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Title:

The fire resistance performance of a single-leaf, single-acting steel access panel, when tested in accordance with BS EN 1634-1: 2014 +A1: 2018 and BS EN 1363-1: 2012

WF Report No:

435047

Prepared for:

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11th January 2021

1762

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1 Summary of Performance

The following performance was achieved from the specimens tested. Full details of the testing and specimen construction are described in the report.

Results:

Fire resistance test in accordance with BS EN 1634-1: 2014 +A1: 2018 and BS EN 1363-1: 2012

Integrity	
Cotton pad	132 (one hundred and thirty two) minutes *
Continuous flaming	132 (one hundred and thirty two) minutes *
Gap gauges	132 (one hundred and thirty two) minutes *
Thermal insulation	
Insulation I_2 (mandatory procedure)	1 (one) minute
Radiation – time to 15kW/m^2	132 (one hundred and thirty two) minutes *

***** No failure of the test criteria at test termination at 132 minutes

Summary of specimen:

A latched, single leaf single-acting, steel access panel, hung opening away from the furnace

Access panel leaf size – 1198mm high x 695mm wide x 24mm thick

2 Introduction

The access panel was installed into a rigid supporting construction. In accordance with BS EN 16034: 2014 Annex A.2.2 the leaf was pre-cycled before the fire test. The access panel was instrumented with the standard set of thermocouples. At request of the client the access panel was installed opening away from the furnace.

3 Specimen verification

The specimens were supplied for testing and delivered to Warringtonfire during January 2021. The component parts of the access panel were identified based on nominal information provided by the client. The conformity of the specimens against these nominal values has been verified and agreed by the laboratory insofar as the structure of the specimen allowed verification to take place. If possible, additional moisture content readings, species verification and density checks were performed on either the original specimen, or, samples provided by the sponsor. These details are outlined in the construction section of this report (Section 6).

3.1 Conditioning

Warringtonfire stored the specimens in climatic conditions approximate to those in normal service.

3.2 Sampling

Warringtonfire was not involved in factory sampling of the products and materials used for the test specimen described in this report, and as such the results apply to the sample as received.

4 Description of supporting construction

The supporting construction comprised an AAC blockwork and lintel wall built into a refractory line steel restraint frame, mounted in front of a 1.5m x 1.5m furnace opening.

5 Description of specimen

Details of the specimen are shown in Figures 1 to 4 of Appendix 1.

5.1 Access panel leaf

The leaf measured 1198mm high x 695mm wide x 24mm thick.
.

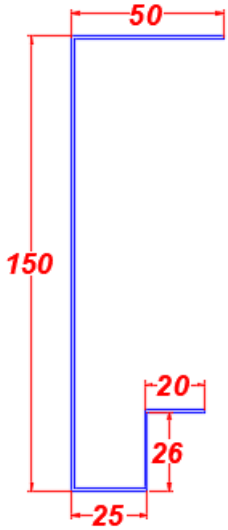
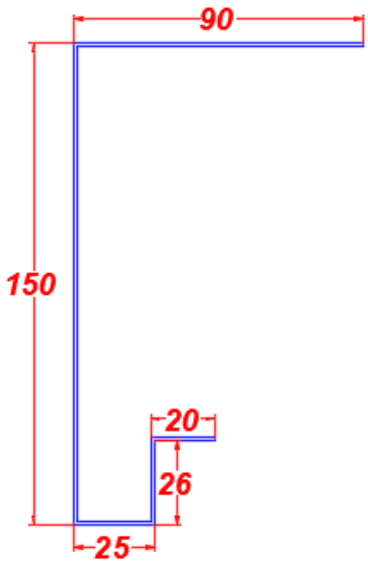
6 Description of Construction (Refers to Figures 1 to 4 and the clients drawings of the Appendix)

Leaf

	Material	Dimensions (mm)	Key to figures
Profiled steel tray section	Zintec coated profiled steel tray section on the unexposed face with a 20mm wide return on all edges* 	22 deep x 0.9 thick*	1
Lock channel	Zintec coated profiled steel 	0.9 thick x 23 high x 48 wide 'U' channel with a 15 flange welded to the leaf face	2
Core	None fitted	-	-
Leaf reinforcement	None fitted	-	-

* Stated by client, not verified by laboratory

Door frame

	Species/type	Dimensions (mm)	Key to figures
Frame –vertical edges	Profiled Zintec steel section featuring an integral stop 	150 deep x 50 wide x 1 thick overall featuring a 20 wide integral stop	3
Top and bottom edges	Profiled Zintec steel section featuring an integral stop 	150 deep x 90 wide x 1 thick overall featuring a 20 wide integral stop	4
Stop	Integral to the frame section		-
Frame jointing detail	Welded	-	-
Frame to supporting construction fire stopping detail	Intumescent acrylic sealant Mann McGowan Pyromas A*	Continuous bead sealing frame to face of supporting construction	-
Frame to supporting construction fixing detail	Steel masonry fixings – 5No. per jamb, 3No. per head and threshold	Ø7.5 X 60mm long	5

* Stated by client, not verified by laboratory

Intumescent and sealing materials

	Make/type	Size (mm)	Location	Key to figures
Frame reveal	Norseal FS1000 15mm x 4.5mm Intumescent foam seal*	-	Fitted on the stop	6
Leaf edge	None fitted	-	-	-

* Stated by client, not verified by laboratory

Hardware

	Make/type	Size (mm)	Location	Key to figures
Hinges	Pivot pin type hinge – one sprung, one screwed	Ø8 (pin size)	Fitted at the top and bottom of the leaf	7
Latch	2No. Single Point Budget Locks fitted on lock channel	54 high x 25 wide (case size)	Fitted at 300mm and 900mm from the bottom of the leaf (Welded)	8

* Stated by client, not verified by laboratory

7 Pre-test measurements and mechanical conditioning

Pre-test measurements and mechanical conditioning were conducted on the samples in the order detailed below.

7.1 Method of installation

The access panels were fixed into pre-prepared openings. The details of the fixings and fire stopping between frame and supporting construction are outlined in the construction section and Figures 2 and 3 of Appendix 1.

7.2 Pre-cycling operability

Operability test of 25 manual cycles was completed on each leaf in accordance with BS EN 16034: 2014 Annex A, section A.2.2.

Minimum angle of opening	90º
Number of operation cycles completed	25

7.3 Specimen self-closing

No closers were fitted. The locking systems were engaged for the test at both positions on the access panel.

7.4 Leaf/frame perimeter gaps

The manufacturer did not declare a working range so the doors were installed to open and close freely, maintaining gaps, where possible, to a range of 2-4mm along all edges except the threshold, and 3-8mm along the threshold. The gaps between the edge of the leaf and frame were measured prior to test in accordance with BS EN 1634-1 2014 +A1: 2018, Section 10.1.2. A total of 12 readings were recorded. The measurements (in mm) are detailed in Section 8.7.

7.5 Closer forces

No closers were fitted – the leaves were held closed by means of the budget locks.

7.6 Final setting

Final setting of the specimens was conducted in accordance with BS EN 1634-1: 2014 +A1: 2018, Section 10.1.4.

