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Testing, calibrating, advising.

Title:

The fire resistance performance of 10 No. surface mounted meter box fire seals when tested in accordance with BSEN 1364-1: 1999 utilising the principles of BSEN 1366-3: 2009

WF Report No:

BMT/FEP/F15263

Prepared for:

Ritherdon and Company Limited

Lorne Street
Darwen
Lancashire
BB3 1QW

Test date:

30th November 2015

Notified Body No:

1314

1762

Exova Warringtonfire – the new name for BM TRADA

On December 1st 2015, Chiltern International Fire Limited (trading as BM TRADA) commenced trading under the name Exova Warringtonfire.

To coincide with this change, our Technical Reports, Test Reports, Product Assessments, company stationery and marketing collateral have been updated to reflect the Exova Warringtonfire branding.

The validity of all documents previously issued by Chiltern International Fire Limited including certificates, test reports and product assessments is unaffected by this change. A letter to this effect is available upon request by e-mailing globalfire@exova.com

About Exova Warringtonfire

Exova Warringtonfire is part of the Exova Group one of the world's leading laboratory-based testing groups, trusted by organisations to test and advise on the safety, quality and performance of their products and operations. Headquartered in Edinburgh, UK, Exova operates 143 laboratories and offices in 32 countries and employs around 4,500 people throughout Europe, the Americas, the Middle East and Asia/Asia Pacific. With over 90 years' experience, Exova specialises in testing across a number of key sectors from health sciences to aerospace, transportation, oil and gas, fire and construction.

Be assured that whilst the name will change, your service provision and primary contacts have not. What will be available to you is a wider team of testing experts and an extended range of testing capabilities including structural steelwork testing, ventilation duct and damper testing, ASTM testing, water mist system testing and smoke toxicity testing and covering additionally both the rail and marine sectors.

If you have any questions, please do not hesitate to contact a member of the team and we will do our best to answer them. We appreciate your business to date and we look forward to working with you in the future.

Kind regards

Exova Warringtonfire

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1 Introduction

10 No. surface mounted meter box fire seals were tested to determine their fire resistance.

2 Specimen verification

The specimens were delivered to Exova Warringtonfire during November 2015. Exova Warringtonfire constructed a nominally 140mm thick timber stud/plasterboard clad partition. Exova Warringtonfire then subsequently installed the specimens into the supporting construction.

3 Description of supporting construction

The supporting construction comprised a 3000mm wide x 3000mm high x nominally 140mm thick timber stud/plasterboard clad partition, built into a refractory lined steel restraint frame.
The partition framing comprised of 95mm thick x 46mm wide timber head and base track, studs and noggins, and clad on the unexposed face with a single layer of 15mm thick type F plasterboard, and clad on the exposed face with 2 No. layers of 15mm thick type F plasterboard. The supporting construction was fixed on all edges, and included 10 No. apertures. The apertures were lined with 1 No. layer of 15mm thick type F plasterboard. All plasterboard was fixed to the timber framing with the appropriately sized screws in order to achieve a minimum of 10mm penetration into the timber.

4 Description of specimens

Details of the specimens are shown in the drawings supplied by the client in Appendix 1, and Exova Warringtonfire drawings in Appendix 2. All measurements are in mm and the descriptions are written viewing the specimens from the unexposed face unless stated otherwise. The meter box fire seals were labelled as shown in figure 1 of Appendix 2

4.1 Meter box fire seal units fitted in the partition

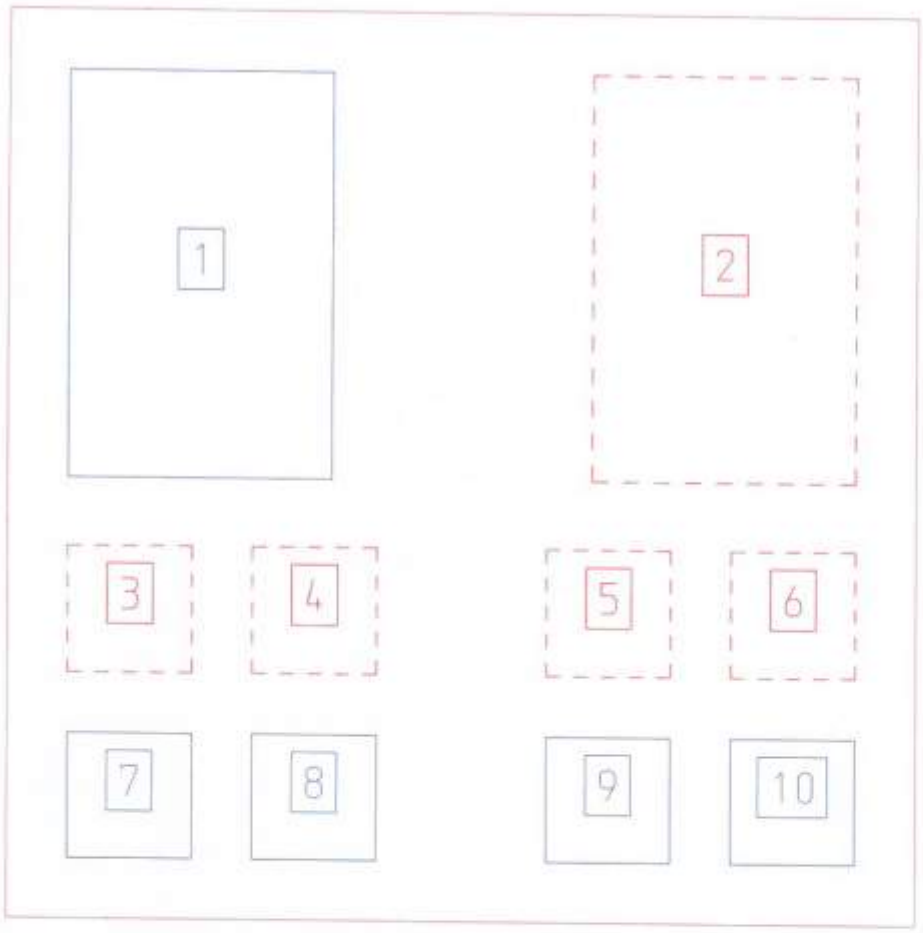
(see figure 1 of Appendix 2 for location)

Specimen reference and product reference	Fire seal unit material	Mounting position – direction of opening	Unit size (mm)	Aperture size (mm)	Lock type	Service inlet sealing material
1 Extra Large FireSeal	1.2mm thick stainless steel (polyester powder coated)	Unxposed face - opening away from the furnace	1000 wide x 1500 high x 152.2 deep	870 wide x 1344 high	2No. Tri-key cam lock	-
2 Extra Large FireSeal	1.2mm thick stainless steel (polyester powder coated)	Exposed face - opening in towards the furnace	1000 wide x 1500 high x 152.2 deep	870 wide x 1344 high	2No. Tri-key cam lock	-

Specimen reference and product reference	Enclosure material	Mounting position – direction of opening	Unit size (mm)	Aperture size (mm)	Lock type	Service inlet sealing material
3 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Exposed face - opening into the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Pyroplex acrylic sealent
4 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Exposed face - opening into the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Pyroplex acrylic sealent
5 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Exposed face - opening into the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Fire foam*
6 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Exposed face - opening into the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Fire foam*
7 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Unexposed face opening away from the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Pyroplex acrylic sealent
8 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Unexposed face opening away from the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Pyroplex acrylic sealent
9 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Unexposed face opening away from the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Fire foam*
10 R22 FireSeal	1.2mm thick stainless steel (polyester powder coated)	Unexposed face opening away from the furnace	472 wide x 563.4 high x 243 deep	410 wide x 415 high	Tri-key cam lock	Fire foam*

*Product information kept on file by Exova Warringtonfire

4.2 Meter box Fire Seal unit fire sealing details

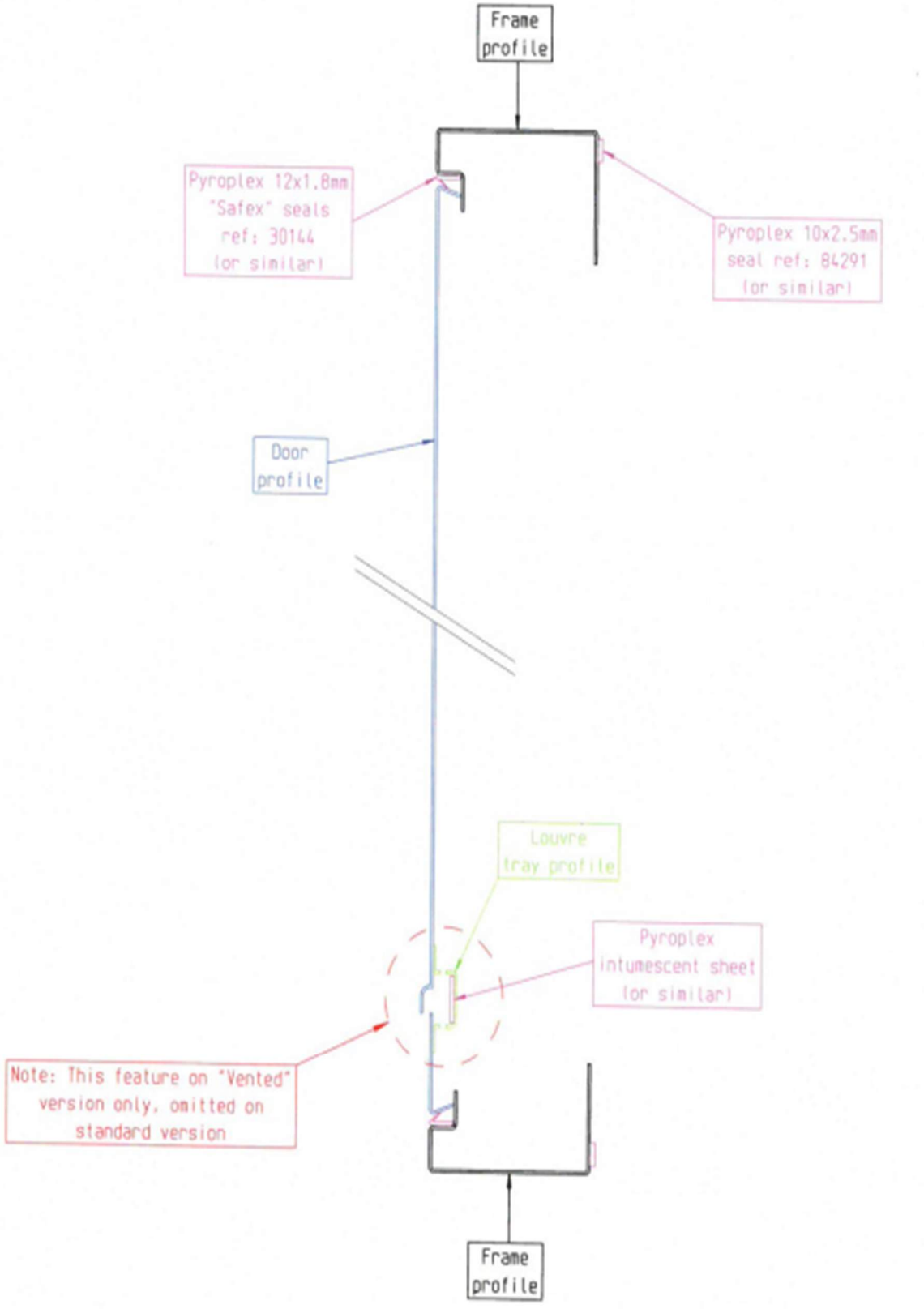


Outside
1: "FireSeal XXL"
7: "Surface Mounted FireSeal" with side brackets (Pyroplex acrylic sealant)
8: "Surface Mounted FireSeal" (Pyroplex acrylic sealant)
9: "Surface Mounted FireSeal" with side brackets (Hilti FireStop foam)
10: "Surface Mounted FireSeal" (Hilti FireStop foam)

