675	1489	1404	1255	910	1043	778	847	580	231	516	511	250
29	1574	1342	1764	1781	1668	1482	1363	1215	931	1066	791	859	585	227	478	472	213
29.25	1595	1322	1745	1759	1664	1506	1374	1241	926	1080	832	885	591	218	478	595	240
29.5	1626	1331	1773	1774	1678	1526	1436	1306	991	1136	878	946	605	205	506	485	222
29.75	1596	1350	1745	1819	1761	1603	1440	1331	991	1179	840	927	589	231	527	477	236
30	1625	1360	1729	1798	1731	1538	1467	1323	985	1141	847	944	603	203	493	499	214
30.25	1341	936	972	936	868	774	704	637	593	622	497	516	473	211	428	306	201
30.5	1099	1117	1468	1240	1148	998	950	863	691	751	592	634	484	172	333	296	178
30.75	968	1348	1473	1165	1032	865	873	794	667	700	584	622	476	162	292	275	166
31	889	1437	1419	1089	1011	910	861	789	665	721	578	622	457	156	274	244	163
31.25	837	1463	1338	1021	922	818	810	733	628	664	557	587	452	151	249	229	157
31.5	791	1490	1208	950	840	733	733	673	582	605	493	530	430	158	249	235	158
31.75	752	1487	1160	875	777	694	698	641	551	579	476	508	419	150	240	244	161
32	722	1462	1085	859	785	707	690	629	550	583	478	506	417	148	241	229	158
32.25	691	1423	1064	831	770	686	694	635	560	579	495	530	415	146	216	220	156
32.5	668	1437	993	796	708	631	618	576	513	529	445	467	398	146	231	229	155
32.75	648	1401	992	785	705	611	588	541	479	496	422	441	390	149	217	208	153
33	615	1402	977	769	687	608	595	550	480	506	415	437	389	146	215	206	149
33.25	599	1366	902	729	668	582	561	516	457	484	401	422	379	144	204	222	149
33.5	585	1326	882	700	632	559	546	504	445	475	381	402	370	141	198	220	148
33.75	548	1317	861	685	622	539	521	473	415	443	364	376	355	141	186	207	146
34	526	1282	816	656	578	498	497	463	411	423	371	381	364	140	184	206	142
34.25	497	1319	837	660	614	543	537	489	430	450	377	395	367	141	189	198	143
34.5	483	1248	734	602	527	460	481	443	402	405	353	367	353	141	188	197	144
34.75	461	1265	765	608	546	482	493	459	412	426	365	379	352	140	184	197	145
35	439	1225	716	577	530	475	478	440	390	400	339	357	338	137	171	196	143
35.25	427	1234	664	559	505	441	457	422	387	391	331	344	338	138	178	187	142
35.5	421	1186	617	514	469	427	443	413	379	386	330	343	331	135	162	184	141
35.75	410	1018	593	513	467	427	439	409	368	375	325	334	328	134	164	182	141
36	406	992	571	502	459	408	422	391	353	355	314	323	323	137	170	171	139
36.25	403	1154	643	513	472	417	430	396	361	363	318	331	326	136	170	177	140
36.5	392	1241	669	532	486	424	426	387	353	361	305	319	317	135	177	181	140
36.75	394	1053	606	498	453	404	416	385	351	356	304	318	320	137	166	181	138
37	380	977	572	484	443	402	411	388	354	357	311	324	316	132	159	173	137
37.25	365	633	466	436	398	368	374	353	327	333	286	292	306	133	161	194	139
37.5	363	525	439	419	387	358	368	345	327	330	287	295	307	134	161	176	137
37.75	358	485	418	397	365	333	354	334	318	312	276	284	301	131	159	179	139
38	352	475	413	399	373	346	355	339	320	322	279	290	295	133	155	172	139

Exterior Temperatures - 1 in. Away from Wall																	
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	TC 14	TC 15	TC 16	TC 17
38.25	345	461	410	399	371	344	352	333	315	317	280	287	297	132	160	163	140
38.5	339	449	403	393	372	351	353	339	324	331	285	297	297	130	159	167	140
38.75	340	444	396	383	360	337	344	328	311	315	271	280	291	132	158	174	137
39	345	439	391	378	355	336	339	323	309	311	274	283	287	134	155	173	139
39.25	331	433	384	370	352	330	334	320	310	309	271	281	285	133	162	161	135
39.5	322	428	376	373	355	338	337	324	310	318	271	279	285	132	157	159	136
39.75	321	420	365	361	341	322	324	312	300	308	261	271	282	131	155	158	136
40	317	420	368	362	346	327	333	320	306	312	268	280	282	131	150	161	135
40.25	246	202	174	110	103	169	207	212	217	206	192	191	233	114	124	138	130
40.5	231	142	136	158	142	133	128	123	137	145	135	106	197	102	125	113	107
40.75	289	138	138	144	132	121	118	113	113	117	113	107	184	100	105	113	106
41	221	150	133	144	137	136	138	129	144	124	202	143	223	95	95	105	100

Cavity Air Space Temperatures between Ext. Heatlok HFO Pro and Cladding													
Time(min)	TC 18	TC 19	TC 20	TC 21	TC 22	TC 23	TC 24	TC 25	TC 26	TC 27	TC 28	TC 29	TC 30
0	89	89	89	87	90	91	87	85	87	91	87	87	88
0.25	89	89	89	87	90	92	87	85	87	91	87	87	88
0.5	89	89	89	87	90	92	87	85	87	91	87	87	88
0.75	90	89	89	87	91	92	87	85	87	91	87	87	88
1	90	89	89	87	91	92	87	85	87	92	87	87	88
1.25	90	89	89	87	91	92	87	85	87	93	87	87	88
1.5	90	89	89	87	91	93	87	85	87	93	87	87	88
1.75	90	89	89	87	91	93	87	85	87	94	87	87	88
2	91	89	89	87	92	94	87	85	87	95	87	87	88
2.25	91	89	89	87	92	94	87	85	87	96	87	87	88
2.5	91	89	89	87	93	95	87	85	87	98	87	87	88
2.75	91	89	89	87	93	95	87	85	87	99	87	87	88
3	91	90	89	87	94	96	87	85	87	100	87	87	88
3.25	92	90	90	87	94	96	87	85	87	102	87	88	89
3.5	92	90	90	87	95	97	87	85	87	103	87	88	89
3.75	92	90	91	87	96	98	87	85	87	105	87	88	89
4	93	90	91	88	97	98	87	85	87	106	87	88	89
4.25	93	91	92	88	97	99	87	85	87	108	87	88	90
4.5	93	91	92	88	98	99	87	85	88	109	87	88	90
4.75	94	91	93	88	99	100	87	85	88	110	87	88	90
5	94	91	94	88	100	100	87	85	88	112	87	88	91
5.25	94	91	94	88	101	101	87	85	88	113	87	88	91
5.5	95	92	95	88	102	102	87	85	88	115	87	88	92
5.75	95	92	96	88	103	103	87	85	88	117	87	88	92
6	96	92	97	88	104	103	87	85	88	119	88	89	93
6.25	96	93	98	89	105	104	88	85	88	121	88	89	93
6.5	97	93	99	89	106	105	88	85	88	124	88	89	94
6.75	97	93	100	89	108	106	88	85	89	125	88	89	95