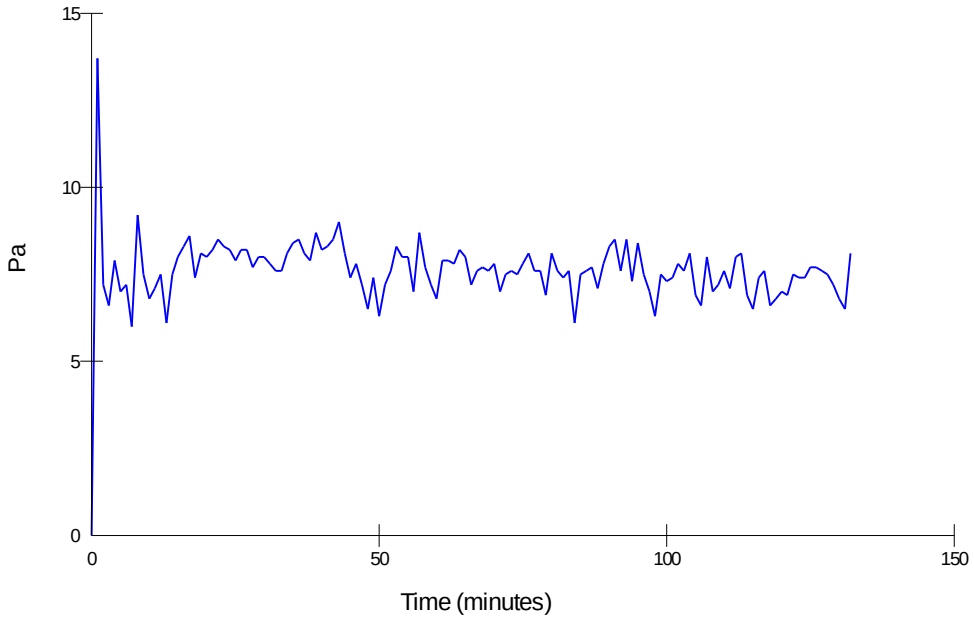
8 Test Conditions

8.1 Ambient temperature

The ambient temperature of the test area at commencement of test was 6°C

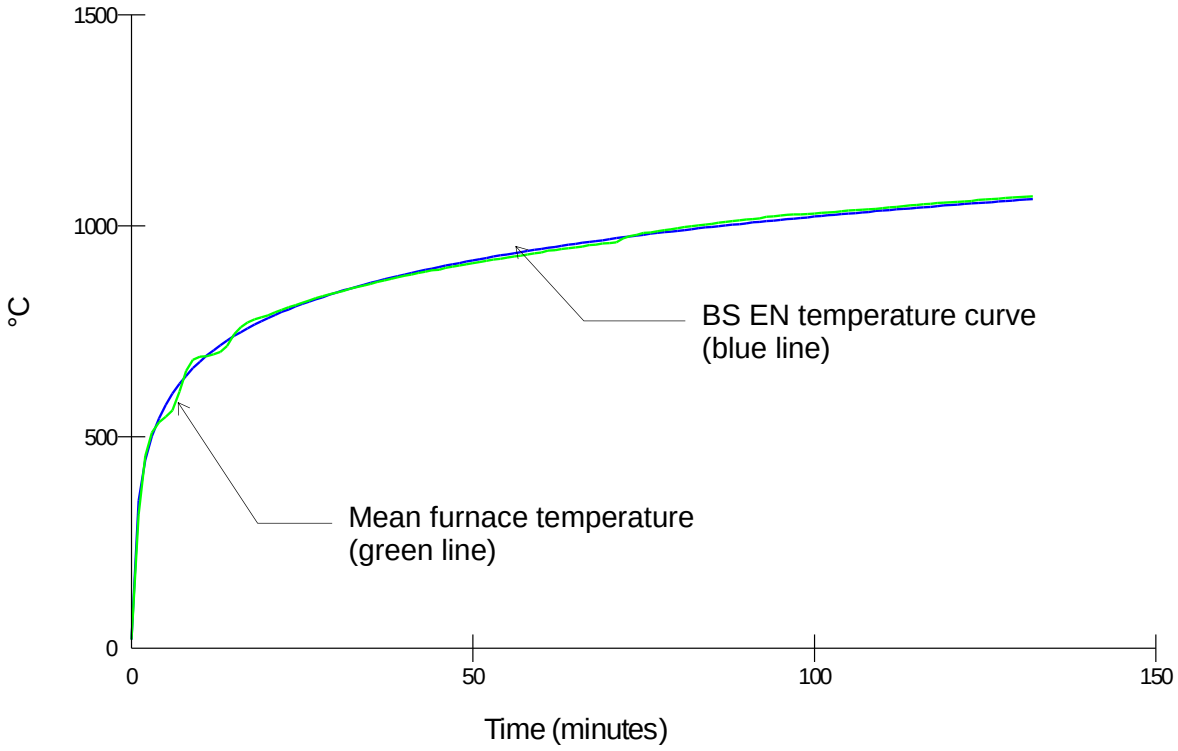
8.2 Pressure readings

After the first 5 minutes of the test, the furnace pressure was maintained at 7.4 ± 5 Pa and after 10 minutes was maintained at 7.4 ± 3 Pa with respect to atmosphere, at a point 1m from the furnace floor, equating to a pressure of 10.6 Pa with respect to atmosphere at the head of the access panel. The pressure readings were recorded and are shown graphically below:



8.3 Furnace temperature

The furnace was controlled to follow the temperature/time relationship specified in BS EN 1363: Part 1: 2012 Section 5.1.1 as closely as possible, using the average of four plate thermometers suitably distributed within the furnace. The temperatures were recorded and are shown graphically below:



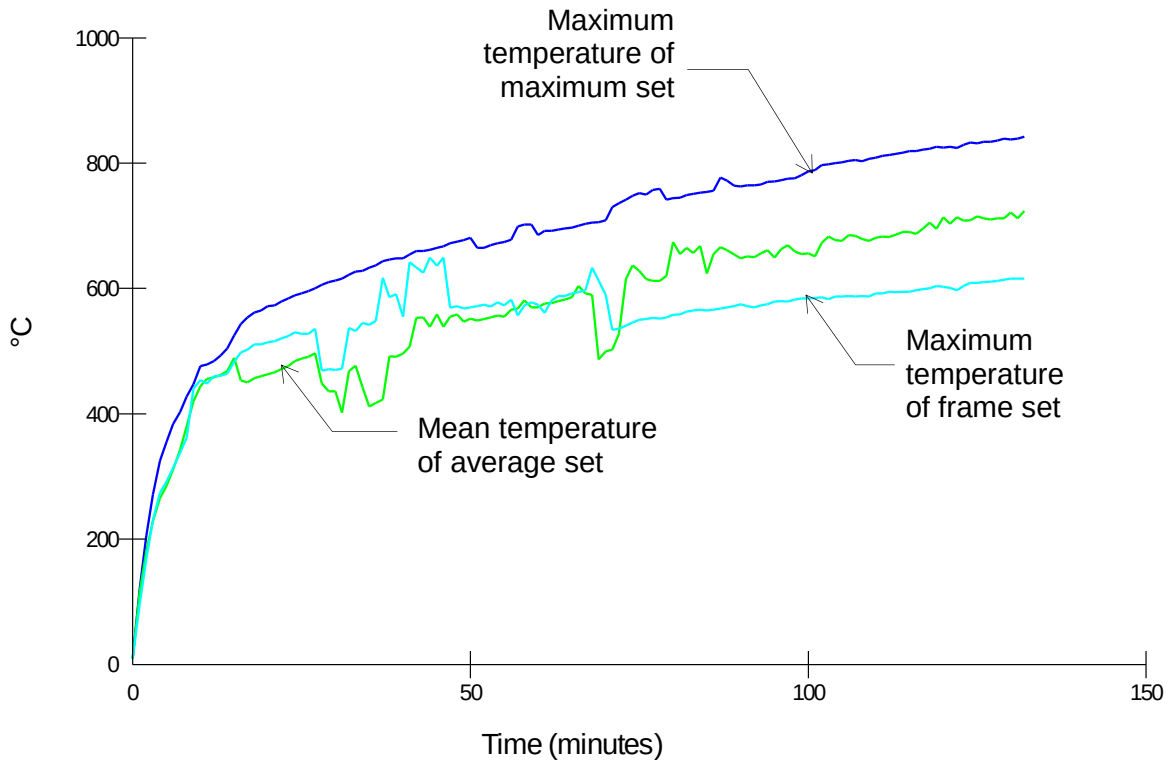
8.4 Unexposed face temperatures

The temperature of the unexposed face of the access panels was monitored by means of the following thermocouples:

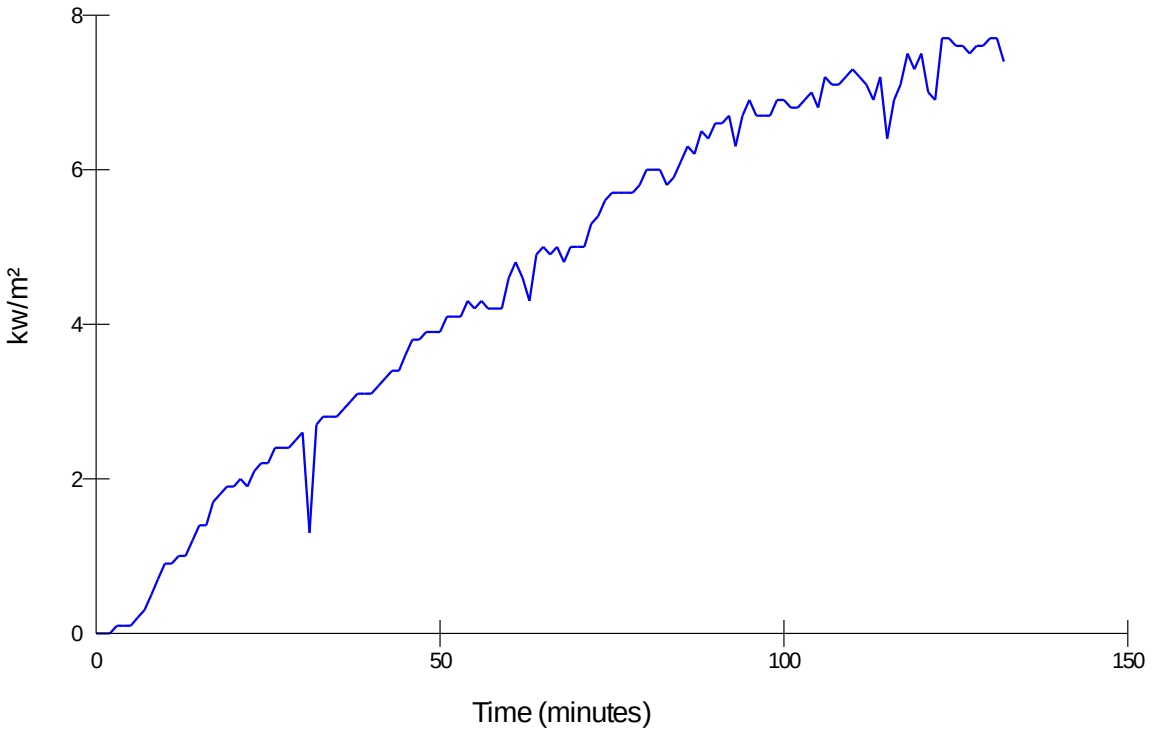
	1 discrete area (steel)
Leaf	5 measuring mean temperature rise.
	4 measuring maximum temperature rise, standard set 100mm in from the leaf edges.
Frame	5 measuring maximum temperature rise.

The locations of the thermocouples are shown in Figure 4 of Appendix 1. The readings recorded are tabulated in Appendix 2 and are shown graphically below.

Access panel

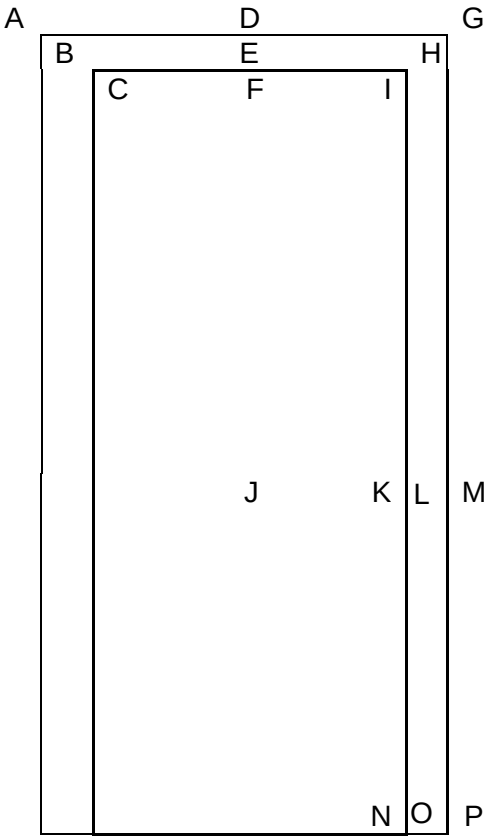


8.5 Radiation



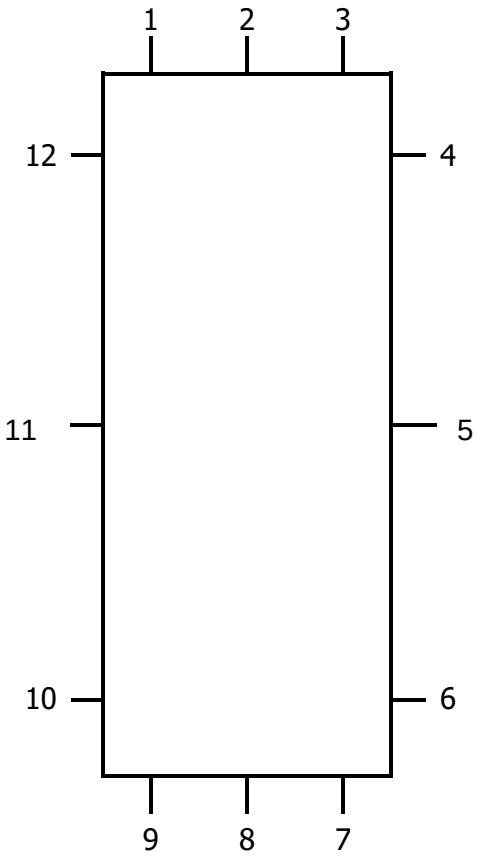
8.6 Leaf and frame distortion data

The following tables show the distortion in mm with an accuracy of ±1mm.
A positive measurement indicates distortion towards the furnace.
A negative measurement indicates distortion away from the furnace.



Deflections – mm																
TIME mins	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
15	5	0	-5	0	5	-3	0	0	-10	-25	0	0	0	-5	0	0
30	5	0	-2	0	0	-5	0	0	-13	-25	0	0	0	-5	0	0

8.7 Leaf edge to frame gaps pre-test measurement



View from unexposed face

Gap Between Face of Leaf and Frame in mm at Position											
1	2	3	4	5	6	7	8	9	10	11	12
1.8	2.5	2.8	2.5	2.1	2.0	1.5	1.6	3.2	2.1	2.3	2.6
Mean		2.3	Maximum			3.2	Minimum				1.5

9 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	Comments
00:00	Test Started
00:50	There is smoke issuing all along the hanging edge
01:10	There is smoke issuing through both keyhole positions
01:15	There is smoke issuing across the top door caps
02:05	There is smoke issuing at the top closing corner and at the bottom closing corner
12:14	There is discolouration across the head and all along the hanging edge
16:57	There is discolouration at the corners of the frame
26:42	There is discolouration appearing at the centre of the leaf
28:11	The mastic around the perimeter is discoloured
30:00	No change
45:00	No change
52:13	There is an increase in the discolouration across the specimen
60:00	No change
65:38	There is an increase in the discolouration across the specimen
75:00	No change
90:00	No change
105:00	No change
132:00	Test terminated

10 Expression of results

Access panel

Integrity	
Cotton pad	132 (one hundred and thirty two) minutes *
Continuous flaming	132 (one hundred and thirty two) minutes *
Gap gauges	132 (one hundred and thirty two) minutes *
Thermal insulation	
Inulation I_2 (mandatory procedure)	1 (one) minute
Radiation – time to 15kW/m^2	132 (one hundred and thirty two) minutes *

***** No failure of this test criteria at test termination at 132 minutes

11 Limitations

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outline in BS EN 1634-1, BS EN 1363-1, and where appropriate BS EN 1363-2. Any significant deviation with respect to size, construction details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report.