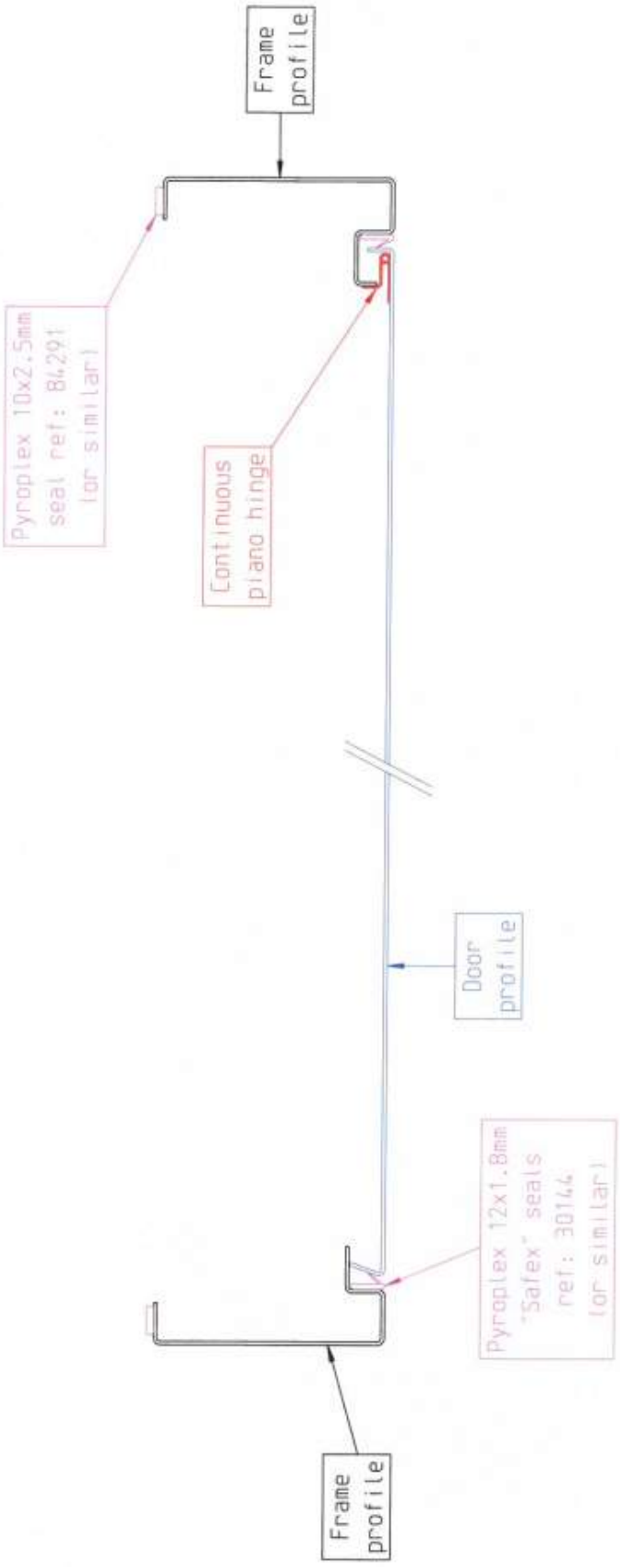
Furnace side
2: "FireSeal XXL"
3: "Surface Mounted FireSeal" with side brackets (Pyroplex acrylic sealant)
4: "Surface Mounted FireSeal" (Pyroplex acrylic sealant)
5: "Surface Mounted FireSeal" with side brackets (Hilti FireStop foam)
6: "Surface Mounted FireSeal" (Hilti FireStop foam)