Cavity Air Space Temperatures between Ext. Heatlok HFO Pro and Cladding													
Time(min)	TC 18	TC 19	TC 20	TC 21	TC 22	TC 23	TC 24	TC 25	TC 26	TC 27	TC 28	TC 29	TC 30
7	98	94	101	89	109	107	88	85	89	127	88	89	95
7.25	98	94	103	89	110	108	88	85	89	129	88	89	96
7.5	99	94	104	89	111	109	88	85	89	131	88	90	97
7.75	99	95	105	89	113	110	88	85	89	134	88	90	98
8	100	95	107	90	114	111	88	85	89	135	88	90	98
8.25	100	95	108	90	115	112	88	85	89	137	88	90	99
8.5	101	96	110	90	117	113	88	85	90	140	88	90	100
8.75	102	96	112	91	120	114	88	85	90	141	88	91	101
9	102	96	113	91	121	116	89	85	90	143	88	91	102
9.25	103	97	115	91	123	117	89	85	90	145	88	91	104
9.5	103	97	117	92	125	118	89	85	91	146	88	91	105
9.75	104	98	119	92	127	119	89	86	91	149	88	92	106
10	105	98	121	93	130	120	89	86	91	152	88	92	107
10.25	106	99	123	93	132	121	89	86	91	155	88	92	108
10.5	107	99	125	94	133	122	89	86	92	157	89	93	110
10.75	108	99	127	94	135	123	90	86	92	160	89	93	111
11	109	100	129	94	137	124	90	86	92	161	89	93	112
11.25	110	100	131	95	140	125	90	86	92	166	89	94	113
11.5	111	101	133	96	143	126	90	86	93	170	89	94	115
11.75	113	101	134	96	145	127	90	86	93	174	89	95	116
12	115	102	136	97	147	129	91	86	93	177	89	95	117
12.25	116	102	138	97	149	130	91	86	94	179	89	95	119
12.5	118	103	140	98	151	131	91	86	94	182	89	96	120
12.75	119	103	142	98	154	132	91	86	94	185	90	96	121
13	121	104	144	99	156	134	91	86	95	189	90	97	122
13.25	123	104	146	99	159	135	92	86	95	191	90	97	124
13.5	125	105	148	100	161	136	92	86	95	193	90	98	125
13.75	127	105	150	100	163	137	92	86	96	195	90	98	126
14	128	106	152	101	166	139	92	86	96	198	90	98	127
14.25	129	106	154	102	168	140	93	86	96	201	91	99	129
14.5	131	107	156	102	171	142	93	86	97	203	91	99	130
14.75	132	107	158	103	173	143	93	86	97	205	91	100	131
15	134	108	159	104	176	144	94	86	98	208	91	100	133
15.25	134	108	161	104	179	146	94	86	98	212	91	101	134
15.5	135	109	164	105	181	147	94	86	98	215	91	101	136
15.75	136	110	166	106	184	148	95	86	99	218	92	102	137
16	137	110	168	106	185	150	95	86	99	221	92	102	138
16.25	137	111	170	107	187	150	95	86	100	224	92	103	139
16.5	138	112	172	108	188	152	96	86	100	225	92	103	140
16.75	138	112	174	109	189	153	96	87	101	226	92	104	141
17	137	113	176	109	189	154	96	87	101	226	93	105	142
17.25	138	113	179	110	190	155	97	87	102	227	93	105	144
17.5	138	114	181	111	191	156	97	87	102	230	93	106	145
17.75	139	115	183	111	192	157	98	87	103	233	93	106	146
18	139	116	185	112	193	159	98	87	103	236	94	107	147
18.25	140	116	188	113	194	159	98	87	104	238	94	108	148
18.5	141	117	190	114	196	160	99	87	104	239	94	108	149
18.75	143	118	193	115	198	161	99	87	105	242	94	109	150
19	143	119	195	115	200	162	100	87	105	243	95	110	152
19.25	144	120	197	116	201	163	100	87	106	245	95	110	153
19.5	144	121	200	117	202	163	100	87	106	247	95	111	154
19.75	145	122	202	118	204	165	101	87	107	250	95	112	155
20	145	123	205	120	205	165	101	87	107	252	96	112	156
20.25	145	124	207	121	205	166	102	88	108	255	96	113	157
20.5	147	126	210	122	207	167	102	88	109	257	96	114	158
20.75	148	127	212	123	208	168	103	88	109	260	96	115	160
21	150	128	215	123	210	169	103	88	110	262	97	115	161
21.25	151	129	217	124	211	169	104	88	110	264	97	116	162
21.5	153	130	220	125	211	170	104	88	111	267	97	117	163
21.75	155	132	222	126	212	170	105	88	112	267	98	118	164

Cavity Air Space Temperatures between Ext. Heatlok HFO Pro and Cladding													
Time(min)	TC 18	TC 19	TC 20	TC 21	TC 22	TC 23	TC 24	TC 25	TC 26	TC 27	TC 28	TC 29	TC 30
22	157	133	224	127	213	171	105	88	112	270	98	118	165
22.25	159	134	227	127	214	172	105	88	113	272	98	119	166
22.5	162	136	229	128	215	173	106	89	114	274	99	120	167
22.75	165	137	232	128	216	174	106	89	114	275	99	121	168
23	168	139	234	129	217	174	107	89	115	277	99	122	169
23.25	171	140	237	129	217	175	107	89	116	278	100	122	170
23.5	174	141	239	130	218	176	108	89	116	280	100	123	171
23.75	178	142	241	130	219	177	108	89	117	282	100	124	172
24	183	143	244	131	220	181	109	89	118	287	101	125	173
24.25	188	145	246	132	221	186	109	89	118	291	101	126	174
24.5	192	146	249	133	223	188	110	89	119	295	101	126	175
24.75	197	147	251	133	224	189	110	90	120	298	102	127	176
25	203	148	253	134	225	193	110	90	120	301	102	128	177
25.25	206	149	255	135	227	194	111	90	121	304	102	128	178
25.5	212	151	258	136	228	198	111	90	122	307	103	129	179
25.75	220	152	260	137	229	203	112	90	122	310	103	130	179
26	230	153	262	139	230	206	112	90	123	313	103	131	180
26.25	242	155	264	141	231	208	113	90	124	314	104	131	181
26.5	256	157	266	144	232	214	113	91	124	316	104	132	182
26.75	272	160	268	146	233	216	114	91	125	319	105	133	183
27	286	162	270	148	233	222	114	91	126	322	105	133	185
27.25	269	163	272	148	234	216	115	91	127	324	105	134	184
27.5	271	163	273	149	235	214	115	91	127	325	106	135	185
27.75	276	164	275	150	237	216	115	91	128	327	106	135	185
28	285	165	277	150	238	216	116	91	129	327	107	136	185
28.25	294	166	279	152	240	214	116	92	130	329	107	137	186
28.5	305	166	281	153	241	214	117	92	130	329	108	137	186
28.75	316	166	282	155	242	213	117	92	131	331	108	138	187
29	326	166	284	156	244	213	118	92	132	332	109	138	187
29.25	338	166	286	157	245	214	118	92	133	333	110	139	188
29.5	348	166	288	158	247	214	119	92	133	335	110	139	188
29.75	356	167	289	158	248	213	119	93	134	336	111	140	188
30	368	167	291	158	249	214	119	93	135	336	112	140	189
30.25	369	168	292	159	251	223	120	93	136	338	112	141	189
30.5	355	169	294	159	251	226	120	93	137	338	113	141	190
30.75	342	171	296	160	252	234	121	93	137	336	114	142	190
31	334	172	297	160	252	235	121	93	138	334	114	142	190
31.25	326	174	299	161	252	238	122	94	139	332	115	143	191
31.5	323	175	300	162	252	238	122	94	140	330	116	143	191
31.75	313	176	302	162	251	241	123	94	140	329	117	144	191
32	303	178	304	163	251	238	123	94	141	329	118	144	191
32.25	288	181	306	163	250	240	124	94	142	328	118	144	192
32.5	285	184	308	164	250	237	124	95	143	328	119	145	192
32.75	280	188	310	164	249	235	125	95	144	329	120	145	192
33	270	193	313	164	248	235	125	95	145	329	121	145	192
33.25	261	194	315	164	247	233	125	95	145	327	121	145	192
33.5	254	195	317	165	246	237	126	95	146	325	122	146	192
33.75	248	196	319	165	245	236	126	96	147	323	123	146	192
34	243	198	320	165	245	233	127	96	148	322	124	146	192
34.25	238	200	322	165	244	232	127	96	149	320	124	146	192
34.5	233	201	323	165	243	234	128	96	150	318	125	146	192
34.75	228	202	324	165	242	235	128	96	150	316	126	147	192
35	222	203	325	165	241	231	128	97	151	314	126	147	191
35.25	219	204	326	165	240	231	129	97	152	312	127	147	191
35.5	215	204	326	165	240	230	129	97	153	309	128	147	191
35.75	212	204	327	165	239	229	129	97	153	307	128	147	191
36	210	203	327	165	238	230	130	97	154	305	129	147	191
36.25	208	203	327	165	237	226	130	98	155	303	129	147	191
36.5	206	202	327	165	237	225	130	98	155	300	130	148	191
36.75	204	201	327	165	236	225	131	98	156	298	131	148	191

Cavity Air Space Temperatures between Ext. Heatlok HFO Pro and Cladding													
Time(min)	TC 18	TC 19	TC 20	TC 21	TC 22	TC 23	TC 24	TC 25	TC 26	TC 27	TC 28	TC 29	TC 30
37	200	201	327	165	236	219	131	98	156	296	131	148	190
37.25	199	200	326	166	235	221	131	99	157	294	132	148	190
37.5	197	199	326	166	235	220	131	99	157	292	132	148	190
37.75	195	199	325	166	234	222	132	99	158	291	133	148	190
38	194	198	325	166	234	219	132	99	158	289	133	148	189
38.25	192	197	324	166	233	219	132	99	159	287	134	148	189
38.5	191	196	323	166	233	218	133	100	159	286	134	148	189
38.75	190	195	322	166	232	216	133	100	160	284	135	148	189
39	190	194	321	166	232	216	133	100	160	283	135	149	188
39.25	188	194	320	166	231	215	133	100	160	281	135	149	188
39.5	188	193	319	166	231	215	133	101	161	279	136	149	188
39.75	187	192	318	166	230	213	134	101	161	278	136	149	187
40	186	191	316	166	229	214	134	101	161	276	137	149	187
40.25	189	190	315	166	229	213	134	101	162	274	137	149	187
40.5	200	190	314	166	228	208	134	101	162	271	137	149	187
40.75	187	188	312	166	227	203	134	102	162	265	138	149	186
41	179	187	311	166	225	202	135	102	163	258	138	149	186