The results only relate to the behaviour of the element of construction under the particular conditions of test; they are not intended to be the sole criteria for assessing the potential fire performance of the element in use nor do they reflect the actual behaviour in fires. The results of this test were obtained using the leaf to frame gaps recorded in Section 8.7. The fire resistance performance of doors of this design may change if substantially different gaps are employed.

The specification and interpretation of fire test methods are the subject of ongoing development and refinement. Changes in associated legislation may also occur. For these reasons it is recommended that the relevance of test reports over 5 years old should be considered by the user. Warringtonfire will be able to offer, on behalf of the legal owner, a review of the procedures adopted for a particular test to ensure that they are consistent with current practices, and if required may endorse the test report.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

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	Written by:	Checked by:	Authorised by:
Signature:			
Name:	Courtney Clifford	Dr Vic Kearley	Nikolas Whitelock
Title:	Technical Officer	Technical Author	Technical Manager
Date of issue:	26/04/2021	26/04/2021	26/04/2021

12 Field of direct application of test results

BS EN 1363-1:2012, Fire resistance tests - Part 1: General requirements, states within Section 12.1, Clause v) that “The field of direct application of the results for the specimen being evaluated, either in the form of the full text from the appropriate standard, or only those clauses which are relevant for the specimen tested” shall be included within the test report. The full text of the field of direct application for the results of the specimen being evaluated herein, can be found within the appropriate test standard, which is referenced on the front cover of this report.