Fire seals 1 and 2 – Extra Large FireSeal

Vertical section

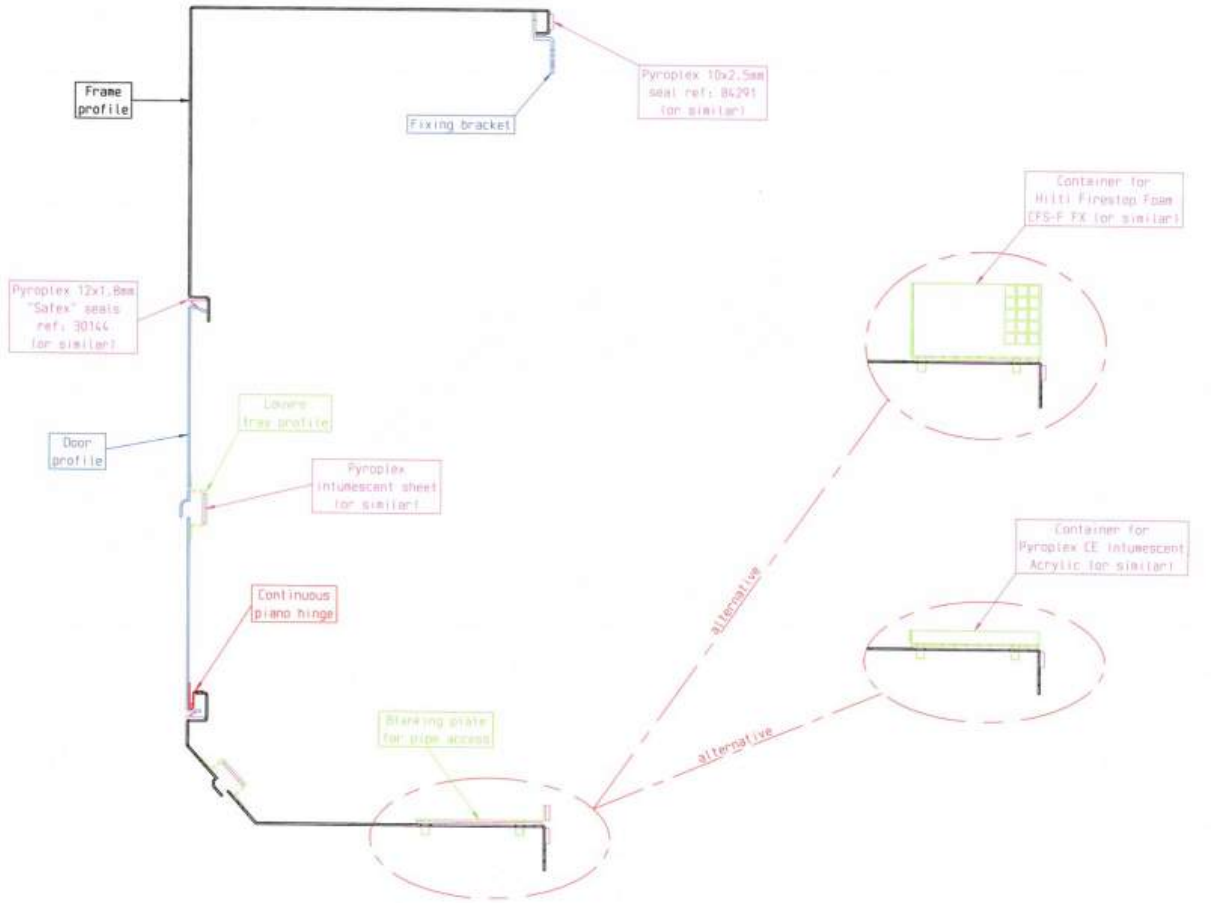


Horizontal section

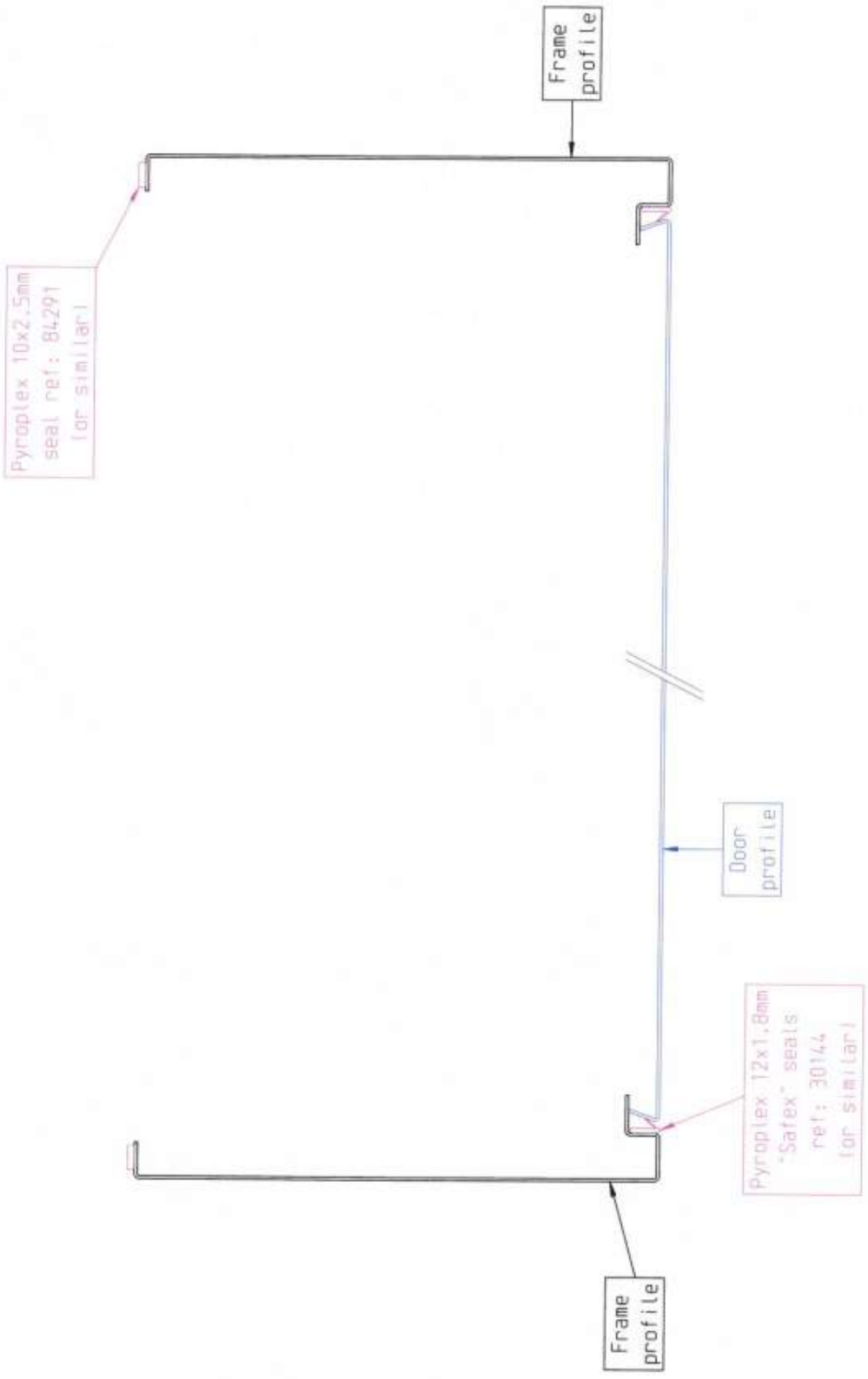


Fire seals 3 – 10 R22 FireSeal

Vertical section



Horizontal section



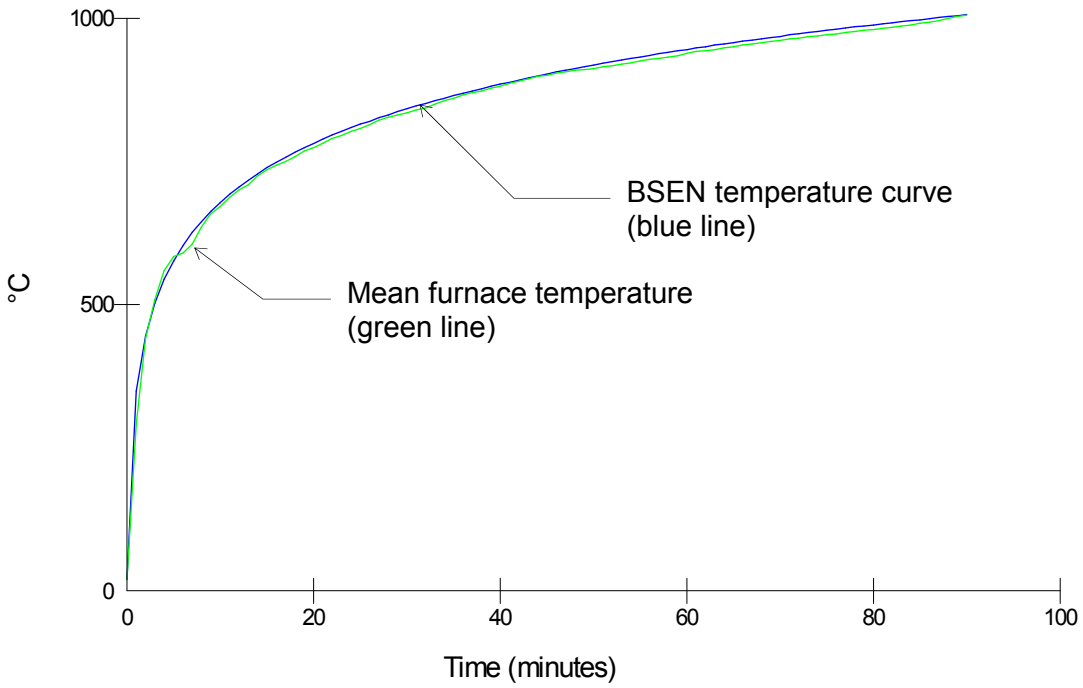
4.3 Specimen fixing detail

Specimen reference and product reference	Fixing method (See Appendix 1 – clients drawings)
1 Extra Large FireSeal	Fixed with No.8 x 50mm steel wood screws at fixing flanges
2 Extra Large FireSeal	Fixed with No.8 x 50mm steel wood screws at fixing flanges
3 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges and 2No. x 50mm steel screws at external fixing brackets
4 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges
5 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges and 2No. x 50mm steel screws at external fixing brackets
6 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges
7 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges and 2No. x 50mm steel screws at external fixing brackets
8 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges
9 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges and 2No. x 50mm steel screws at external fixing brackets
10 R22 FireSeal	Fixed with No.5 x 50mm steel wood screws at fixing flanges

5 Test Conditions

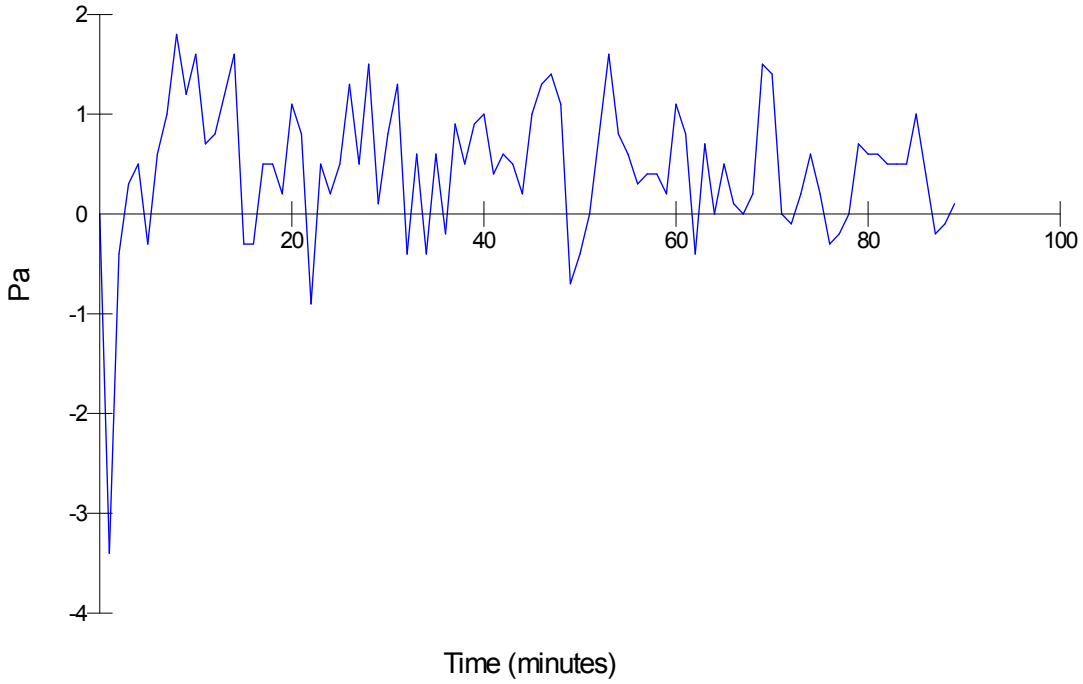
5.1 Furnace temperature

The furnace was controlled to follow the temperature/time relationship specified in BSEN 1363: Part 1: 2012 Section 5.1.1 as closely as possible, using the average of nine plate thermometers suitably distributed within the furnace. The temperatures recorded have been tabulated in Appendix 3 and are shown graphically below:



5.2 Pressure readings

After the first 5 minutes of the test, the furnace pressure was maintained at 0.45 ± 5 Pa and after 10 minutes was maintained at 0.45 ± 3 Pa with respect to atmosphere, at a point 0.5m from the furnace floor level. Therefore equating to 20 Pa at the head of the upper fire seal units. The pressure readings have been tabulated in Appendix 3 and are shown graphically below:



5.3 Ambient temperature

The ambient temperature of the test area at commencement of test was 13°C.

5.4 **Thermocouple positions** (see Appendix 2 figure 2)

The temperature of the unexposed face of fire seal unit 1 was monitored by means of two thermocouples fixed to the plasterboard 25mm from the unit framing, three thermocouples fixed to the plasterboard above the frame of the unit, and three thermocouples fixed to the leaf of the unit.

The temperature of the unexposed face of fire seal unit 1 was monitored by means of three thermocouples fixed to the frame of the unit and three thermocouples fixed to the leaf of the unit.

The temperature of the unexposed face of fire seal units 3, 4, 5 and 6 was monitored by means of one thermocouple fixed to the body of the unit and two thermocouples fixed to the leaf of the unit.

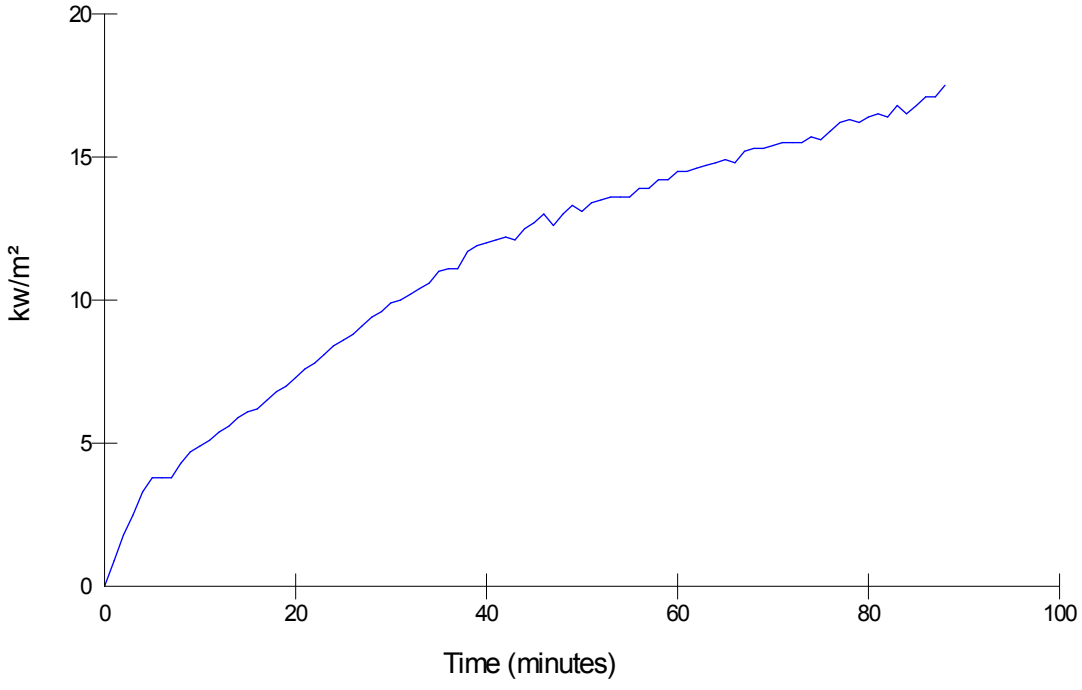
The temperature of the unexposed face of fire seal units 7, 8, 9 and 10 were monitored by mean of one thermocouple fixed to the plasterboard of the supporting construction 25mm from the unit framing, one thermocouple on the plasterboard above the unit frame, one thermocouple fixed to the body of the unit and two thermocouples fixed to the leaf of the unit

Graphs of each meter box / fire seal unit can be found in Section 10.

The temperatures recorded have been tabulated in the Appendix 3.

5.5 Radiation

A radiometer was used to measure the radiation 1m away from the specimens. The results of the radiometer were recorded and tabulated in Appendix 3 and are shown graphically below:



6 Observations

All comments relate to the unexposed face unless otherwise specified.

Time (minutes)	
01.22	Samples 2, 3, 4, 5 and 6, the faces are discolouring and there is smoke issuing from the perimeter of the hatches
03.59	Sample 1, the face is discolouring
05.30	Samples 1, 7, 8 and 9, the intumescent at the perimeter of the sample is reacting
07.20	Sample 1, the corners of the seal are bowing out away from the furnace
10.26	Samples 7, 8 and 9 are discolouring. Sample 10, the intumescent at the perimeter of the seal is reacting
12.35	Samples 1, 7, 8, 9 and 10, the intumescent at the perimeter of the samples are reacting
14.13	Samples 5 and 6, there is continuous flaming at the foam on the inside of the box, thereby constituting **integrity failure.**
15.30	Samples 1,7,8,9 and 10, the paint across the surface is blistering
17.47	Sample 1, there is smoke issuing from the left hand side of the box, where it meets the wall
24.40	Sample 2, there is glow at the centre of the head
26.20	Sample 2, there is a visual gap across the entire head
32.32	Sample 2, a 6mm gap gauge failure was recorded across the threshold, thereby constituting **integrity failure.**
36.23	Sample 2, a 6mm gap gauge failure was recorded across the head, thereby constituting **further integrity failure.**
60.00	No change
73.32	Sample 1, there is continuous flaming at the centre of the head, where the box meets the wall, thereby constituting **integrity failure.**
76.06	Sample 4, there is continuous flaming at the centre of the head, where the box meets the wall, thereby constituting **integrity failure.**
77.56	Sample 3, there is continuous flaming at the centre of the head, where the box meets the wall, thereby constituting **integrity failure.**
90.00	Test terminated

7 Expression of results

Specimen test reference	Integrity			Insulation
	Cotton pad	Gap gauge	Continuous flaming	
1	90 (ninety) minutes *	90 (ninety) minutes *	73 (seventy three) minutes	4 (four) minutes
2	90 (ninety) minutes *	32 (thirty two) minutes	90 (ninety) minutes *	1 (one) minutes
3	90 (ninety) minutes *	90 (ninety) minutes *	77 (seventy seven) minutes	1 (one) minutes
4	90 (ninety) minutes *	90 (ninety) minutes *	76 (seventy six) minutes *	3 (three) minutes
5	90 (ninety) minutes *	90 (ninety) minutes *	14 (fourteen) minutes	1 (one) minutes
6	90 (ninety) minutes *	90 (ninety) minutes *	14 (fourteen) minutes	1 (one) minutes
7	90 (ninety) minutes *	90 (ninety) minutes *	90 (ninety) minutes *	4 (four) minutes
8	90 (ninety) minutes *	90 (ninety) minutes *	90 (ninety) minutes *	3 (three) minutes
9	90 (ninety) minutes *	90 (ninety) minutes *	90 (ninety) minutes *	5 (five) minutes
10	90 (ninety) minutes *	90 (ninety) minutes *	90 (ninety) minutes *	6 (six) minutes

* No failure of the test criteria at termination of the test at 90 minutes

8 Limitations

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 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. Exova Warrinmgtyonfire 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.