Half the Depth of Exterior Heatlok HFO Pro Spray Foam											
Time(min)	TC 55	TC 56	TC 57	TC 58	TC 59	TC 60	TC 61	TC 62	TC 63	TC 64	TC 65
0	86	87	87	85	85	87	86	85	84	88	85
0.25	86	87	87	85	85	87	86	85	84	88	85
0.5	86	87	87	85	85	87	86	85	84	88	85
0.75	86	87	87	85	85	87	86	85	84	88	85
1	86	87	87	85	85	87	86	85	84	88	85
1.25	86	87	87	85	85	87	86	85	84	88	85
1.5	86	87	87	85	85	87	86	85	84	88	86
1.75	86	87	87	85	85	87	86	85	84	88	86
2	86	87	87	85	85	87	86	85	84	88	86
2.25	86	87	87	85	85	87	86	85	84	88	86
2.5	86	87	87	85	85	87	86	86	84	88	86
2.75	86	87	87	85	85	87	86	85	84	87	86
3	86	87	87	85	85	87	86	86	84	87	86
3.25	86	87	87	85	85	87	86	86	84	87	86
3.5	87	87	87	85	85	87	86	86	84	87	86
3.75	87	87	87	85	85	87	87	86	84	87	86
4	87	87	87	85	85	87	87	86	84	87	86
4.25	87	87	88	85	85	87	87	86	84	87	86
4.5	87	87	88	85	85	87	87	86	84	87	86
4.75	87	87	88	85	85	88	87	86	84	87	86
5	87	87	88	86	85	88	87	86	84	87	86
5.25	87	87	89	86	85	88	87	86	84	88	86
5.5	87	87	89	86	85	88	87	86	84	88	86
5.75	87	87	89	86	85	89	88	86	84	88	86
6	88	87	89	86	85	89	88	86	84	88	86

Half the Depth of Exterior Heatlok HFO Pro Spray Foam											
Time(min)	TC 55	TC 56	TC 57	TC 58	TC 59	TC 60	TC 61	TC 62	TC 63	TC 64	TC 65
6.25	88	87	90	86	85	90	88	86	84	89	86
6.5	88	87	90	86	85	90	88	86	84	89	86
6.75	88	87	90	86	85	90	89	86	84	89	86
7	89	87	91	86	85	91	89	86	84	89	86
7.25	89	87	91	86	85	91	89	86	84	89	86
7.5	89	87	92	86	85	92	89	86	84	89	86
7.75	89	87	92	86	85	93	90	86	84	90	86
8	89	87	93	86	85	93	90	86	84	90	86
8.25	89	87	93	86	85	94	90	86	84	90	86
8.5	90	88	94	86	85	95	91	86	84	90	86
8.75	90	88	95	86	85	96	91	86	84	90	86
9	90	88	95	86	85	97	92	86	84	90	86
9.25	91	88	96	86	85	98	92	86	84	90	86
9.5	91	89	97	86	85	99	93	86	84	90	86
9.75	91	89	97	86	85	100	93	86	84	90	86
10	92	90	98	86	85	101	94	86	84	90	86
10.25	92	90	99	86	85	102	94	86	84	90	86
10.5	93	91	99	86	85	103	95	86	84	92	86
10.75	94	92	100	86	85	104	95	86	84	93	86
11	94	93	100	86	85	106	96	86	84	95	86
11.25	95	94	101	86	85	107	97	86	84	99	86
11.5	95	95	102	87	85	108	97	87	84	102	86
11.75	96	96	102	87	85	109	98	87	84	103	86
12	96	97	103	87	85	110	98	87	84	105	86
12.25	97	98	103	87	85	111	99	87	84	107	86
12.5	97	98	104	87	85	112	100	87	84	109	86
12.75	98	99	105	87	85	113	100	87	84	112	86
13	98	100	106	87	85	114	101	87	84	115	86
13.25	98	101	107	87	85	115	101	87	84	117	86
13.5	99	101	107	87	85	116	102	87	84	119	86
13.75	99	102	108	87	85	117	102	87	84	120	86
14	99	103	109	87	85	117	103	87	84	122	86
14.25	99	104	110	88	85	118	104	88	84	126	86
14.5	99	105	111	88	85	119	104	88	84	129	86
14.75	99	106	112	88	85	120	105	88	84	132	86
15	99	107	113	88	85	121	105	88	84	135	87
15.25	99	108	114	88	85	121	106	88	84	137	87
15.5	99	109	115	88	85	122	107	88	84	141	87
15.75	99	110	116	88	85	122	107	88	84	143	87
16	98	110	117	88	85	123	108	88	84	146	87
16.25	98	111	118	89	85	124	109	89	84	148	87
16.5	98	112	119	89	85	124	109	89	84	149	87
16.75	98	112	120	89	85	125	110	89	84	151	87
17	98	113	121	89	85	126	111	89	84	153	87
17.25	99	113	122	89	85	126	112	89	84	154	87
17.5	99	114	123	89	85	127	113	89	84	156	87
17.75	98	115	124	89	85	128	114	89	84	159	87
18	99	115	124	90	85	128	114	90	84	162	87
18.25	100	116	125	90	85	129	115	90	84	165	88
18.5	101	117	126	90	85	130	116	90	85	169	88
18.75	101	117	127	90	85	131	117	90	85	172	88
19	101	118	127	90	85	132	118	90	85	175	88
19.25	102	118	128	90	86	133	119	91	85	178	88
19.5	104	119	128	91	86	134	119	91	85	180	88
19.75	106	119	129	91	86	134	120	91	85	183	88
20	108	119	129	91	86	135	121	91	85	186	88
20.25	108	119	130	91	86	136	121	91	85	188	88
20.5	107	119	130	91	86	137	122	92	85	190	88
20.75	105	119	131	91	86	138	123	92	85	192	89
21	103	119	131	92	86	139	124	92	85	194	89

Half the Depth of Exterior Heatlok HFO Pro Spray Foam											
Time(min)	TC 55	TC 56	TC 57	TC 58	TC 59	TC 60	TC 61	TC 62	TC 63	TC 64	TC 65
21.25	102	119	131	92	86	140	125	92	85	195	89
21.5	101	118	131	92	86	141	125	92	85	196	89
21.75	100	118	132	92	86	142	126	93	85	197	89
22	100	118	132	92	86	143	127	93	86	198	89
22.25	100	118	132	93	86	143	127	93	86	198	89
22.5	100	117	132	93	86	144	128	93	86	199	89
22.75	101	117	132	93	86	145	128	94	86	199	90
23	101	117	132	93	86	146	129	94	86	200	90
23.25	100	117	132	93	86	147	130	94	86	201	90
23.5	101	116	132	94	86	148	130	94	86	201	90
23.75	101	116	133	94	86	149	131	95	86	201	90
24	101	116	133	94	86	150	131	95	86	202	90
24.25	103	116	133	94	86	151	132	95	86	202	90
24.5	106	116	133	94	87	152	132	96	86	202	91
24.75	107	116	134	95	87	154	133	96	87	202	91
25	109	116	134	95	87	157	133	96	87	202	91
25.25	111	116	135	95	87	160	133	96	87	201	91
25.5	112	116	135	95	87	162	134	97	87	200	91
25.75	113	116	135	95	87	163	134	97	87	199	91
26	114	116	136	96	87	165	135	97	87	198	92
26.25	116	116	136	96	87	166	135	98	87	197	92
26.5	117	116	137	96	87	168	136	98	87	197	92
26.75	118	116	137	96	87	169	136	98	87	197	92
27	118	116	138	97	87	170	137	98	88	198	92
27.25	119	116	138	97	87	172	137	99	88	195	92
27.5	120	116	138	97	87	173	137	99	88	193	93
27.75	120	116	137	97	88	174	137	99	88	191	93
28	119	117	137	97	88	176	138	100	88	190	93
28.25	118	117	138	98	88	177	138	100	88	189	93
28.5	117	117	137	98	88	178	138	100	88	188	93
28.75	116	117	137	98	88	179	139	101	89	188	94
29	114	117	137	98	88	181	139	101	89	188	94
29.25	113	117	137	98	88	182	140	101	89	188	94
29.5	111	118	137	99	88	183	140	102	89	188	94
29.75	111	118	137	99	88	185	140	102	89	188	94
30	111	118	137	99	88	186	141	102	89	188	95
30.25	110	118	138	99	88	187	141	103	90	189	95
30.5	110	119	138	100	88	188	141	103	90	189	95
30.75	110	119	138	100	89	190	142	103	90	190	95
31	109	119	138	100	89	191	142	103	90	190	96
31.25	109	119	138	100	89	192	142	104	90	190	96
31.5	109	120	138	100	89	193	143	104	91	190	96
31.75	109	120	138	101	89	194	143	104	91	191	96
32	109	120	138	101	89	195	143	105	91	191	97
32.25	109	120	138	101	89	197	144	105	92	191	97
32.5	109	121	138	101	89	198	144	105	92	191	97
32.75	108	121	138	102	89	199	144	106	92	191	97
33	109	121	137	102	90	200	144	106	93	190	98
33.25	109	121	137	102	90	201	145	106	93	190	98
33.5	110	121	137	102	90	203	145	106	93	189	98
33.75	110	122	137	103	90	204	145	107	94	189	98
34	110	122	137	103	90	205	145	107	94	189	99
34.25	110	122	136	103	90	206	145	107	95	188	99
34.5	110	122	136	103	90	207	145	108	95	188	99
34.75	109	122	136	103	90	208	145	108	95	188	100
35	110	123	136	104	91	210	146	108	96	187	100
35.25	110	123	135	104	91	211	146	108	96	187	100
35.5	110	123	135	104	91	212	146	109	96	187	100
35.75	110	123	135	104	91	213	146	109	97	186	101
36	110	123	135	105	91	214	146	109	97	186	101