13 Photographs

Exposed face prior to testing

At start of test

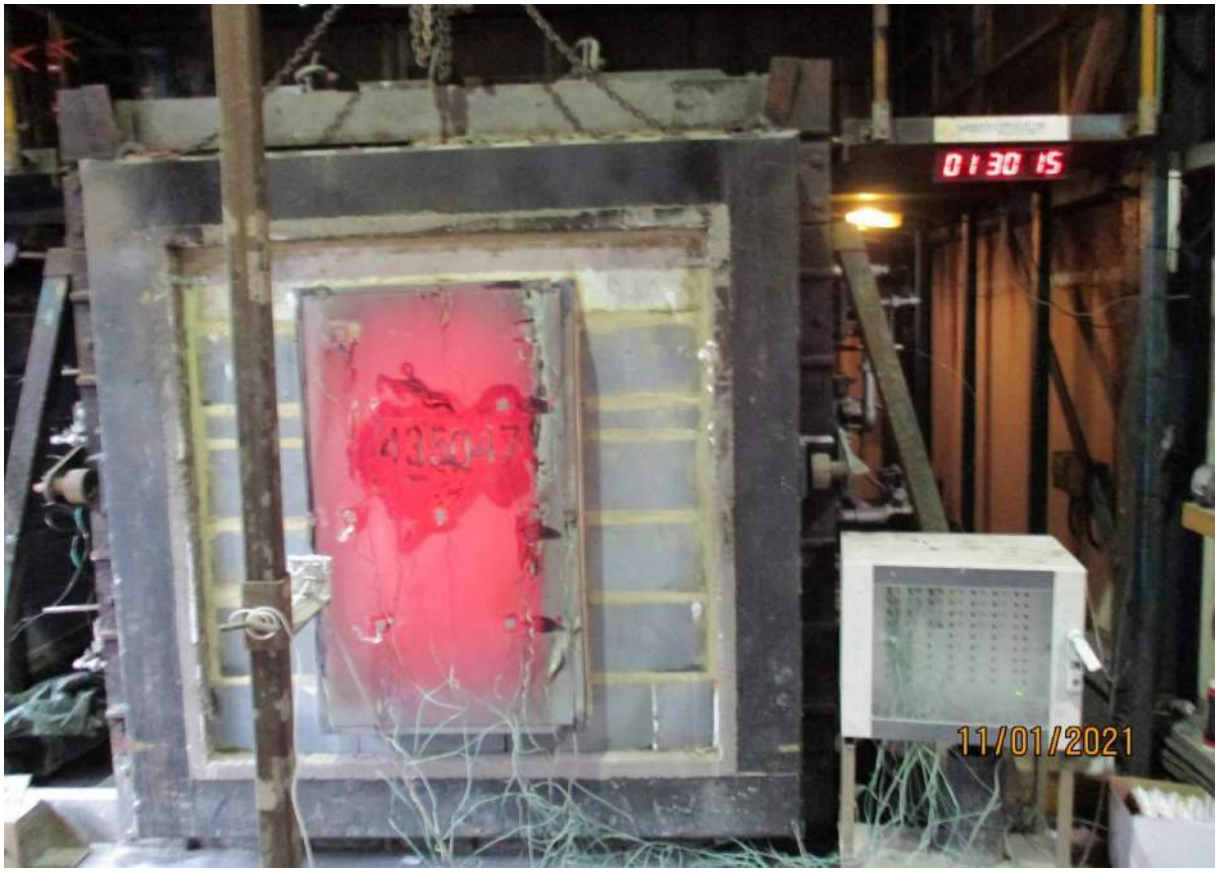
At 15 minutes

At 30 minutes

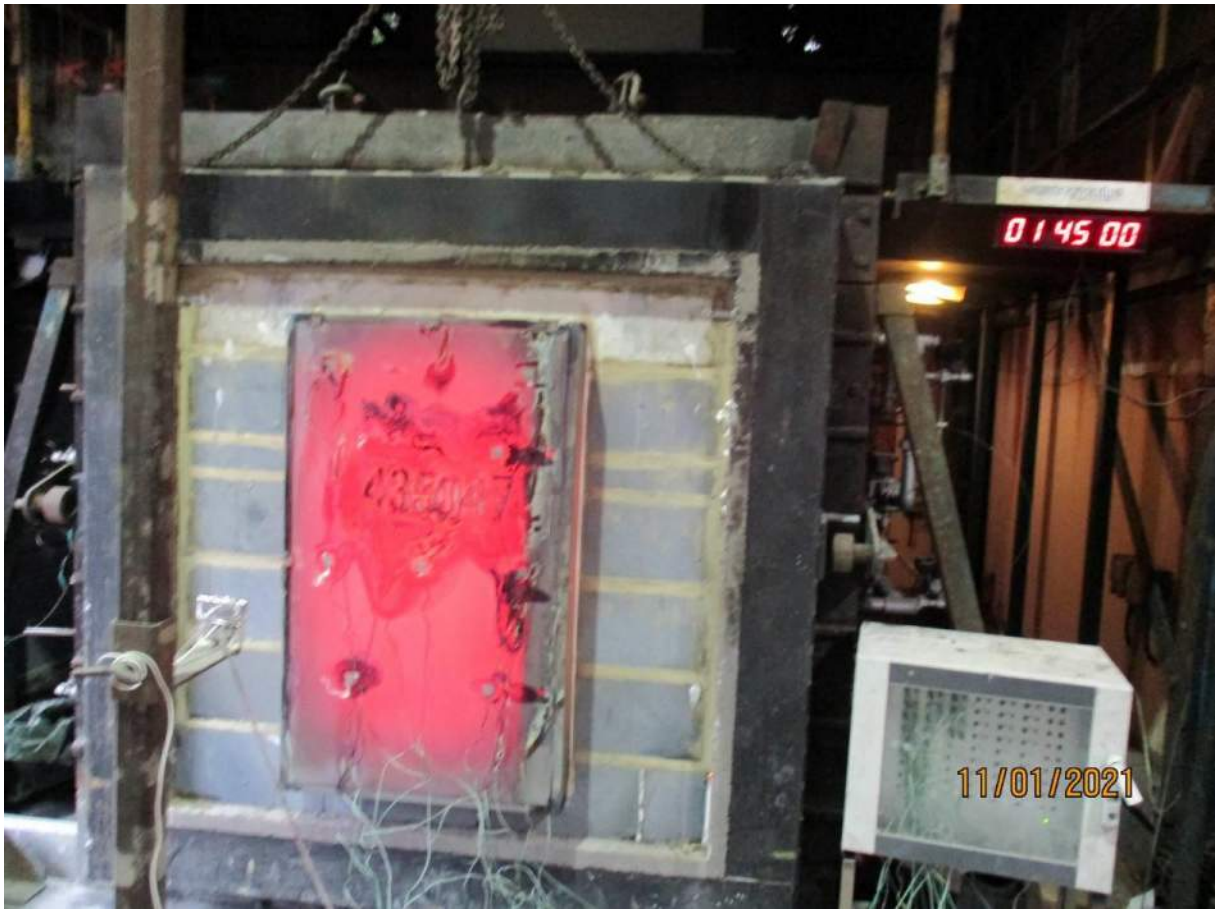
At 45 minutes

At 75 minutes

After 90 minutes

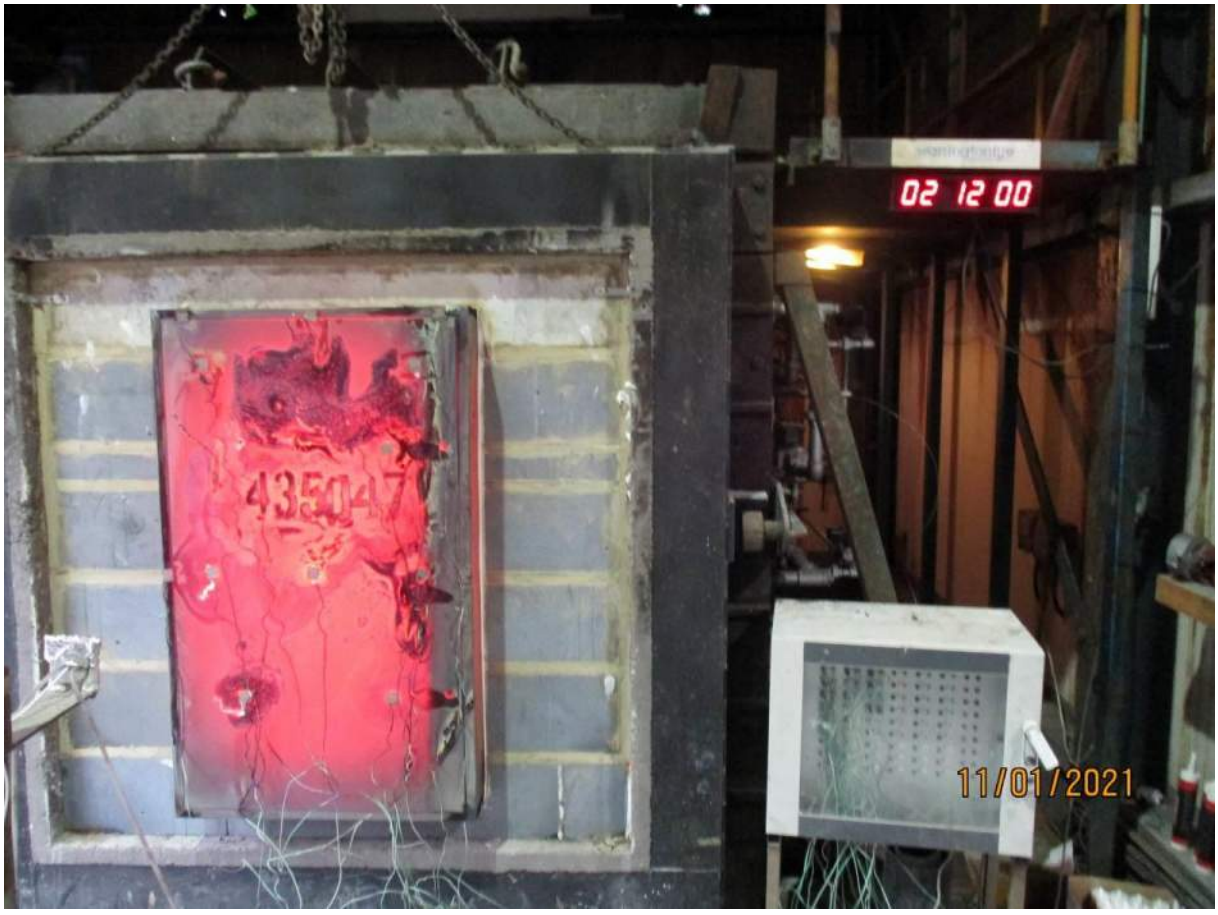


At 105 minutes



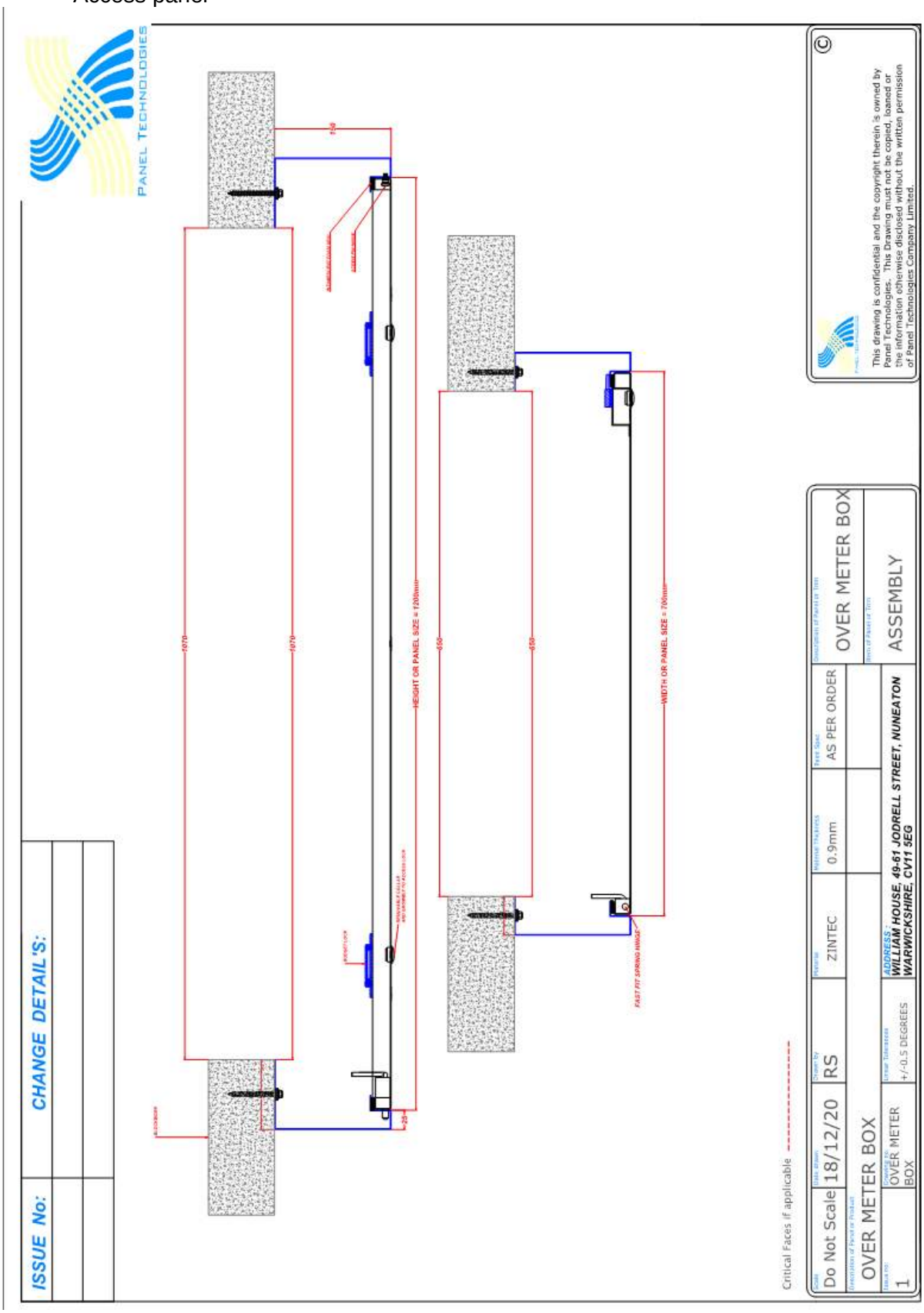