	Written and checked by:	**Authorised by:**
Signature:		
Name:	Adam Scott	Mark Cummings
Title:	Technical Officer	Deputy Technical Head
Date of issue:	06/04/2016	06/04/2016

9 Photographs

Service inlet fire sealing

Acrylic fire sealing of service inlets, specimens 3,4,7 and 8 (inside the box)

Foam fire sealing of service inlets, specimens 5,6,9 and 10 (inside the box)

External view of acrylic fire sealing of service inlet at the bottom of the box

External view of foam fire sealing of service inlet at the bottom of the box

Unexposed face at start of test

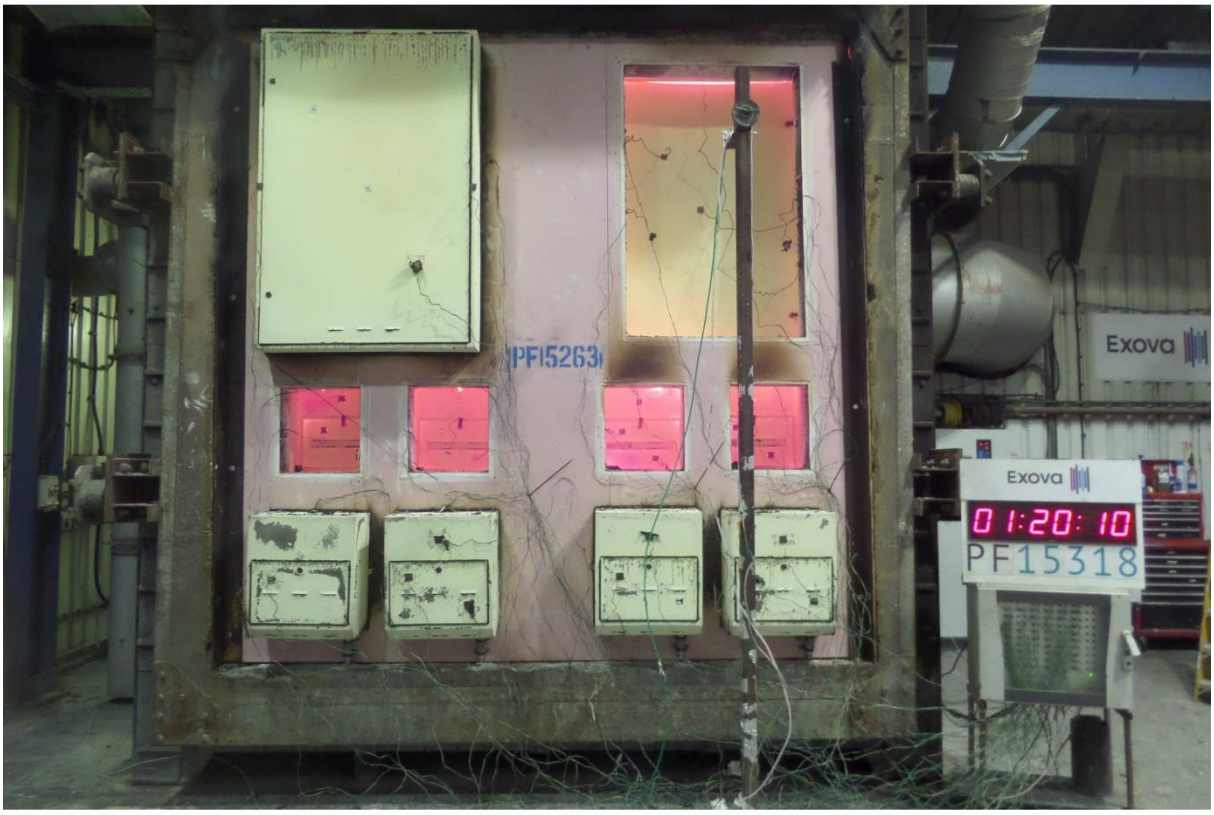
After 15 minutes

After 20 minutes

At 40 minutes

At 60 minutes

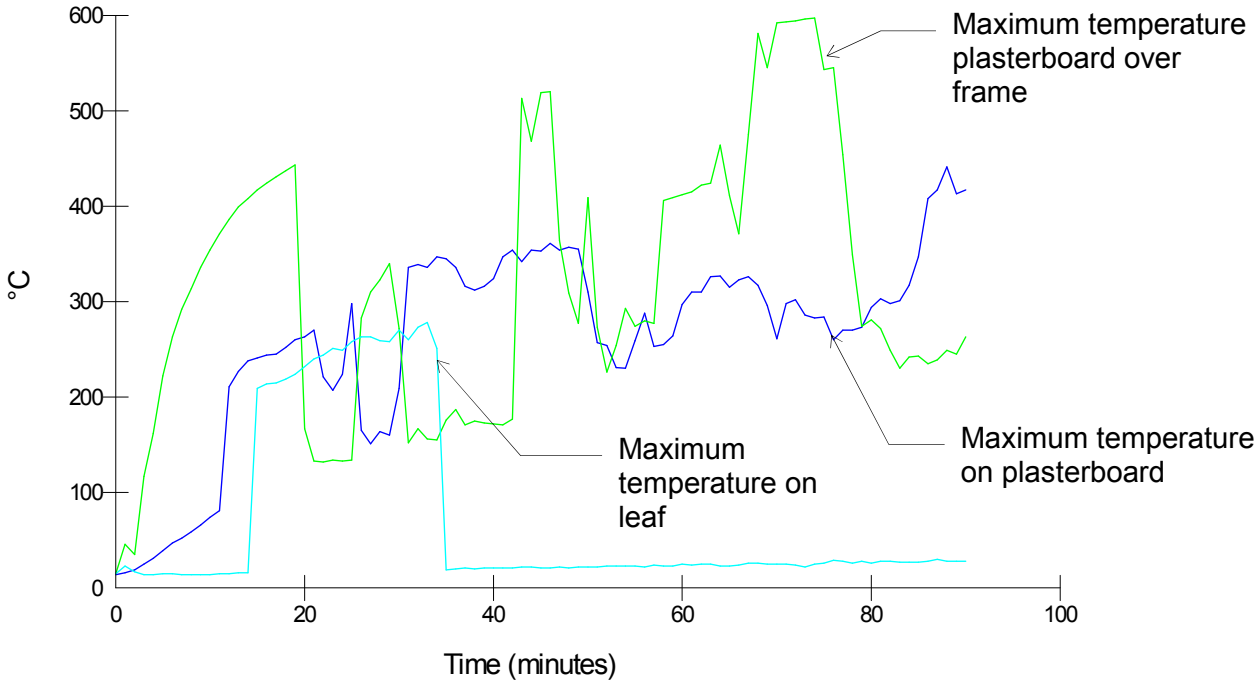
After 80 minutes



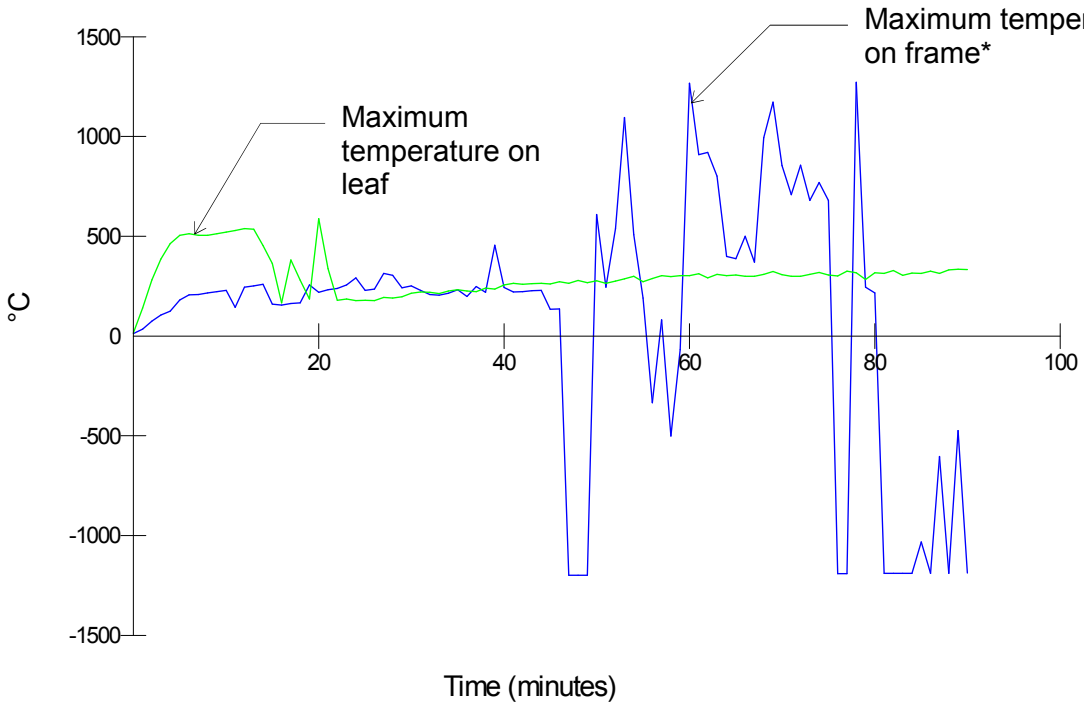
10 Graphs

Unexposed face temperature curves

Fire seal unit 1

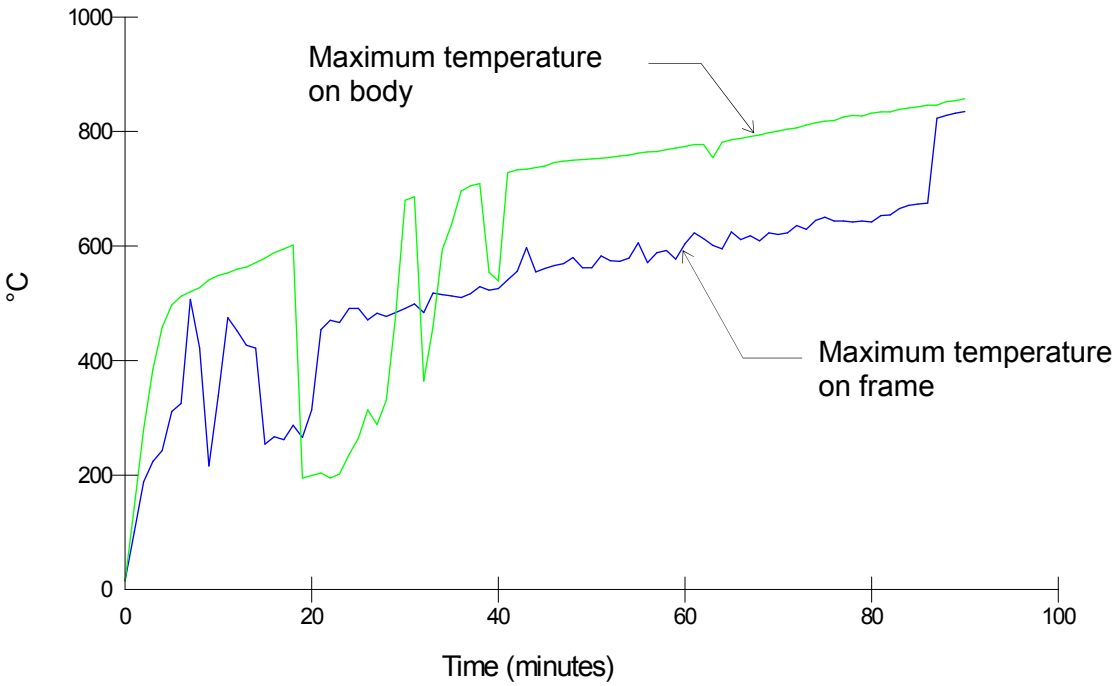


Fire seal unit 2

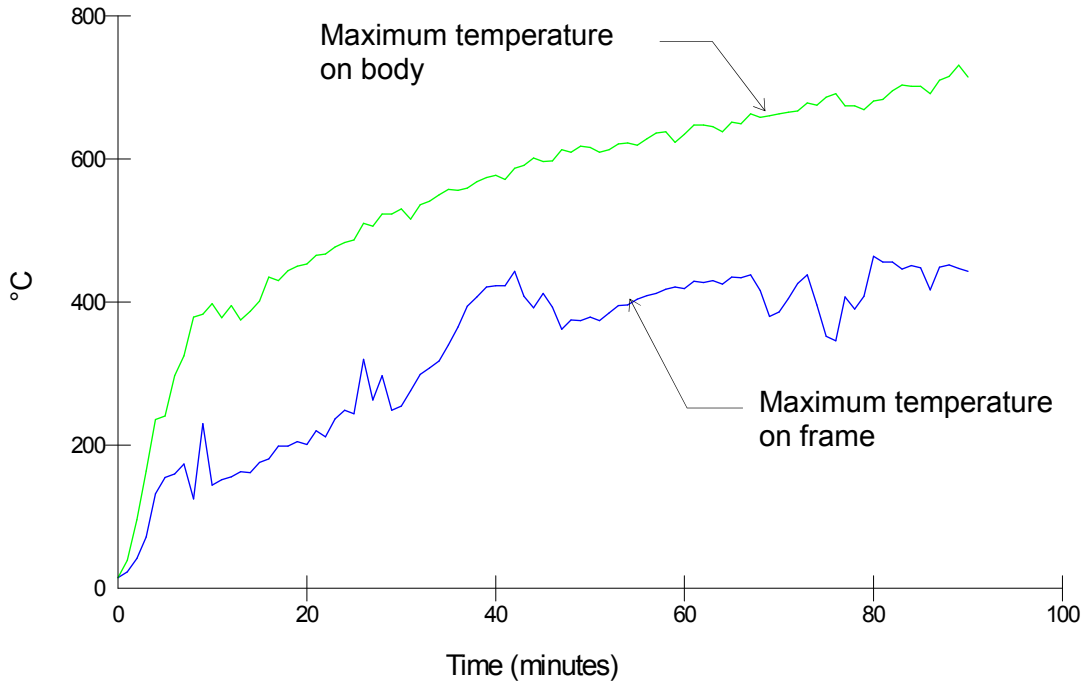


*Thermocouple malfunction due to heat damage of cable