Half the Depth of Exterior Heatlok HFO Pro Spray Foam											
Time(min)	TC 55	TC 56	TC 57	TC 58	TC 59	TC 60	TC 61	TC 62	TC 63	TC 64	TC 65
36.25	110	124	135	105	91	215	146	109	98	186	101
36.5	110	124	134	105	91	216	146	110	98	186	102
36.75	110	124	134	105	91	216	146	110	98	185	102
37	110	124	134	105	92	217	146	110	99	185	102
37.25	110	124	134	106	92	218	146	110	99	185	103
37.5	110	124	134	106	92	219	146	111	99	185	103
37.75	110	125	134	106	92	219	146	111	100	184	103
38	110	125	133	106	92	220	146	111	100	184	103
38.25	110	125	133	106	92	220	146	111	101	184	104
38.5	110	125	133	106	92	221	146	111	101	184	104
38.75	110	125	133	107	93	221	146	112	101	184	104
39	110	125	133	107	93	222	146	112	102	184	105
39.25	110	126	133	107	93	222	146	112	102	184	105
39.5	110	126	133	107	93	222	146	112	102	184	105
39.75	110	126	132	107	93	223	146	112	103	184	105
40	110	126	132	108	93	223	146	113	103	184	106
40.25	110	126	132	108	93	223	146	113	103	184	106
40.5	110	126	132	108	94	223	146	113	104	185	106
40.75	110	127	132	108	94	223	146	113	104	187	107
41	111	127	132	108	94	223	146	113	104	188	107

Half the Depth of Stud Cavity Heatlok HFO Pro Spray Foam											
Time(min)	TC 68	TC 69	TC 70	TC 71	TC 72	TC 73	TC 74	TC 75	TC 76	TC 77	TC 78
0	86	86	86	85	85	85	85	85	85	85	85
0.25	86	86	86	85	85	85	85	85	85	85	85
0.5	86	86	86	85	85	85	85	85	85	85	85
0.75	86	86	86	85	85	85	85	85	85	85	85
1	86	86	86	85	85	85	85	85	85	85	85
1.25	86	86	86	85	85	85	85	85	85	85	85
1.5	86	86	86	85	85	85	86	85	85	85	85
1.75	86	86	86	85	85	85	86	85	85	85	85
2	86	86	86	85	85	85	86	85	85	85	85
2.25	86	86	86	85	85	85	86	85	85	85	85
2.5	86	86	86	85	85	85	86	85	85	85	85
2.75	86	86	86	85	85	85	86	85	85	85	85
3	86	86	86	85	85	85	86	85	85	85	85
3.25	86	86	86	85	85	85	86	85	85	85	85
3.5	86	86	86	85	85	85	86	85	85	85	85
3.75	86	86	86	85	85	85	86	85	85	85	85
4	86	86	86	85	85	86	86	85	85	85	85
4.25	86	86	86	85	85	86	86	85	85	85	85
4.5	86	86	86	85	85	86	86	85	85	85	85
4.75	86	86	86	85	85	86	86	85	85	86	85
5	86	86	86	85	85	86	86	85	85	86	85
5.25	87	86	86	85	85	86	86	85	85	87	85
5.5	87	86	86	85	85	86	86	85	85	87	85
5.75	87	86	87	85	85	86	86	85	86	87	85

Half the Depth of Stud Cavity Heatlok HFO Pro Spray Foam											
Time(min)	TC 68	TC 69	TC 70	TC 71	TC 72	TC 73	TC 74	TC 75	TC 76	TC 77	TC 78
6	87	86	87	85	85	86	86	85	86	88	86
6.25	87	86	87	85	85	86	86	85	86	89	86
6.5	87	86	87	85	85	86	86	85	86	89	86
6.75	88	86	87	85	85	86	86	85	86	89	86
7	88	86	87	85	85	86	86	85	86	90	87
7.25	88	87	87	85	85	86	86	85	86	91	87
7.5	88	87	88	85	85	86	86	85	87	92	87
7.75	88	87	88	85	85	86	86	85	87	92	88
8	89	87	88	85	85	86	86	85	87	92	88
8.25	89	87	88	85	85	86	86	85	88	93	89
8.5	89	87	88	85	85	86	86	85	88	94	89
8.75	89	87	88	85	85	86	86	85	89	94	90
9	89	87	89	85	85	86	86	85	89	94	90
9.25	90	87	89	85	85	86	86	85	89	95	91
9.5	90	87	89	85	85	86	86	85	90	95	91
9.75	90	87	89	85	86	86	86	85	90	95	91
10	90	87	90	85	86	86	86	85	90	95	92
10.25	91	87	90	85	86	86	86	85	90	94	92
10.5	91	87	90	85	86	86	86	85	90	93	93
10.75	91	87	91	86	86	86	87	85	90	93	93
11	92	87	91	85	86	86	87	85	90	92	94
11.25	92	87	91	86	86	86	87	86	90	91	94
11.5	92	87	92	86	86	86	87	86	91	91	94
11.75	93	88	92	86	86	86	87	86	91	91	95
12	93	88	93	86	86	86	87	86	91	92	95
12.25	93	88	93	86	86	86	87	86	91	92	95
12.5	94	88	93	86	86	86	87	86	91	92	95
12.75	94	88	94	86	86	86	87	86	92	93	96
13	94	88	94	86	86	86	87	86	92	94	96
13.25	95	89	94	86	86	86	87	86	92	94	96
13.5	95	89	95	86	86	86	87	86	92	94	96
13.75	95	89	95	86	86	86	87	86	93	95	97
14	95	89	95	86	86	86	87	86	93	95	97
14.25	95	90	95	86	86	86	87	86	93	96	97
14.5	96	90	96	86	86	87	88	86	93	98	98
14.75	96	90	96	86	86	87	88	86	94	98	98
15	96	90	96	86	86	87	88	86	94	99	98
15.25	96	90	97	86	86	87	88	86	94	100	98
15.5	96	91	97	86	86	87	88	86	95	101	99
15.75	96	91	97	86	86	87	88	86	95	102	99
16	96	91	98	86	86	87	88	86	95	102	99
16.25	95	91	98	86	86	87	88	86	96	103	99
16.5	95	91	98	86	86	87	88	86	96	103	100
16.75	95	91	99	86	86	87	88	86	96	104	100
17	95	91	99	86	86	87	89	86	96	105	100
17.25	95	92	100	86	86	87	89	86	97	105	100
17.5	95	92	100	86	86	87	89	86	97	106	100
17.75	95	92	101	86	86	87	89	86	97	107	101
18	95	92	101	87	86	87	89	86	97	108	101
18.25	95	92	102	87	86	87	89	86	97	110	101
18.5	96	92	102	87	86	87	90	86	97	111	102
18.75	96	92	102	87	86	87	90	86	97	113	102
19	97	92	102	87	86	87	90	86	97	114	102
19.25	97	92	102	87	86	87	90	86	97	116	102
19.5	97	93	102	87	86	88	90	86	97	117	102
19.75	98	93	102	87	86	88	90	86	96	118	102
20	99	93	102	87	86	88	90	86	96	119	102
20.25	100	93	102	87	86	88	90	87	96	120	102
20.5	100	93	102	87	86	88	91	87	96	121	102
20.75	100	93	102	87	86	88	91	87	95	122	102