At 120 minutes

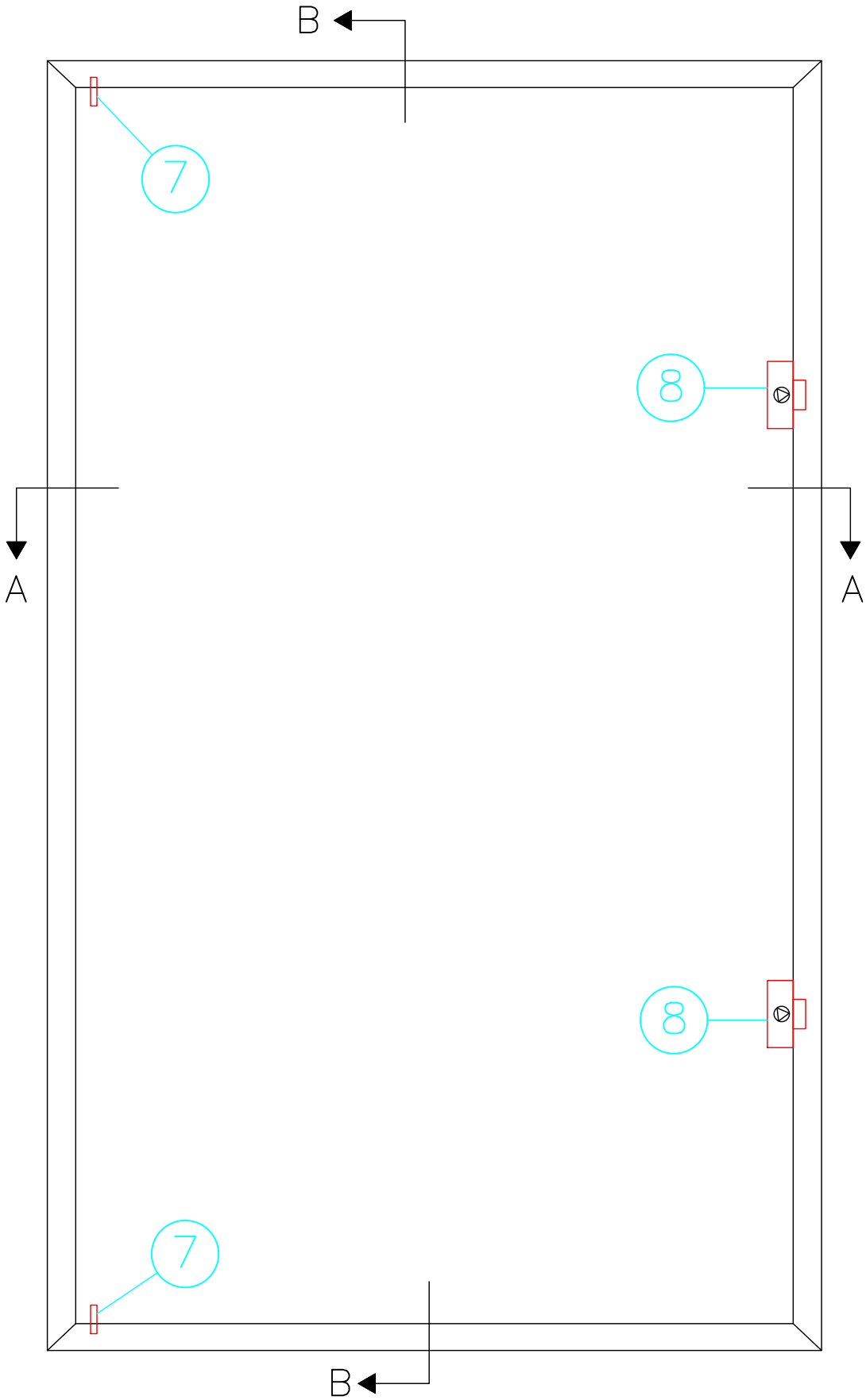
At 132 minutes



Appendix 1 – Client suppled drawing and Figures 1 to 4

Access panel





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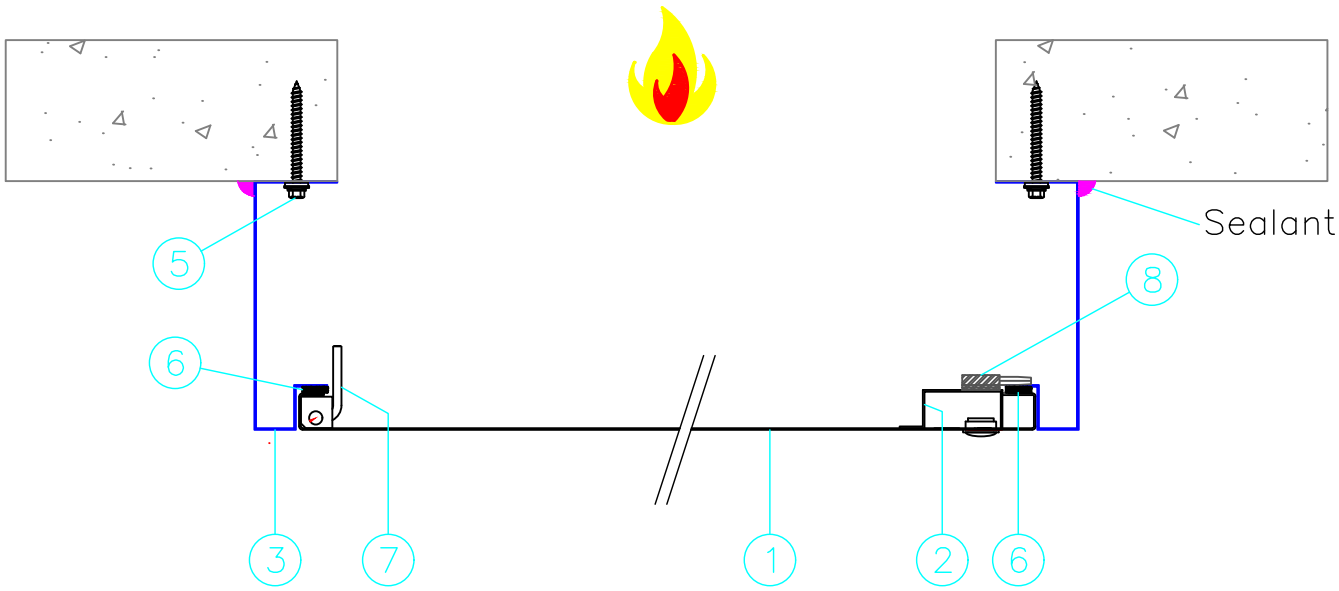
Title: Unexposed face elevation showing hardware positions
(All dimensions in mm)