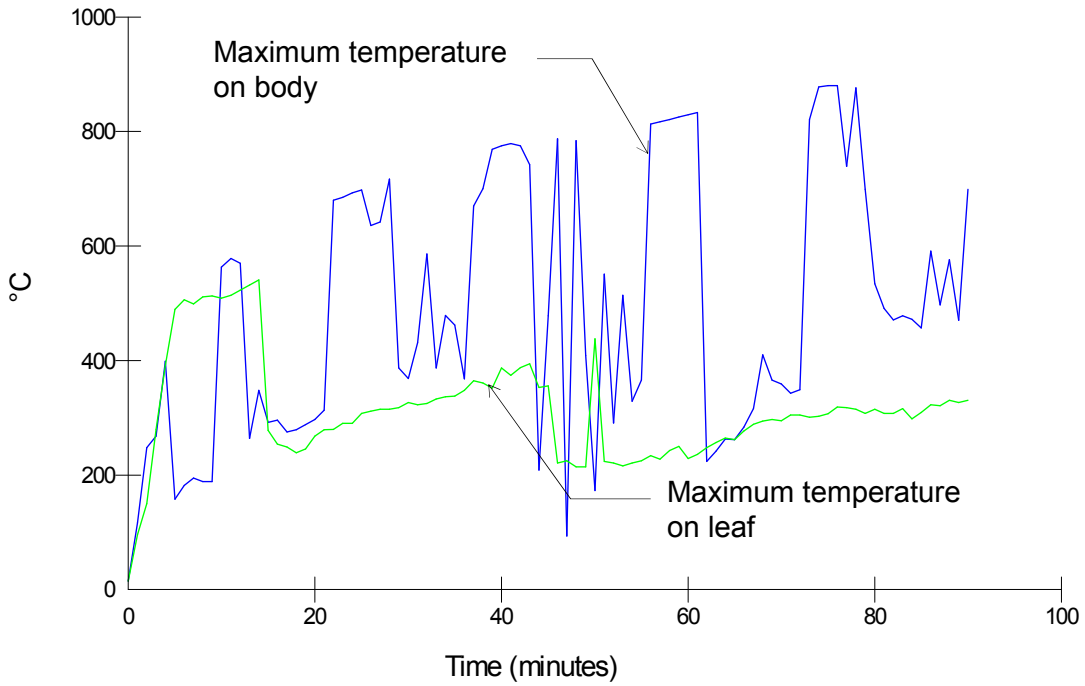
Fire seal unit 3



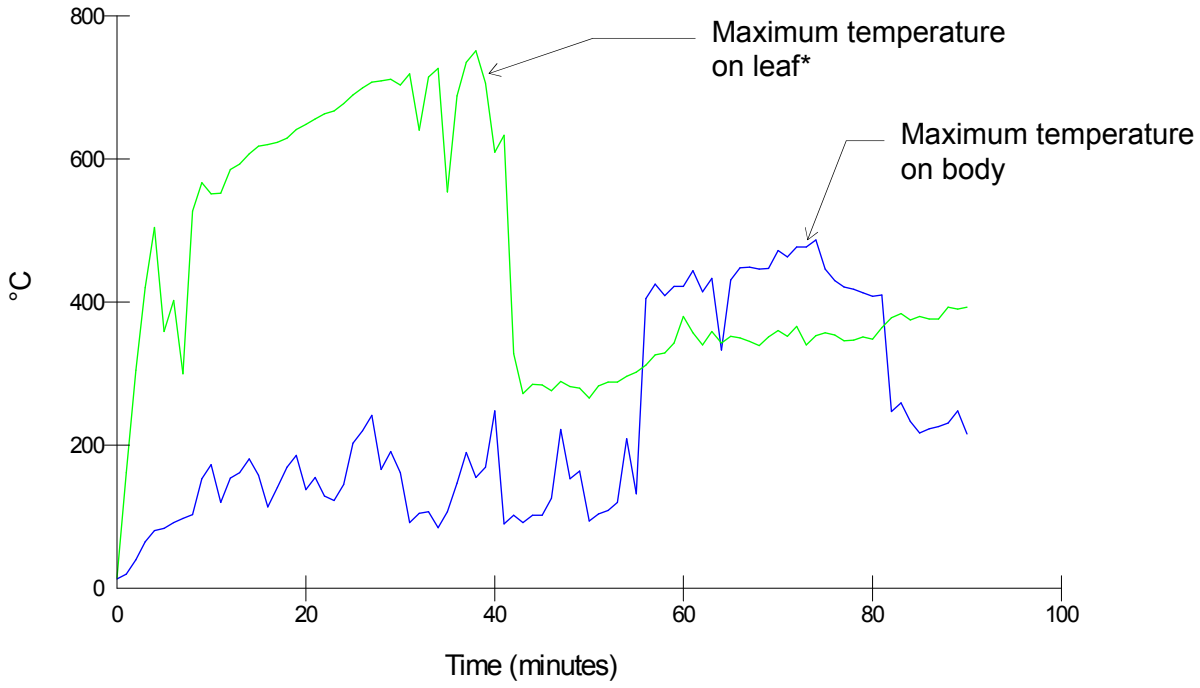
Fire seal unit 4



Fire seal unit 5

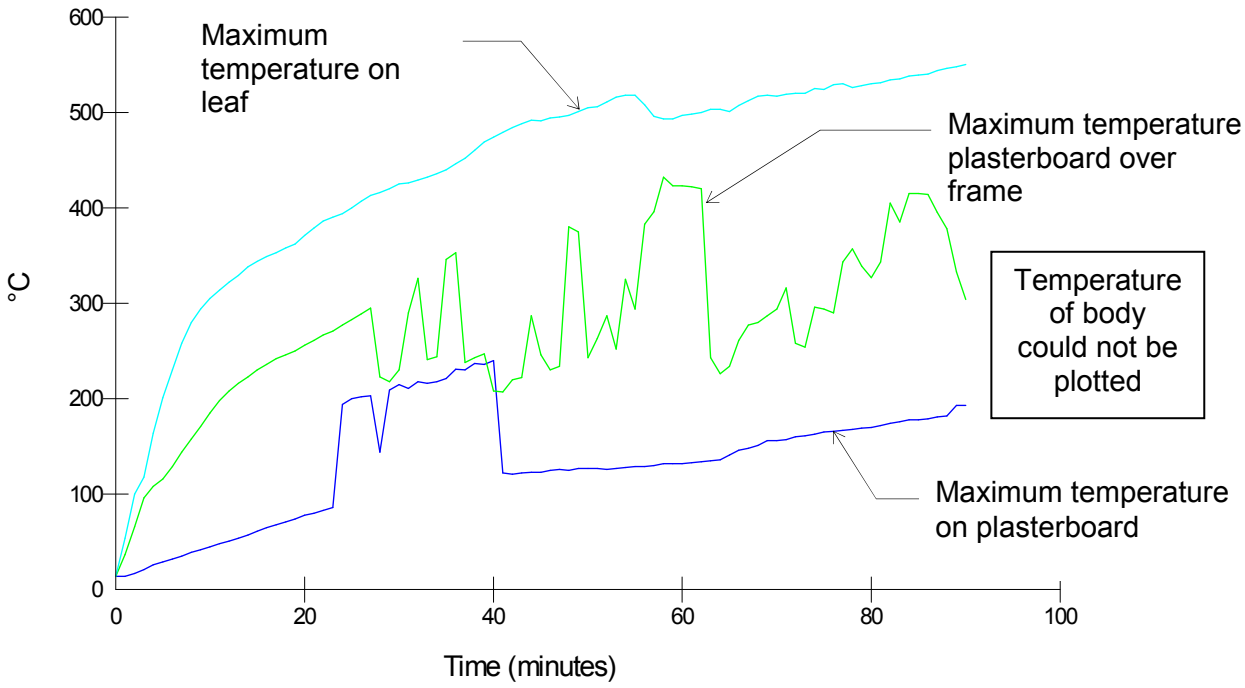


Fire seal unit 6

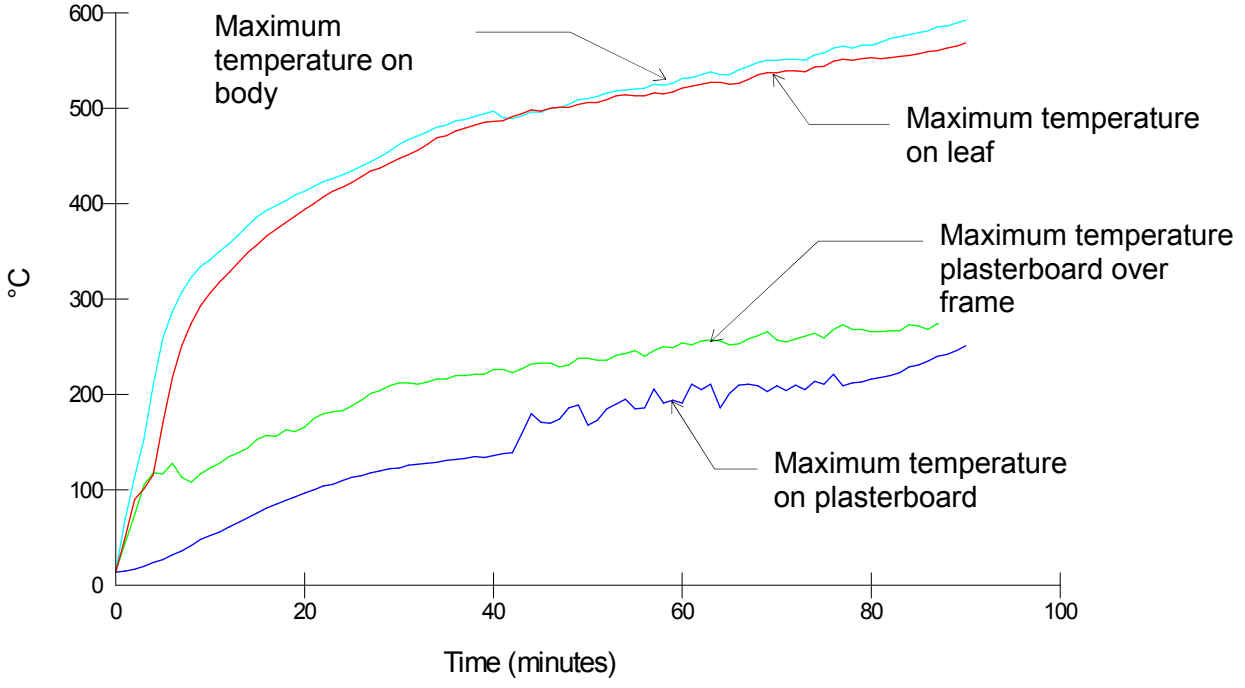


*Thermocouple malfunction due to heat damage of cable

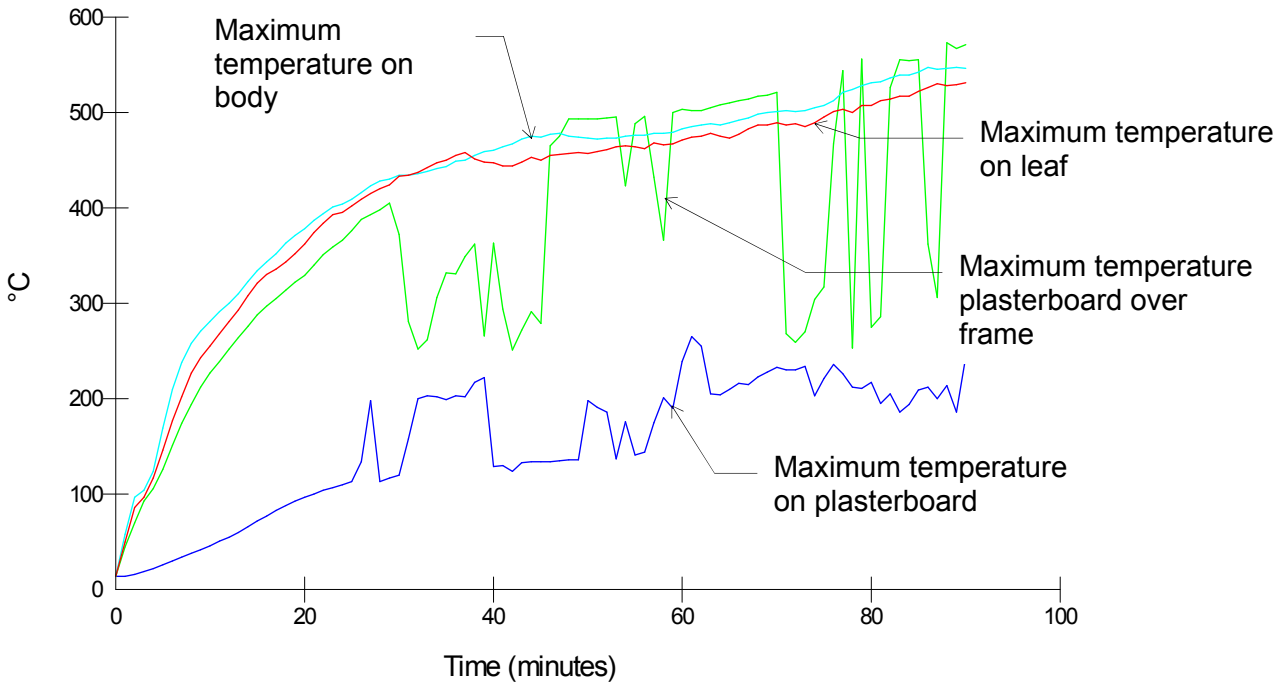
Fire seal unit 7



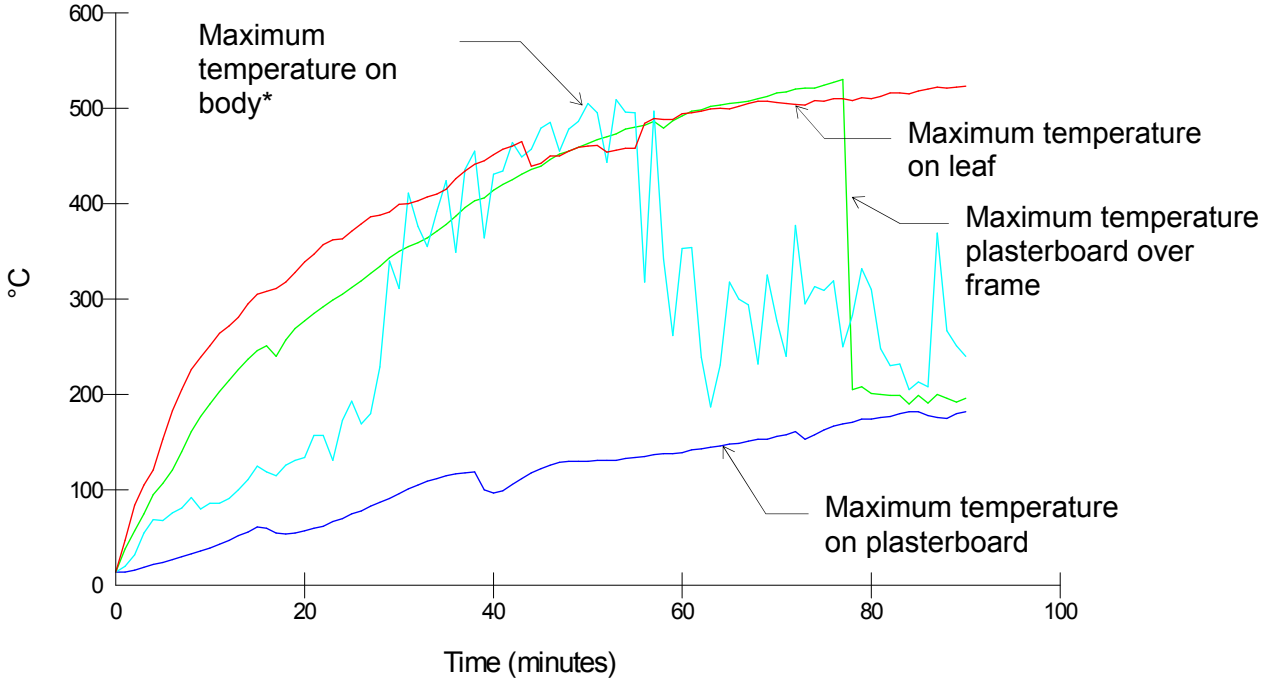
Fire seal unit 8



Fire seal unit 9



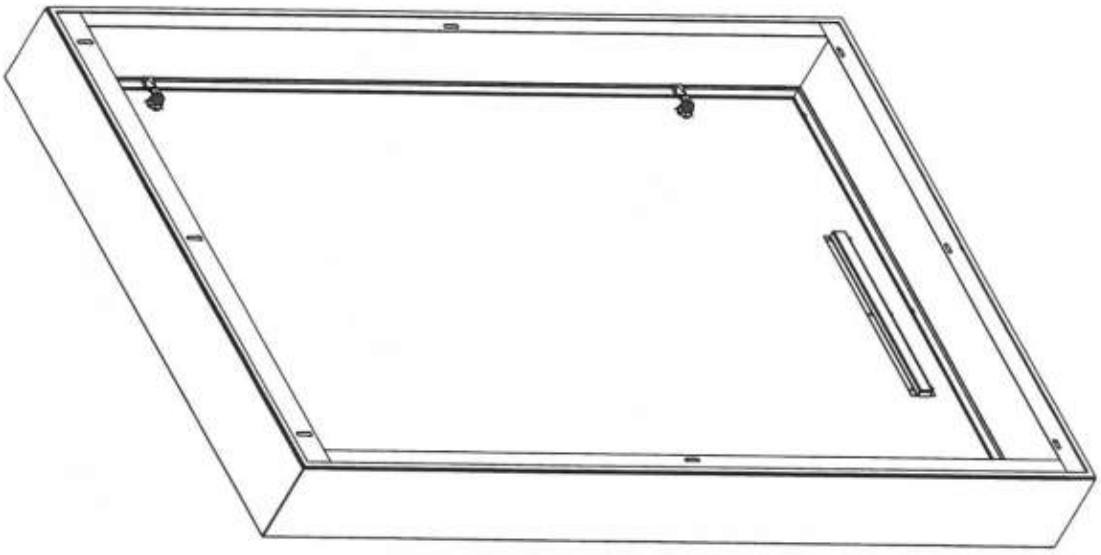