Half the Depth of Stud Cavity Heatlok HFO Pro Spray Foam											
Time(min)	TC 68	TC 69	TC 70	TC 71	TC 72	TC 73	TC 74	TC 75	TC 76	TC 77	TC 78
21	100	93	102	87	86	88	91	87	95	123	102
21.25	99	93	102	87	86	88	91	87	95	123	102
21.5	99	93	102	87	86	88	91	87	95	123	103
21.75	98	93	101	87	86	88	91	87	95	124	103
22	98	93	101	87	86	88	91	87	95	124	103
22.25	98	93	101	87	86	88	91	87	94	124	102
22.5	98	93	101	87	86	88	91	87	94	125	102
22.75	98	93	101	87	86	89	91	87	94	125	102
23	98	93	100	87	86	89	91	87	94	125	102
23.25	98	93	100	87	87	89	91	87	94	125	102
23.5	98	93	100	87	87	89	91	87	94	125	101
23.75	98	93	100	87	87	89	91	87	94	125	101
24	98	93	100	87	87	89	91	87	94	125	101
24.25	98	93	100	87	87	89	90	87	94	125	101
24.5	99	93	99	87	87	89	90	87	94	125	101
24.75	100	93	99	87	87	89	90	87	93	125	101
25	101	94	99	88	87	89	90	87	93	124	100
25.25	102	94	99	88	87	89	90	87	93	123	100
25.5	103	95	99	88	87	90	90	87	93	122	100
25.75	104	95	99	88	87	90	90	87	93	122	100
26	105	96	98	88	87	90	90	87	93	121	100
26.25	106	96	98	88	87	90	90	87	93	120	100
26.5	108	96	98	88	87	90	90	87	93	120	100
26.75	109	96	98	88	87	90	90	87	93	120	100
27	111	96	98	88	87	90	90	87	93	120	99
27.25	112	97	98	88	87	90	90	87	93	118	99
27.5	113	97	98	88	87	91	90	87	93	117	99
27.75	113	97	98	88	87	91	90	88	93	116	100
28	113	97	97	88	87	91	90	88	93	115	100
28.25	113	98	97	88	87	91	90	88	93	115	101
28.5	113	98	97	88	87	91	90	88	93	114	101
28.75	112	98	97	88	87	91	90	88	93	114	102
29	112	99	98	88	87	91	90	88	93	113	102
29.25	111	99	99	89	87	91	90	88	93	113	103
29.5	110	99	99	89	87	92	90	88	92	113	103
29.75	110	99	100	89	87	92	90	88	92	112	103
30	109	99	100	89	87	92	90	88	92	112	103
30.25	109	99	101	89	87	92	90	88	92	112	103
30.5	109	99	101	89	88	92	90	88	92	112	103
30.75	108	99	101	89	88	92	90	88	92	112	103
31	108	99	102	89	88	93	91	88	92	112	103
31.25	108	99	102	89	88	93	91	88	92	112	103
31.5	108	99	102	89	88	93	91	88	93	112	103
31.75	107	99	103	89	88	93	91	88	93	112	103
32	107	99	103	89	88	93	91	88	94	112	102
32.25	107	99	103	89	88	93	91	88	95	111	102
32.5	107	99	103	89	88	94	91	88	95	111	102
32.75	107	99	104	89	88	94	91	88	96	111	102
33	107	99	104	90	88	94	92	88	96	111	102
33.25	107	99	104	90	88	94	92	88	96	110	102
33.5	107	99	104	90	88	94	92	89	97	110	101
33.75	107	99	104	90	88	94	92	89	97	110	101
34	107	99	105	90	88	95	92	89	97	110	101
34.25	107	99	105	90	88	95	92	89	98	109	101
34.5	107	99	105	90	88	95	92	89	98	109	101
34.75	107	99	105	90	88	95	93	89	98	109	101
35	107	99	105	90	88	95	93	89	98	109	101
35.25	107	99	106	90	89	96	93	89	99	108	101
35.5	107	99	106	90	89	96	93	89	99	108	101
35.75	107	99	106	90	89	96	93	89	99	108	101

Half the Depth of Stud Cavity Heatlok HFO Pro Spray Foam											
Time(min)	TC 68	TC 69	TC 70	TC 71	TC 72	TC 73	TC 74	TC 75	TC 76	TC 77	TC 78
36	107	99	106	90	89	96	93	89	99	108	101
36.25	107	99	106	90	89	96	93	89	99	108	101
36.5	107	99	106	90	89	97	94	89	99	107	101
36.75	107	99	107	90	89	97	94	89	100	107	101
37	107	99	107	90	89	97	94	89	100	107	101
37.25	107	99	107	91	89	97	94	89	100	107	101
37.5	107	99	107	91	89	97	94	89	100	107	101
37.75	107	99	107	91	89	98	94	89	100	106	101
38	107	99	107	91	89	98	95	90	100	106	101
38.25	107	100	107	91	89	98	95	90	100	106	101
38.5	107	100	107	91	89	98	95	90	100	106	101
38.75	107	100	107	91	89	98	95	90	100	106	101
39	107	100	107	91	89	99	95	90	101	105	101
39.25	107	100	107	91	90	99	95	90	101	105	101
39.5	107	100	107	91	90	99	96	90	101	105	101
39.75	107	100	108	91	90	99	96	90	101	105	101
40	107	100	108	91	90	99	96	90	101	105	101
40.25	107	100	108	91	90	100	96	90	101	105	101
40.5	107	100	108	91	90	100	96	90	101	105	101
40.75	107	100	108	91	90	100	96	90	101	105	101
41	107	100	108	91	90	100	97	90	101	105	101

Time(min)	First Story Burn Room Temperatures								Second Story Burn Room - 1 in. Away from Wall					
	TC 41	TC 42	TC 43	TC 44	TC 45	TC 46	TC 47	TC 48	TC 49	TC 50	TC 51	TC 52	TC 53	TC 54
0	130	130	158	155	142	159	159	155	87	87	87	88	88	88
0.25	324	339	531	408	425	491	453	485	87	87	87	88	88	88
0.5	712	725	1034	878	891	934	859	882	87	87	88	88	88	88
0.75	861	895	1097	981	1054	1009	986	996	87	87	88	88	88	88
1	930	959	1117	1073	1124	1048	1002	1033	88	87	88	88	88	88
1.25	987	986	1152	1122	1173	1109	1066	1071	88	87	88	88	88	88
1.5	1009	1018	1169	1138	1193	1113	1078	1084	88	87	88	88	88	88
1.75	1021	1035	1178	1149	1200	1116	1090	1084	88	87	88	88	88	88
2	1037	1047	1153	1167	1221	1146	1139	1108	88	87	88	88	88	88
2.25	1055	1076	1203	1233	1261	1395	1439	1353	88	87	88	88	88	88
2.5	1083	1091	1231	1253	1277	1249	1255	1397	88	87	88	88	88	88
2.75	1091	1098	1223	1257	1292	1226	1214	1243	88	87	88	88	88	88
3	1092	1111	1211	1239	1287	1203	1184	1226	88	87	88	89	88	88
3.25	1089	1104	1218	1243	1274	1209	1186	1191	88	87	88	89	89	88
3.5	1105	1125	1228	1251	1283	1223	1177	1175	88	88	88	89	89	88
3.75	1110	1124	1247	1259	1293	1206	1203	1171	88	88	88	89	89	88
4	1109	1141	1240	1254	1295	1230	1189	1163	88	88	88	89	89	88
4.25	1128	1152	1246	1264	1301	1232	1222	1164	88	88	88	89	89	89
4.5	1124	1138	1248	1258	1322	1235	1205	1166	88	88	88	89	89	89
4.75	1134	1154	1257	1282	1312	1253	1218	1201	89	88	88	89	89	89
5	1141	1161	1257	1286	1322	1241	1236	1202	89	88	88	89	89	89
5.25	1179	1209	1324	1327	1365	1294	1266	1240	89	88	88	89	89	89
5.5	1300	1340	1549	1435	1487	1380	1355	1380	89	88	89	90	89	89
5.75	1350	1379	1578	1500	1540	1451	1417	1450	89	88	89	90	89	89
6	1350	1368	1533	1525	1534	1474	1420	1442	89	88	89	90	89	89
6.25	1355	1368	1528	1544	1561	1484	1419	1471	89	88	89	90	90	89
6.5	1370	1375	1513	1557	1581	1474	1452	1512	89	88	89	90	90	90
6.75	1371	1394	1521	1568	1578	1478	1423	1482	90	88	89	91	90	90
7	1377	1388	1546	1568	1582	1485	1449	1481	90	89	89	90	90	90
7.25	1376	1394	1536	1552	1564	1474	1446	1495	90	89	90	91	90	90
7.5	1377	1396	1521	1545	1582	1490	1459	1478	91	89	90	91	91	90
7.75	1371	1399	1532	1562	1597	1500	1465	1473	90	89	90	91	90	90