Date Drawn	Drawn By	Scale
11/02/21	ARD	NTS

Project No.	
WF 435047	Appendix 1

Section A–A



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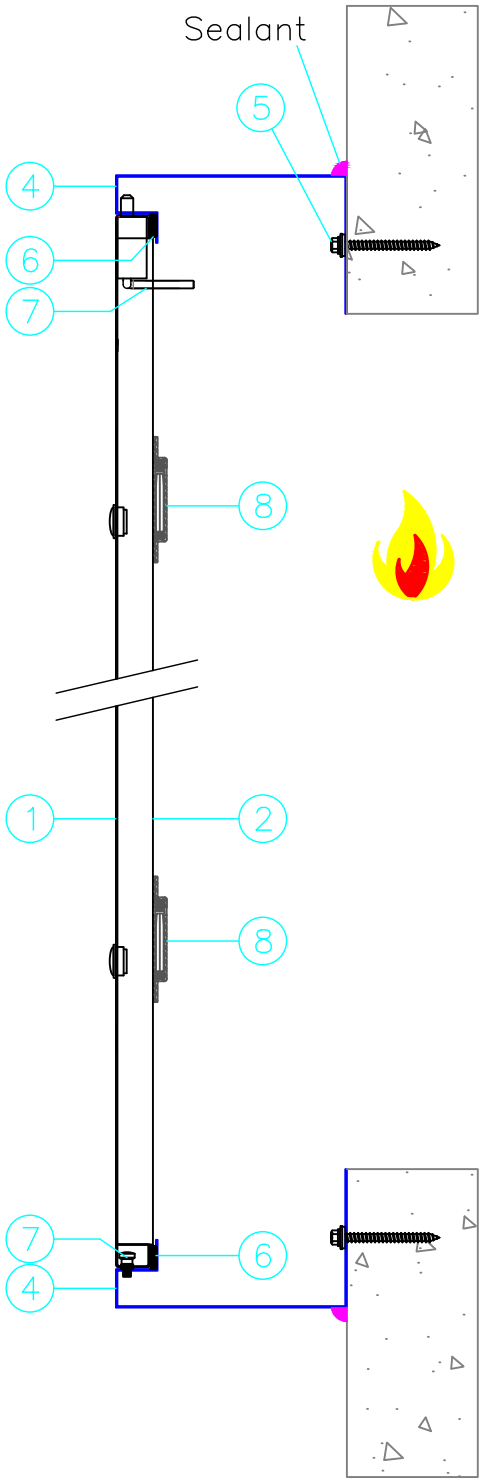
Title
Horizontal cross sections
(All dimensions in mm)

Date Drawn	Drawn By	Scale
11/02/21	ARD	NTS

Project No.	
WF 435047	Appendix 1

Section B–B



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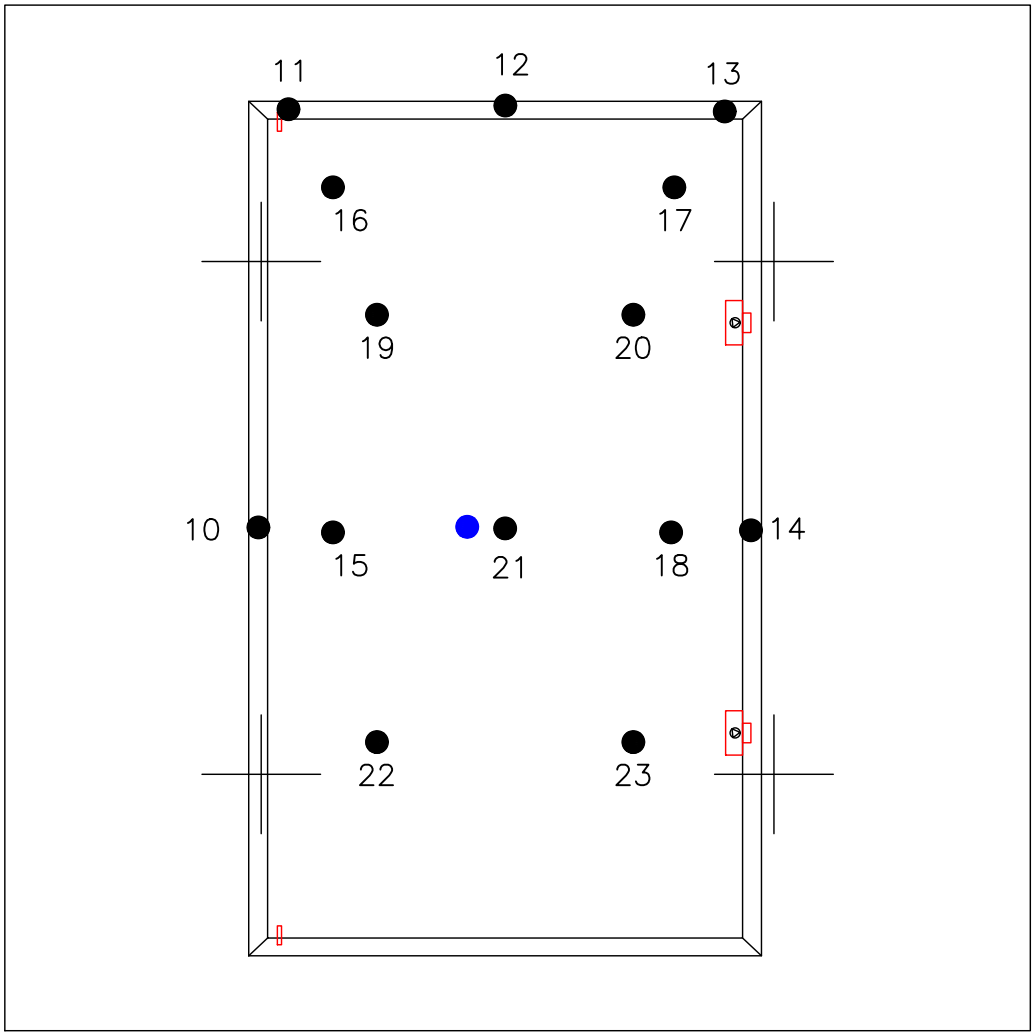
Title
Vertical cross section
(All dimensions in mm)

Date Drawn	Drawn By	Scale
11/02/21	ARD	NTS

Project No.	
WF 435047	Appendix 1



: Furnace Thermocouples

: Unexposed Face Thermocouples

: Radiometer

Viewed From Unexposed Face

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Title
Thermocouple positions
(All dimensions in mm)

Date Drawn	Drawn By	Scale
11/02/21	ARD	NTS

Project No.	
WF 435047	Appendix 1

Appendix 2 - raw test data

(see Figure 4 of Appendix 1 for channel locations)

Time	Chan 10	Chan 11	Chan 12	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	8	9	10	10	10	9	10	10	10	10	10	10	9	9
1	68	73	96	84	68	116	118	121	105	102	126	143	102	107
2	116	124	168	141	114	179	182	205	156	170	206	220	155	153
3	158	165	230	205	157	226	233	271	201	218	266	267	196	197
4	196	199	274	254	194	259	266	325	240	256	311	302	228	230
5	227	224	292	288	222	283	286	355	268	256	339	326	251	255
6	250	241	300	314	243	299	304	384	292	274	379	360	268	274
7	274	260	319	338	265	330	334	403	320	292	416	415	294	299
8	309	284	339	362	288	389	390	428	370	317	457	471	332	330
9	349	316	440	332	318	444	440	447	413	331	482	509	395	381
10	381	334	454	343	342	476	460	453	444	338	493	525	442	422
11	395	346	448	399	360	479	449	467	469	337	501	525	469	447
12	404	350	460	401	374	483	449	471	484	341	504	518	471	458
13	405	351	461	402	382	493	451	478	490	344	511	523	466	465
14	396	352	464	401	385	504	458	481	495	349	522	535	458	474
15	402	369	483	402	390	525	479	485	511	374	533	559	480	497
16	421	387	498	405	397	543	500	492	527	380	547	577	248	512
17	438	400	502	409	405	554	515	503	542	385	556	586	202	523
18	446	404	511	414	413	562	521	510	553	391	564	592	201	535
19	447	404	511	414	416	565	521	511	558	397	565	594	208	537
20	448	400	514	415	418	572	522	517	562	398	571	599	210	537
21	449	401	516	415	420	573	523	520	566	399	574	603	208	544
22	451	400	520	416	424	579	526	526	570	403	581	610	214	549
23	451	400	524	419	428	584	528	534	573	399	587	614	226	553