Fire seal unit 10

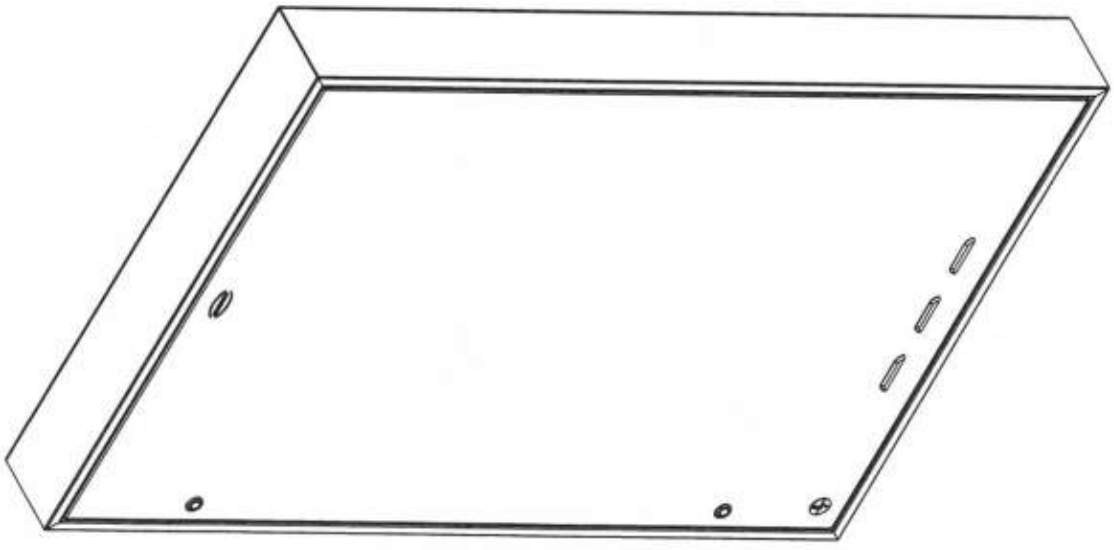


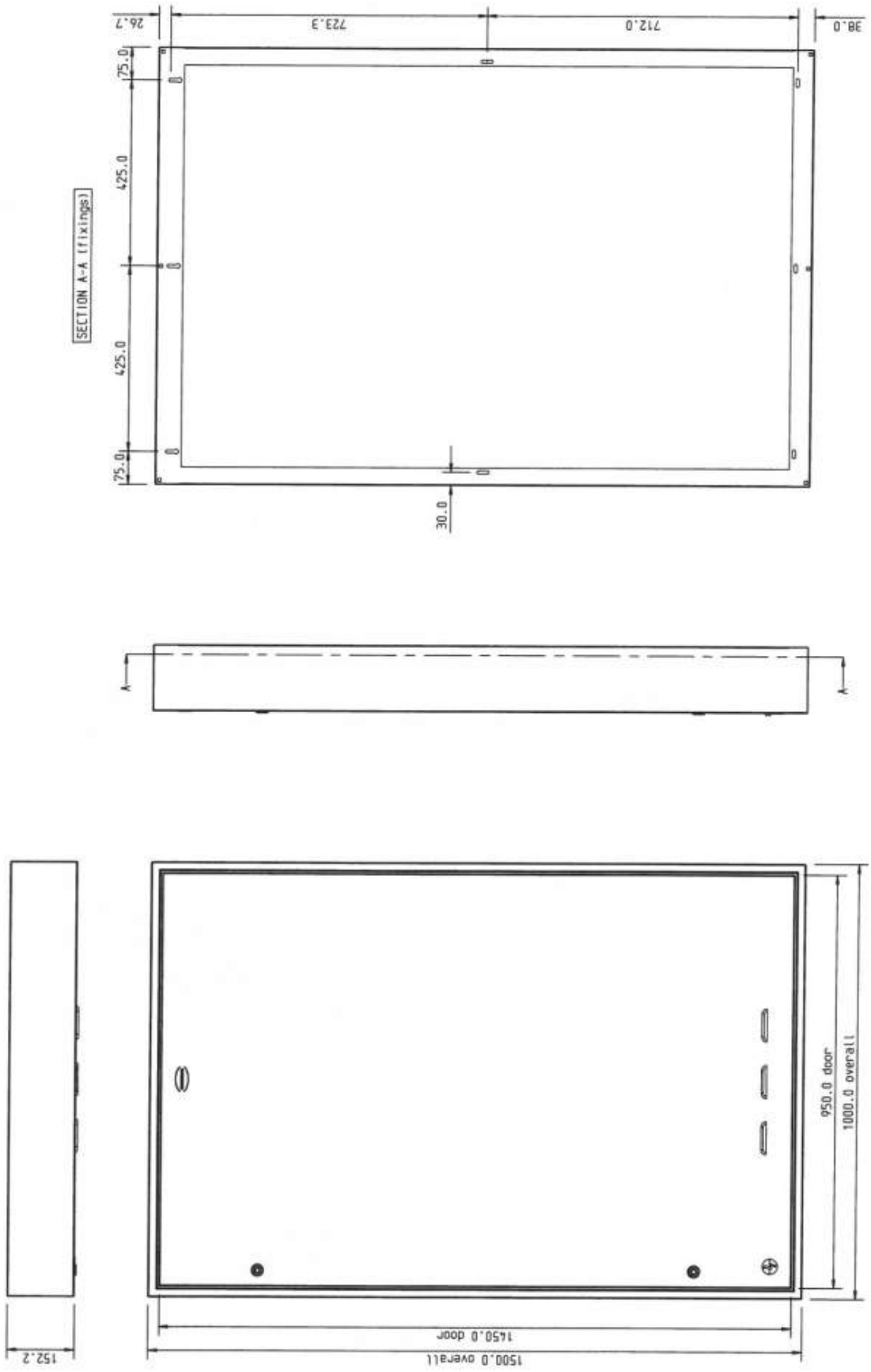
*Thermocouple malfunction due to heat damage of cable

Appendix 1 – clients drawings

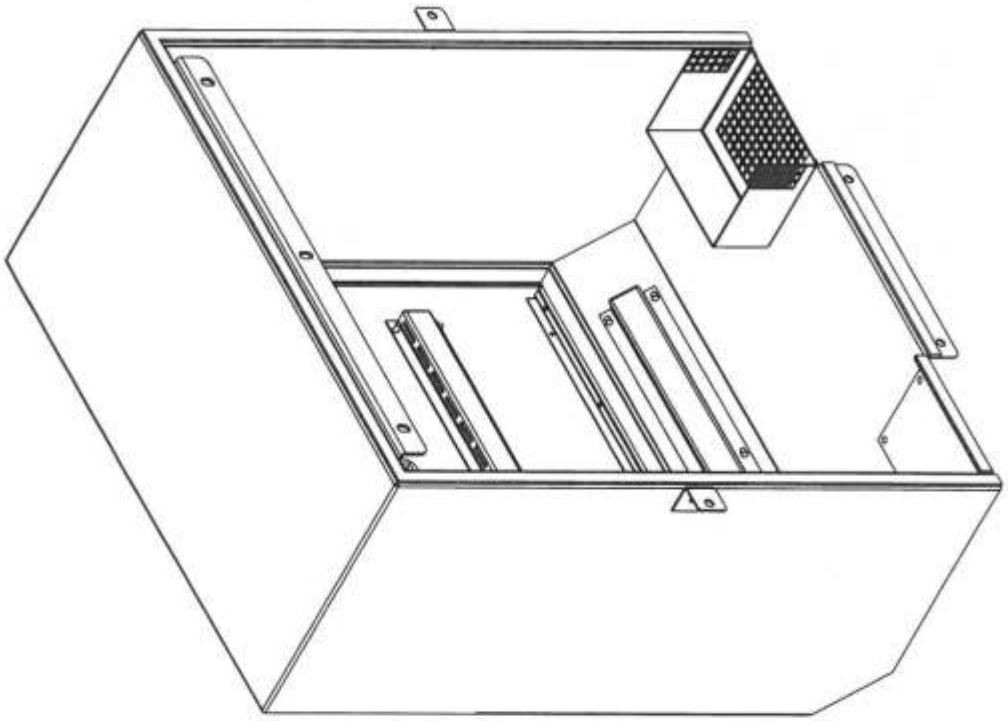
Extra Large FireSeal – specimens 1 - 2

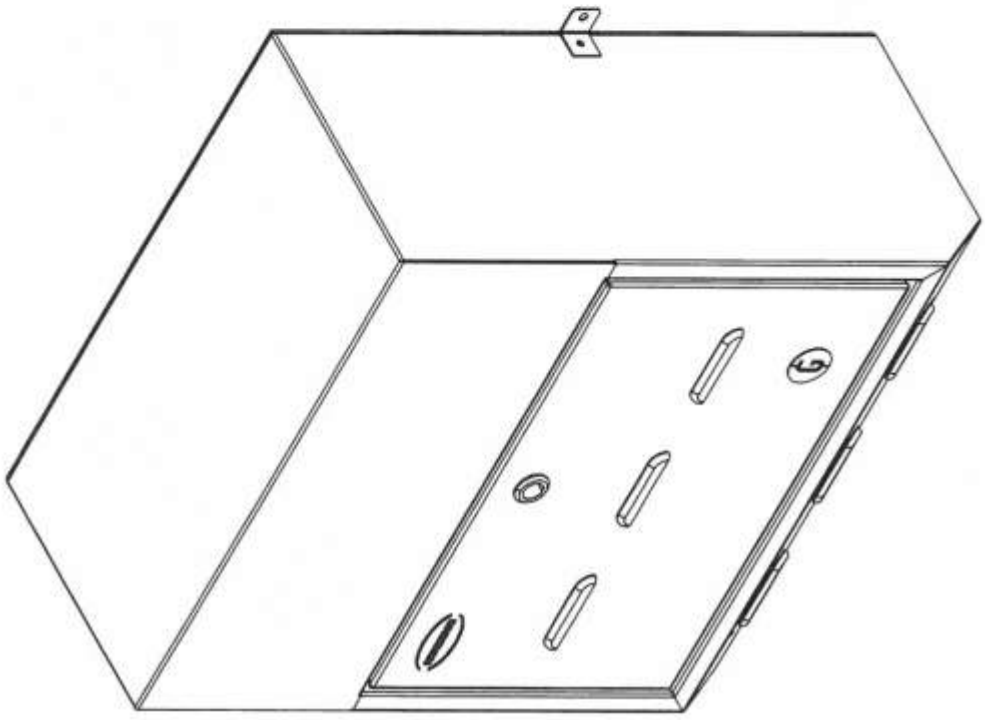


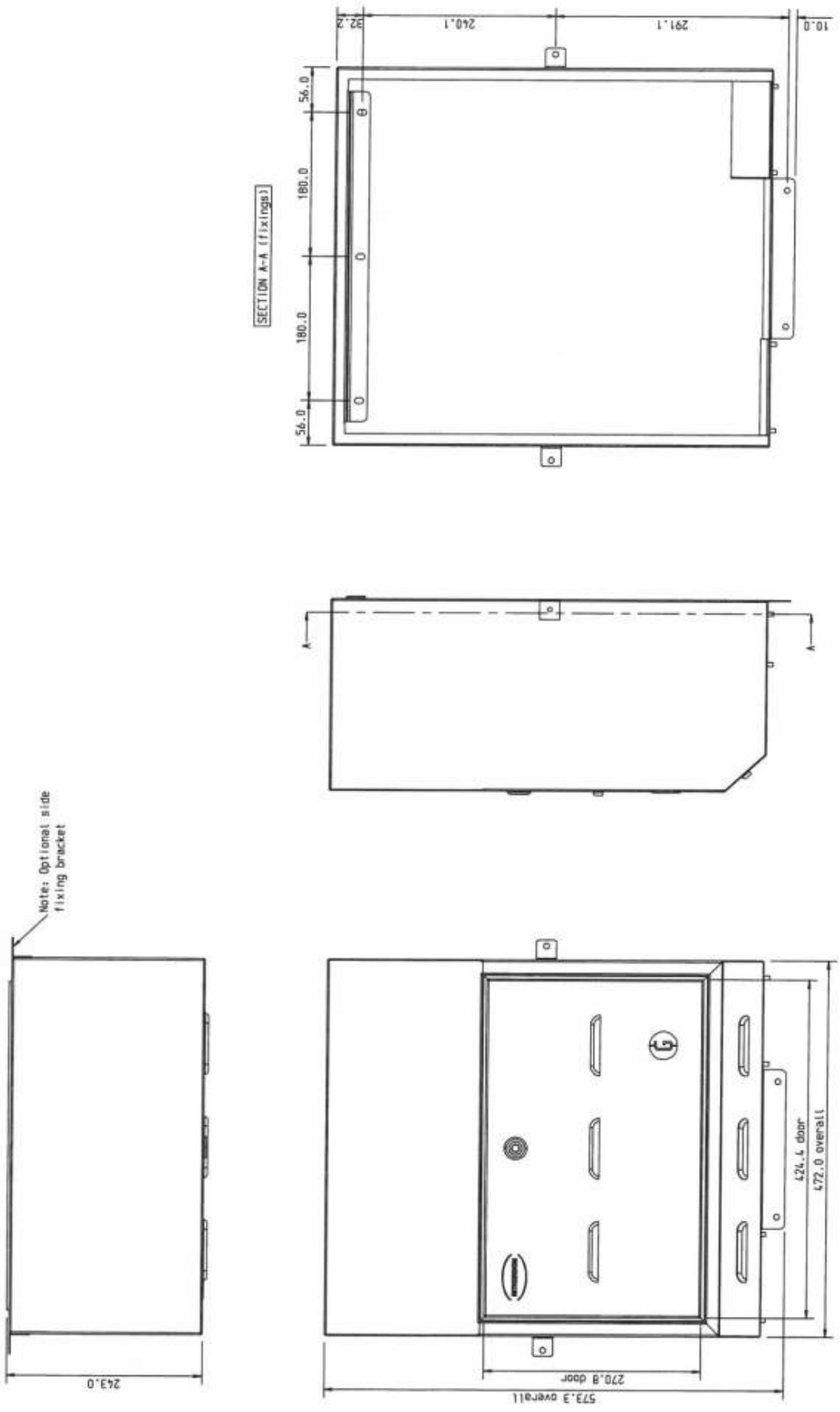



26.7
723.3
712.0
38.0
75.0
425.0
425.0
75.0
30.0
SECTION A-A (fixings)
A
A
152.2
1500.0 overall
1450.0 door
950.0 door
1000.0 overall