Time(min)	First Story Burn Room Temperatures								Second Story Burn Room - 1 in. Away from Wall					
	TC 41	TC 42	TC 43	TC 44	TC 45	TC 46	TC 47	TC 48	TC 49	TC 50	TC 51	TC 52	TC 53	TC 54
8	1379	1403	1539	1578	1577	1485	1459	1473	90	89	90	90	90	90
8.25	1400	1404	1532	1579	1579	1492	1469	1473	90	89	90	91	90	91
8.5	1389	1399	1538	1580	1593	1496	1454	1486	90	89	90	91	91	91
8.75	1396	1427	1536	1573	1599	1479	1445	1487	90	89	90	91	91	91
9	1398	1415	1540	1582	1583	1482	1466	1494	91	89	91	91	91	91
9.25	1393	1412	1536	1579	1612	1490	1471	1498	91	89	91	91	91	91
9.5	1395	1403	1522	1564	1595	1499	1472	1500	91	89	91	91	91	91
9.75	1396	1416	1537	1588	1595	1488	1478	1490	91	89	90	91	91	92
10	1408	1421	1530	1603	1598	1511	1478	1494	92	89	91	92	91	92
10.25	1419	1444	1582	1611	1650	1539	1492	1515	92	90	91	92	91	92
10.5	1439	1469	1600	1648	1670	1536	1510	1541	93	90	91	92	92	92
10.75	1459	1481	1611	1655	1666	1549	1514	1567	92	90	91	92	92	92
11	1464	1478	1603	1667	1678	1560	1522	1558	93	90	90	92	92	92
11.25	1466	1494	1619	1672	1679	1555	1538	1567	92	90	91	92	92	92
11.5	1469	1495	1621	1671	1699	1568	1541	1570	91	90	91	92	92	92
11.75	1475	1506	1645	1669	1699	1564	1540	1574	91	90	91	92	93	92
12	1484	1514	1636	1688	1690	1570	1539	1582	91	90	91	93	93	92
12.25	1496	1507	1644	1674	1688	1565	1538	1580	91	91	91	93	92	92
12.5	1501	1525	1665	1698	1682	1569	1555	1592	92	91	91	93	92	92
12.75	1499	1525	1666	1706	1704	1588	1566	1598	93	91	91	93	92	93
13	1513	1524	1660	1697	1713	1594	1563	1586	94	91	91	93	93	93
13.25	1507	1514	1656	1706	1703	1590	1565	1581	94	91	91	93	93	93
13.5	1507	1515	1634	1699	1718	1595	1566	1592	94	91	92	93	93	94
13.75	1507	1522	1641	1698	1714	1592	1567	1607	94	92	92	93	93	94
14	1505	1532	1653	1702	1720	1588	1574	1604	94	92	92	93	93	94
14.25	1502	1532	1654	1714	1722	1583	1561	1598	95	92	93	93	93	94
14.5	1518	1539	1702	1705	1711	1601	1567	1615	95	92	92	93	95	94
14.75	1525	1546	1663	1715	1715	1597	1599	1616	96	92	93	93	96	94
15	1520	1541	1670	1726	1711	1597	1582	1615	95	94	93	94	100	95
15.25	1527	1558	1695	1748	1741	1612	1588	1628	96	93	93	94	100	95
15.5	1539	1566	1713	1761	1748	1640	1611	1642	96	97	93	94	104	95
15.75	1537	1571	1705	1755	1763	1641	1630	1640	97	96	93	94	104	95
16	1559	1586	1720	1771	1762	1648	1639	1651	97	99	93	94	103	95
16.25	1577	1588	1727	1760	1782	1661	1635	1659	97	101	93	94	106	95
16.5	1577	1601	1728	1781	1775	1670	1663	1662	97	103	93	95	108	95
16.75	1582	1602	1724	1774	1806	1689	1645	1676	96	101	93	95	105	95
17	1590	1599	1737	1788	1791	1689	1654	1673	98	102	94	95	107	95
17.25	1587	1592	1721	1797	1794	1695	1641	1674	97	105	94	95	109	96
17.5	1592	1616	1737	1793	1791	1683	1671	1689	97	107	94	96	110	96
17.75	1588	1634	1736	1802	1802	1685	1677	1700	97	102	94	96	105	96
18	1583	1617	1754	1791	1802	1683	1673	1698	97	106	94	96	106	96
18.25	1585	1631	1724	1784	1813	1694	1687	1715	97	108	94	96	111	97
18.5	1585	1624	1740	1787	1817	1693	1677	1720	97	110	95	96	112	97
18.75	1591	1629	1737	1795	1797	1696	1690	1718	97	111	95	96	113	97
19	1587	1635	1746	1804	1798	1693	1702	1708	97	114	95	96	112	97
19.25	1607	1635	1772	1809	1811	1703	1705	1719	97	113	95	96	112	97
19.5	1609	1639	1788	1784	1811	1698	1704	1726	97	114	95	96	111	97
19.75	1612	1640	1754	1819	1816	1710	1713	1741	97	110	95	96	108	98
20	1607	1650	1765	1824	1833	1705	1700	1737	98	112	96	97	112	98
20.25	1627	1646	1775	1806	1827	1717	1703	1737	98	116	96	97	114	98
20.5	1623	1652	1781	1840	1822	1714	1714	1738	98	113	96	97	112	98
20.75	1624	1668	1770	1836	1836	1711	1727	1745	98	114	96	97	112	98
21	1620	1656	1784	1829	1813	1712	1717	1741	98	113	96	97	109	98
21.25	1633	1665	1815	1840	1807	1717	1717	1734	98	115	96	97	112	98
21.5	1628	1667	1800	1847	1829	1725	1726	1737	98	116	96	97	114	98
21.75	1630	1670	1784	1837	1828	1734	1732	1735	99	116	96	97	115	98
22	1631	1661	1796	1845	1826	1717	1719	1740	99	115	96	97	115	98
22.25	1633	1674	1799	1851	1836	1741	1727	1752	101	117	96	98	116	98
22.5	1643	1676	1814	1830	1819	1732	1735	1752	101	117	96	98	116	99
22.75	1638	1678	1823	1843	1839	1730	1720	1753	100	118	97	98	117	99

Time(min)	First Story Burn Room Temperatures								Second Story Burn Room - 1 in. Away from Wall					
	TC 41	TC 42	TC 43	TC 44	TC 45	TC 46	TC 47	TC 48	TC 49	TC 50	TC 51	TC 52	TC 53	TC 54
23	1652	1681	1836	1870	1833	1734	1726	1742	101	117	97	98	116	99
23.25	1657	1684	1828	1843	1864	1739	1739	1756	103	118	96	99	117	99
23.5	1655	1693	1830	1853	1853	1750	1742	1760	102	121	96	100	118	99
23.75	1640	1679	1827	1852	1851	1739	1741	1761	103	120	96	100	119	99
24	1657	1682	1829	1876	1855	1761	1755	1759	103	122	96	100	120	99
24.25	1651	1692	1806	1843	1857	1741	1738	1760	105	122	97	101	120	99
24.5	1667	1703	1836	1864	1873	1761	1739	1764	102	124	97	101	120	99
24.75	1650	1698	1828	1894	1870	1764	1758	1773	103	126	97	101	122	99
25	1669	1710	1853	1841	1839	1734	1744	1757	101	127	97	101	122	99
25.25	1671	1718	1831	1867	1871	1761	1753	1779	100	130	97	101	121	100
25.5	1683	1715	1867	1882	1880	1751	1760	1780	102	132	97	102	123	100
25.75	1691	1732	1887	1887	1908	1773	1777	1794	104	136	97	102	123	100
26	1701	1754	1875	1895	1891	1803	1785	1799	103	137	97	103	125	100
26.25	1724	1740	1910	1914	1905	1795	1782	1806	102	142	97	103	124	100
26.5	1722	1767	1893	1905	1907	1780	1778	1816	102	142	97	103	126	100
26.75	1737	1760	1912	1936	1904	1784	1779	1816	105	144	97	102	127	100
27	1726	1772	1921	1937	1901	1785	1784	1819	104	146	97	101	129	100
27.25	1735	1782	1927	1946	1923	1818	1806	1809	104	149	97	101	129	100
27.5	1735	1770	1907	1928	1929	1829	1806	1825	105	150	97	101	130	100
27.75	1741	1782	1935	1939	1929	1814	1812	1824	104	154	97	102	129	100
28	1749	1774	1974	1914	1943	1811	1805	1817	105	154	97	102	131	100
28.25	1758	1795	1945	1935	1930	1826	1807	1826	105	153	98	103	131	100
28.5	1756	1801	1964	1937	1926	1809	1812	1833	102	154	99	102	131	101
28.75	1757	1790	1937	1933	1936	1827	1814	1824	100	155	98	101	131	101
29	1763	1791	1955	1922	1945	1813	1825	1832	100	157	98	100	130	101
29.25	1756	1801	1960	1945	1938	1825	1829	1840	102	158	98	101	134	100
29.5	1765	1806	1985	1912	1947	1829	1835	1834	100	159	98	101	135	101
29.75	1763	1819	1946	1949	1936	1823	1823	1845	100	161	98	100	135	101
30	1792	1830	1984	1942	1934	1823	1834	1837	101	163	99	101	138	101
30.25	1518	1532	1516	1533	1526	1575	1538	1542	101	161	100	102	138	102
30.5	1274	1293	1273	1306	1296	1365	1343	1333	100	159	100	101	137	102
30.75	1168	1179	1166	1209	1186	1254	1250	1217	103	158	100	101	139	102
31	1096	1103	1094	1144	1117	1188	1175	1144	103	157	99	102	136	101
31.25	1043	1046	1047	1097	1060	1132	1113	1092	101	155	101	101	136	101
31.5	1001	999	999	1052	1014	1088	1075	1044	100	152	102	101	134	102
31.75	968	963	969	1018	982	1049	1035	1015	99	153	100	100	133	101
32	941	932	940	987	948	1019	1002	987	99	150	99	100	133	101
32.25	917	908	913	960	924	995	975	965	99	148	99	99	132	100
32.5	891	882	891	936	903	971	949	942	99	147	99	99	129	101
32.75	871	862	866	912	882	944	927	922	98	145	99	99	126	101
33	853	841	848	892	861	908	906	894	98	143	99	98	124	101
33.25	835	824	830	872	848	891	884	877	98	143	98	98	126	100
33.5	816	806	813	855	834	871	871	859	97	143	98	98	124	100
33.75	799	787	794	837	811	850	846	842	97	145	98	98	124	100
34	784	772	774	817	792	834	831	818	97	143	98	98	122	100
34.25	766	753	759	797	779	814	819	803	97	142	98	97	121	100
34.5	752	737	742	783	759	794	796	789	97	142	97	97	121	99
34.75	739	726	727	768	746	775	777	774	97	142	97	97	122	100
35	724	713	718	757	734	761	762	758	97	142	98	97	121	100
35.25	710	701	706	746	722	747	762	743	97	141	97	97	121	99
35.5	697	689	696	733	711	732	747	729	97	139	97	97	122	99
35.75	685	678	685	719	698	721	735	715	97	139	97	97	121	99
36	675	667	675	706	686	706	725	708	97	135	97	97	120	99
36.25	665	659	665	694	675	696	717	698	97	133	97	97	119	99
36.5	655	648	655	683	663	691	708	690	99	132	97	98	119	99
36.75	645	639	647	668	655	679	698	681	98	132	97	98	118	99
37	636	630	638	661	647	672	689	670	101	131	97	99	117	99
37.25	625	622	629	653	638	660	683	658	101	131	97	99	117	99
37.5	618	615	622	643	630	648	669	648	99	130	97	99	117	99
37.75	609	607	614	632	622	645	663	638	101	128	97	100	116	99