Time	Chan 10	Chan 11	Chan 12	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
24	458	406	530	423	435	589	538	536	577	417	591	622	232	560
25	461	407	528	423	437	592	537	540	582	419	595	626	237	565
26	462	404	528	425	441	596	538	546	513	419	603	631	234	570
27	467	408	536	428	444	600	543	548	307	416	605	635	253	576
28	469	408	245	430	446	606	547	230	591	424	603	394	240	581
29	471	408	265	433	450	610	545	229	597	422	610	316	246	585
30	470	410	242	434	447	613	554	525	599	427	622	315	231	587
31	472	409	258	436	451	616	555	532	604	215	622	323	257	593
32	474	410	537	437	452	622	561	561	607	206	625	655	257	595
33	476	415	532	440	455	627	565	569	612	221	630	661	273	598
34	473	415	545	443	458	628	569	570	616	232	305	664	406	605
35	475	419	542	446	457	633	571	558	619	214	275	669	294	606
36	478	420	548	446	459	637	572	452	621	217	276	673	312	609
37	482	422	617	449	463	644	576	324	626	228	282	677	311	615
38	483	423	586	449	464	646	579	279	628	219	647	679	298	618
39	482	428	591	450	466	648	581	278	632	217	650	681	287	622
40	483	432	555	451	469	648	585	262	636	224	659	683	288	627
41	485	436	642	454	474	654	587	357	640	236	657	690	319	632
42	486	436	634	459	474	660	587	370	641	452	660	692	327	634
43	488	433	625	459	477	660	589	358	643	445	663	696	328	637
44	485	435	649	460	478	662	594	351	644	448	665	696	246	639
45	491	441	636	458	479	665	600	359	645	450	666	699	339	642
46	494	444	649	460	481	667	602	363	647	463	668	703	215	645
47	497	444	569	462	483	672	601	580	650	454	672	705	300	646
48	500	447	572	463	486	675	607	599	654	460	676	709	297	651
49	500	445	568	465	488	677	606	607	658	456	679	713	234	654
50	501	398	570	467	490	681	611	612	661	458	681	716	245	658
51	503	228	572	468	492	340	612	616	665	460	685	718	220	660

Time	Chan 10	Chan 11	Chan 12	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
52	505	220	574	469	493	218	616	617	665	460	685	720	229	662
53	504	261	571	470	494	220	615	617	669	465	688	723	229	666
54	506	229	578	471	496	254	617	621	672	468	693	726	229	668
55	510	305	573	464	502	245	618	624	674	462	694	728	219	671
56	512	456	582	462	508	277	627	623	678	474	696	731	253	675
57	509	456	557	477	502	699	624	626	678	460	711	734	258	676
58	508	457	573	477	504	702	628	628	680	470	723	734	302	677
59	513	458	578	479	505	702	557	632	683	475	710	737	246	681
60	516	460	574	478	507	266	635	629	685	476	711	739	242	682
61	516	459	561	478	510	561	631	637	692	478	718	743	254	686
62	522	462	581	478	512	661	636	641	692	481	712	745	262	687
63	518	458	588	478	512	262	636	642	694	478	712	747	273	690
64	522	461	588	480	514	268	641	646	696	484	716	750	291	668
65	521	465	592	481	514	272	643	646	697	483	718	751	329	651
66	527	467	594	482	516	268	645	648	700	482	721	755	366	698
67	530	470	597	485	519	278	648	648	703	486	722	755	298	699
68	532	470	633	485	519	273	649	651	705	486	722	739	302	702
69	531	471	613	486	519	279	651	654	706	491	709	230	312	693
70	533	472	590	487	521	280	652	656	709	491	690	247	366	707
71	534	473	202	487	521	730	584	656	710	486	717	223	373	709
72	536	478	216	489	525	736	632	661	718	491	667	350	412	719
73	541	280	205	492	526	742	625	666	722	493	667	779	413	723
74	546	230	212	495	530	748	611	670	726	501	679	784	497	726
75	550	209	229	498	534	752	577	673	732	507	690	788	426	731
76	551	204	218	499	533	750	462	674	734	501	690	789	363	734
77	553	221	241	500	535	757	511	677	735	504	661	791	366	736
78	552	203	212	502	536	759	481	680	738	505	660	795	360	739
79	554	223	231	504	428	698	342	682	742	508	682	797	366	745

Time	Chan 10	Chan 11	Chan 12	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
80	558	493	226	385	274	292	275	684	744	507	763	799	556	746
81	559	519	232	391	272	287	303	686	745	501	765	782	480	749
82	563	503	236	386	276	749	302	689	749	509	768	781	518	751
83	565	459	247	397	263	742	197	683	751	512	773	806	442	754
84	566	499	252	393	272	741	200	630	753	514	772	807	491	755
85	565	488	262	394	269	742	200	212	754	260	773	809	518	758
86	566	502	296	393	281	697	226	267	756	517	772	809	417	762
87	568	501	275	300	294	777	219	218	758	518	774	812	461	763
88	570	480	258	248	299	772	206	203	758	520	775	814	436	761
89	572	498	275	254	309	674	195	154	764	520	777	815	390	768
90	575	464	284	278	307	673	199	145	763	520	782	819	353	767
91	572	484	260	264	302	666	168	132	765	523	783	819	361	771
92	570	501	274	273	305	661	175	154	765	522	783	821	351	773
93	573	499	259	366	284	651	156	158	766	523	785	822	376	775
94	575	491	271	276	309	630	168	169	770	520	789	825	393	776
95	579	497	268	283	305	644	166	166	771	525	790	827	324	777
96	580	511	287	284	308	637	174	169	773	522	792	829	391	780
97	579	512	291	317	297	621	177	175	775	527	794	831	413	781
98	582	511	268	432	266	632	169	167	776	526	797	832	359	780
99	584	511	284	296	293	643	170	174	781	528	799	832	334	781
100	584	506	271	275	293	626	162	159	787	524	800	834	336	784
101	585	516	283	276	295	646	169	172	789	527	800	834	308	785
102	586	516	278	280	295	797	176	170	790	526	801	835	415	789
103	583	517	313	401	308	798	178	179	793	532	803	837	451	792
104	587	517	286	357	247	800	244	184	795	531	804	838	419	793
105	587	519	287	403	305	801	265	188	797	531	805	840	408	796
106	588	521	290	296	308	804	252	182	798	532	807	841	447	797
107	587	521	278	298	310	805	230	174	799	533	808	842	443	795

Time	Chan 10	Chan 11	Chan 12	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
108	588	520	283	308	312	803	243	172	800	528	809	842	419	795
109	587	520	287	295	313	807	242	178	802	534	811	845	395	796
110	592	522	293	300	317	809	248	196	802	539	813	847	411	796
111	592	523	297	435	298	812	252	194	805	536	814	847	418	800
112	595	524	278	282	294	813	243	189	806	534	817	850	410	801
113	594	525	277	284	286	815	239	180	806	534	818	850	428	802
114	595	527	264	282	278	817	231	177	807	532	821	852	442	803
115	595	525	267	285	280	819	232	179	808	522	821	854	449	804
116	597	528	269	283	279	819	239	181	810	531	823	854	423	806
117	599	528	273	287	283	822	237	194	812	539	826	856	450	808
118	600	529	278	287	287	823	241	191	813	537	827	857	497	809
119	604	531	274	288	288	826	240	199	815	535	829	858	442	811
120	603	533	312	302	304	825	274	245	816	541	828	859	531	812
121	601	532	265	284	301	826	234	224	818	531	830	860	478	814
122	597	531	270	281	303	824	238	220	818	526	831	860	540	815
123	604	533	297	289	319	829	257	236	819	542	832	863	488	815
124	609	537	281	289	317	833	250	237	820	542	834	864	492	815
125	609	538	301	295	328	832	266	239	821	542	834	865	518	817
126	610	538	286	289	324	834	248	239	823	544	836	867	496	819
127	611	542	281	288	318	834	256	238	825	542	836	867	482	823
128	612	540	284	287	318	836	251	240	826	540	838	870	491	821
129	614	543	269	282	313	839	237	238	827	542	839	869	486	822
130	616	542	283	288	331	838	255	247	829	540	839	871	530	825
131	616	544	323	297	343	839	289	254	829	544	838	873	478	827
132	616	547	299	314	332	842	265	249	832	546	840	876	527	829