Time(min)	First Story Burn Room Temperatures								Second Story Burn Room - 1 in. Away from Wall					
	TC 41	TC 42	TC 43	TC 44	TC 45	TC 46	TC 47	TC 48	TC 49	TC 50	TC 51	TC 52	TC 53	TC 54
38	601	600	605	624	613	637	656	629	100	126	98	99	116	99
38.25	593	592	597	616	607	631	652	623	101	123	98	100	112	99
38.5	588	587	592	611	601	622	644	618	101	122	98	100	112	99
38.75	581	582	585	604	596	616	640	611	102	124	97	101	112	99
39	576	574	580	596	590	609	632	604	102	122	97	100	111	99
39.25	570	570	572	590	583	606	627	600	100	123	98	100	112	100
39.5	565	564	566	583	575	600	621	592	99	121	98	98	112	99
39.75	558	557	561	577	570	598	618	591	98	120	98	97	112	99
40	555	554	555	571	565	590	608	581	101	121	97	99	112	100
40.25	549	549	549	565	559	584	607	579	101	120	97	99	111	99
40.5	541	542	541	558	550	570	595	569	104	120	97	99	111	99
40.75	534	533	532	549	540	557	584	557	104	122	98	99	110	99
41	526	525	523	542	533	551	576	548	102	121	97	99	108	99

Stud Cavity SPF Thickness (in.)				
Heatlok HFO Pro Spray Foam (Closed-Cell)				
2.5	2	2.25	2.25	3
2.5	2.25	2	2.25	2.25
2.5	2.5	2.25	2.25	2.5
2.25	2.5	2.5	2.25	2.25
2	2.5	2.25	2	2.25
2	2	2.25	2.25	2
2.25	2	2	2.5	2
2.25	2	2.75	2.5	
2.5	1.75	2.5	2.5	
2.25	2	2	2	
2	2.25	2.25	2	
Average	2.25			

Exterior SPF Thickness (in.)				
Heatlok HFO Pro Spray Foam (Closed-Cell)				
4.25	4	3.5	4.25	4
4	3.75	3.25	3.5	4.5
4	3.5	3.75	3.5	3.5
3.75	3.75	3.75	3.75	3.5
4	3.75	3.5	4	3.25
3.75	3.75	4.25	4	4
3.75	3.75	3.5	4.25	
3.75	3.5	4.25	4	
3.5	3.5	3.75	3.75	
3.5	3.5	4	3.5	
3.75	3.5	4	4	
Average	3.78			

Appendix B - Photographs



Photo No. 1
Core Wall Construction Completed



Photo No. 2
Safing Installed



Photo No. 3

Horizontal Z-girts and C-channel Installed



Photo No. 4

Stud Cavity Heatlok HFO Pro Spray Foam applied at nominal 2.25" thickness



Photo No. 5

Exterior Heatlok HFO Pro Spray Foam applied to exterior sheathing at nominal thickness of 3.75"



Photo No. 6

DC-315 and Sherwin-Williams Sher-Cryl HPA applied to exterior spray foam



Photo No. 7

Exterior Cladding Installed & Completed Assembly (Pre-Test)



Photo No. 8

Aluminum window flashing installed (exterior)



Photo No. 9

Window flashing installed (Interior)



Photo No. 10

Interior gypsum installed



Photo No. 11

Room Burner Ignition



Photo No. 12

Window Burner Ignition



Photo No. 13

Burners Extinguished (Test Complete)



Photo No. 14

Interior gypsum wallboard (Post-Test)



Photo No. 15

Exterior Cladding (Post-Test)



Photo No. 16

Exterior Heatlok HFO Pro Spray Foam (Post-Test)

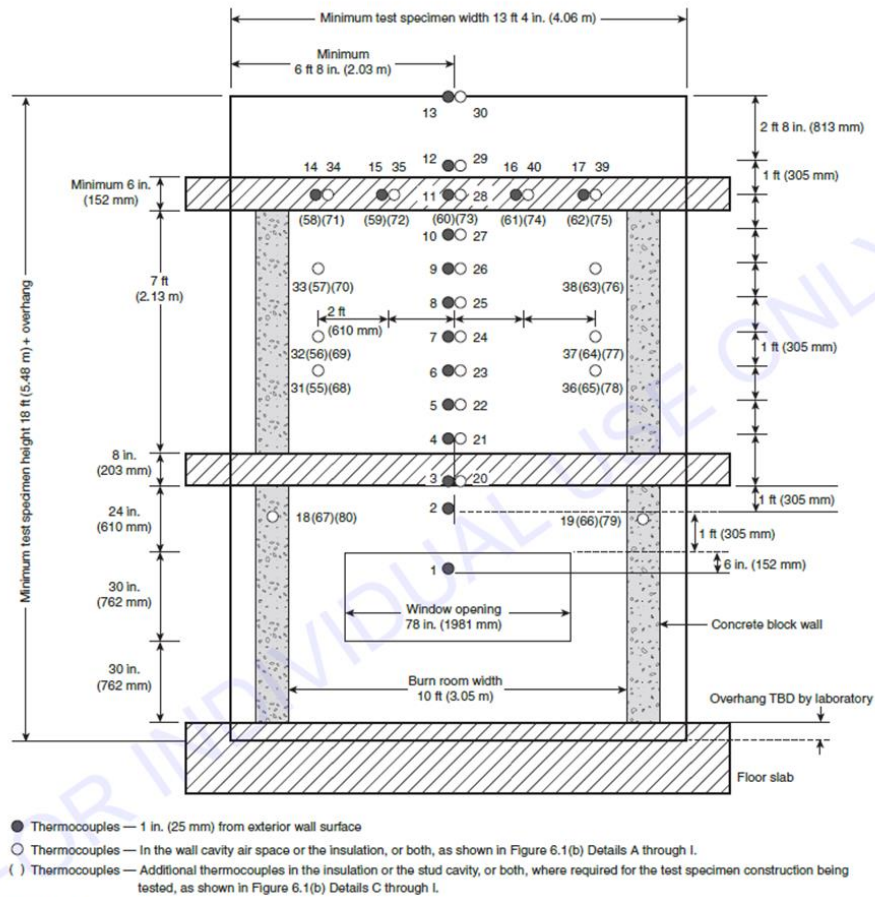


Photo No. 17

Stud Cavity Heatlok HFO Pro (Post-Test)

Appendix C – Drawings

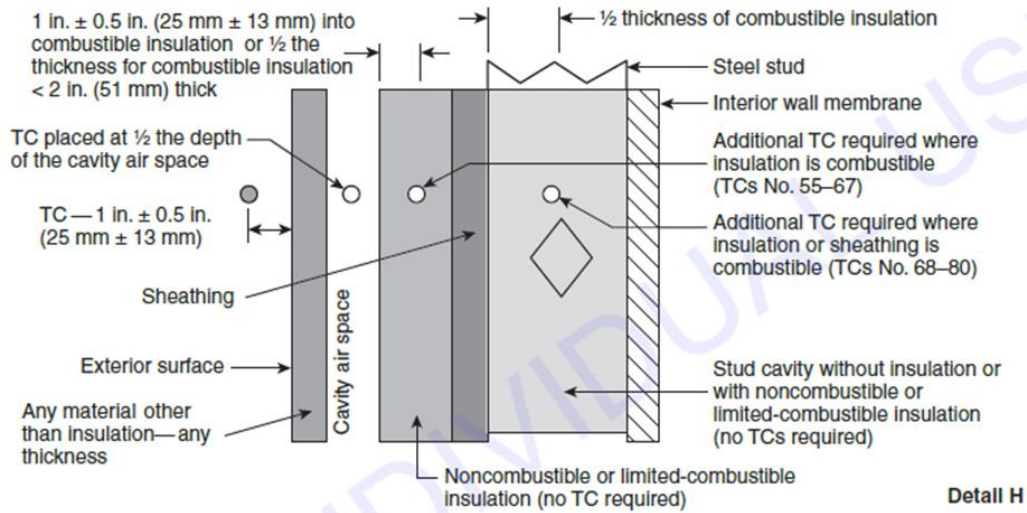
The test specimen drawings which follow have been reviewed by ICC NTA, LLC and are representative of the test specimen(s) reported herein. Test specimen construction was verified by ICC NTA, LLC per the drawings included in this report. Any deviations are documented herein or on the drawings.



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

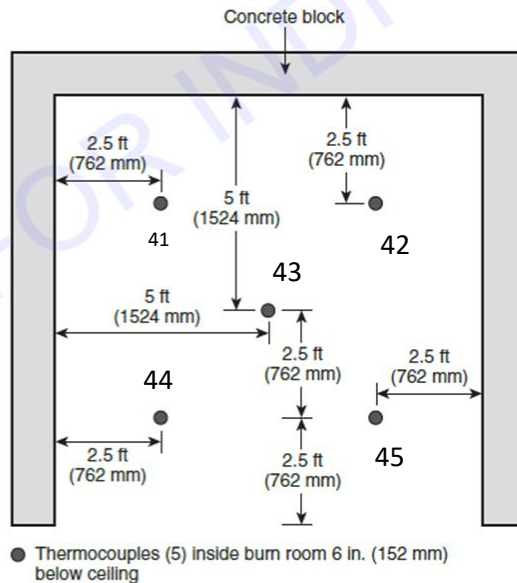
Drawing No. 1

Thermocouple locations



Drawing No. 2

Thermocouple Detail H (Position of additional thermocouples)



△ FIGURE 6.1(d) Plan View — First-Story Test Room. Instrumentation arrangement.

Drawing No. 3

First Story Test Room Ceiling Thermocouples

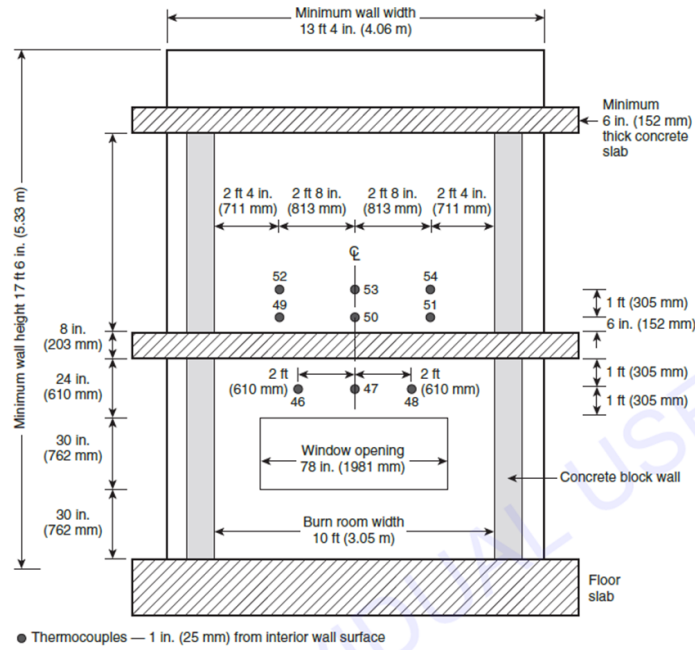
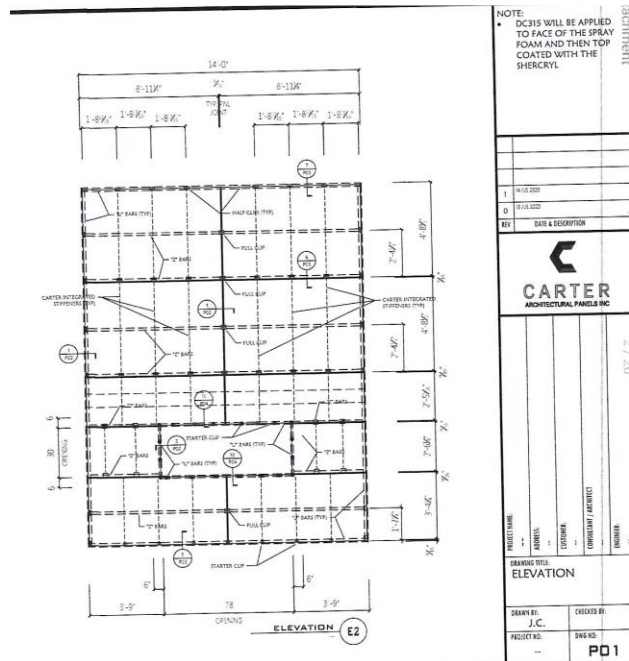


FIGURE 6.1(c) Interior View of the Test Specimen. Instrumentation arrangement.

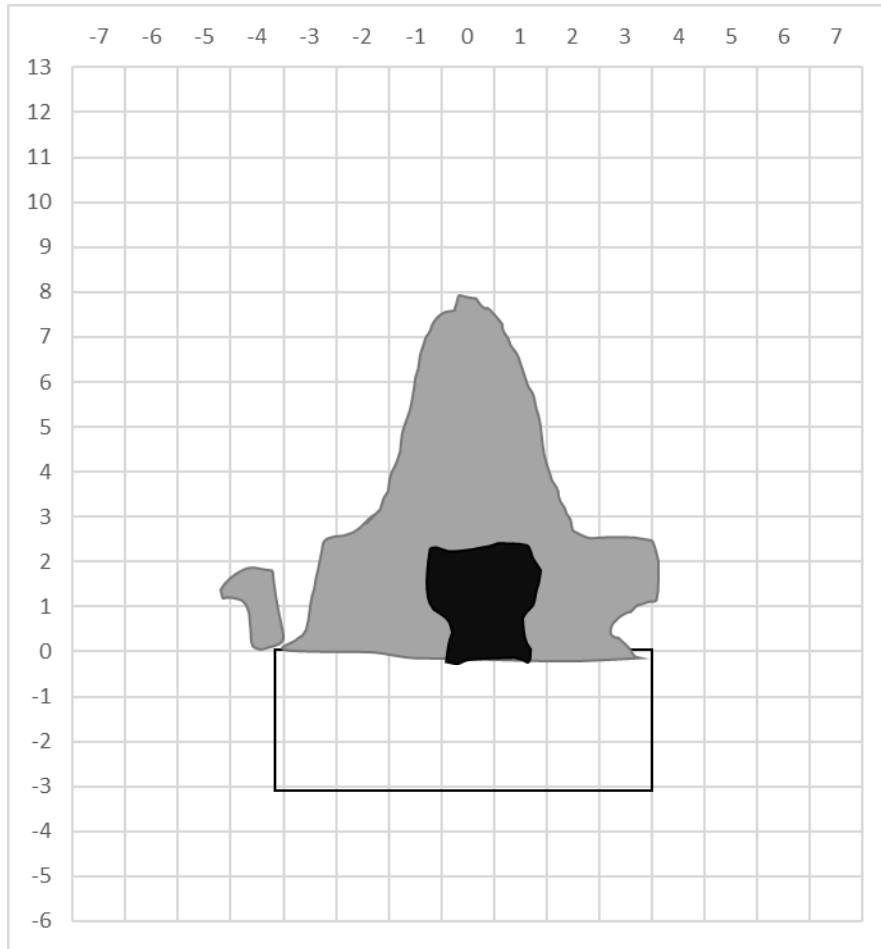
Drawing No. 4

Interior Thermocouples (1 in. away from wall)



Drawing No. 5

Exterior Cladding Installation (Provided by Carter Architectural Panels Inc.)



Drawing No. 6

Burn Extent of Exterior Cladding

Note: Grey area depicts burn pattern of cladding paint

Black area depicts area on wall where exterior cladding melted away

Appendix D - Revision Log

Rev. #	Date	Page(s)	Revision(s)
0	10/21/2020	N/A	Original report issue