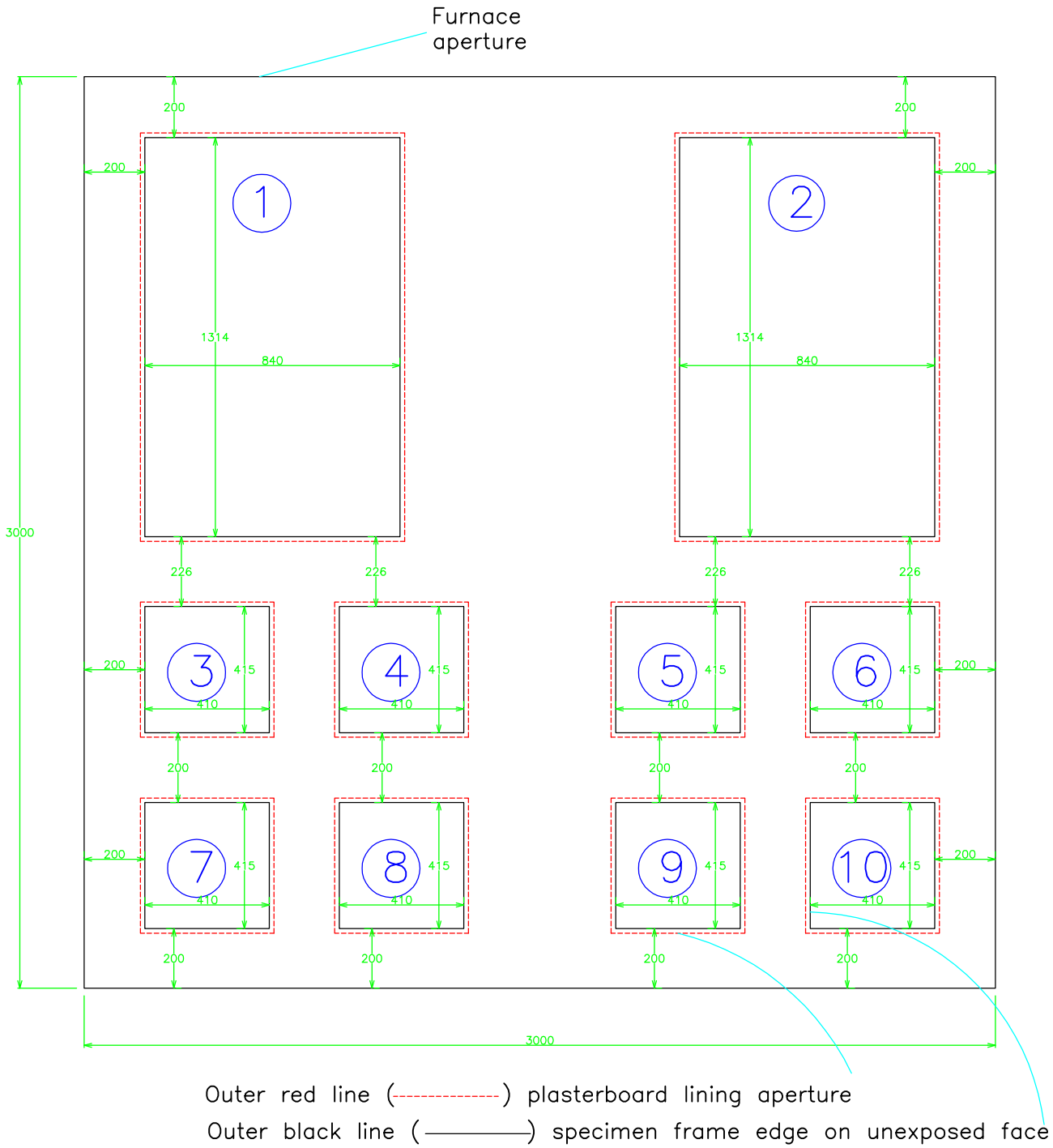
R22 FireSeal – specimens 2-10






SECTION A-A (fixings)
56.0
180.0
180.0
56.0
32.2
210.1
291.1
10.0
A
A
Note: Optional side
fixing bracket
243.0
573.3 overall
270.8 door
424.4 door
472.0 overall

Appendix 2 – figures 1 and 2



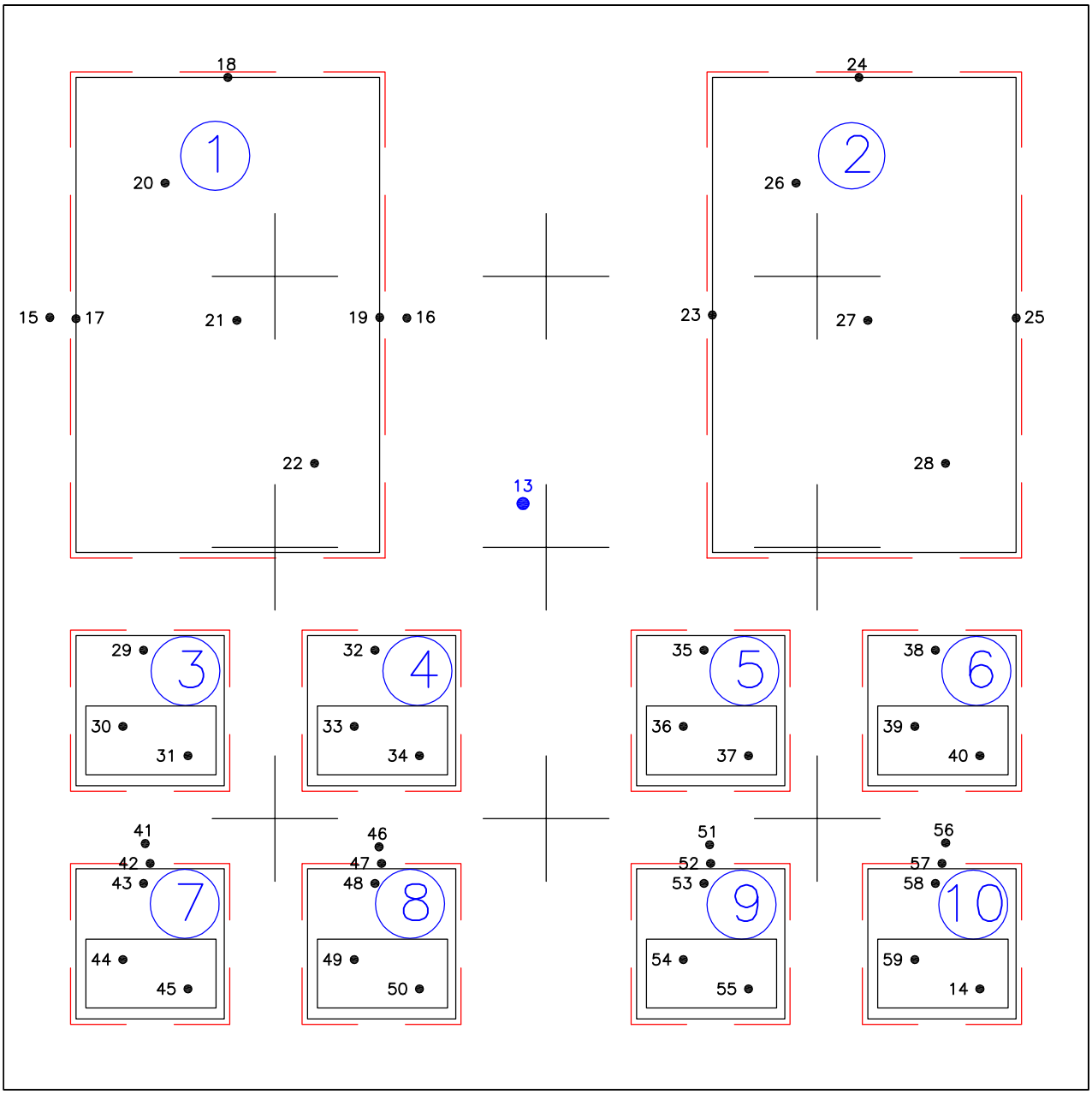
Exova Warringtonfire, Stocking Lane, Hughenden Valley, High Wycombe, Buckinghamshire, HP14 4ND, UK.
Tel: +44 (0)1494 569800
Fax: +44 (0)1494 564895

Title: Unexposed face elevation

(All dimensions in mm)

Date Drawn	Drawn By	Scale
10/12/15	ARD	NTS

Project No.	
BMT/FEP/F15263	Appendix 2



: Furnace Thermocouples

: Unexposed Face Thermocouples

: Radiometer

Viewed From Unexposed Face

Exova Warringtonfire, Stocking Lane, Hughenden Valley, High Wycombe, Buckinghamshire, HP14 4ND, UK.

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Title: Thermocouple positions

(All dimensions in mm)

Date Drawn	Drawn By	Scale
10/12/15	ARD	NTS

Project No.	
BMT/FEP/F15263	Appendix 2

Appendix 3 - raw test data (8 pages)

(see figure 2 of Appendix 2 for channel locations)

Furnace thermocouples

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Chan 11	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	kw/m²	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	0	16	16	14	16	16	17	17	17	17	13	0	14	14	14	15	15	15	15	15	15	13
1	-3.4	344	180	137	229	142	304	456	434	401	13	0.9	47	16	17	30	46	25	23	31	64	34
2	-0.4	519	348	315	350	333	472	566	519	548	13	1.8	84	19	23	24	35	87	17	22	35	75
3	0.3	574	417	404	423	427	545	608	570	611	13	2.5	105	25	30	29	117	90	14	17	25	106
4	0.5	602	474	472	480	503	595	634	623	653	13	3.3	121	31	38	150	162	127	14	16	21	125
5	-0.3	619	509	507	512	553	619	648	630	666	13	3.8	153	39	47	197	222	165	15	17	20	180
6	0.6	622	523	521	521	563	624	650	629	665	13	3.8	183	47	53	246	263	300	15	17	19	207
7	1	638	542	545	540	572	631	666	646	678	13	3.8	205	52	61	275	292	249	14	18	19	208
8	1.8	674	584	590	562	598	666	686	675	694	13	4.3	226	59	67	297	314	215	14	18	19	216
9	1.2	692	614	618	586	628	693	703	694	708	13	4.7	239	66	75	315	336	188	14	17	18	223
10	1.6	703	626	631	598	644	707	710	705	716	13	4.9	251	74	82	332	354	414	14	18	18	228
11	0.7	721	646	654	612	657	722	723	720	729	13	5.1	264	81	90	344	371	422	15	18	19	144
12	0.8	737	664	671	626	671	735	729	730	740	13	5.4	272	211	98	359	386	434	15	19	20	244
13	1.2	742	672	681	636	682	745	736	740	747	13	5.6	281	227	105	371	399	441	16	20	21	252
14	1.6	760	692	703	649	697	764	748	755	761	13	5.9	295	238	111	383	408	267	16	20	22	259
15	-0.3	769	708	710	664	712	772	755	759	770	13	6.1	305	241	116	395	417	240	209	20	23	160
16	-0.3	777	717	715	673	717	777	765	768	780	13	6.2	308	244	121	407	424	207	214	20	23	156
17	0.5	784	724	724	683	726	786	769	777	784	13	6.5	311	245	125	412	431	186	215	19	23	163
18	0.5	791	732	735	693	733	792	776	781	791	13	6.8	318	252	127	419	437	205	219	19	23	167
19	0.2	798	746	747	704	745	800	785	791	799	14	7	328	260	129	424	443	197	224	20	24	257
20	1.1	804	753	756	710	751	808	789	796	807	13	7.3	339	263	131	358	167	190	232	20	25	219
21	0.8	813	761	764	718	759	817	796	805	813	14	7.6	347	270	133	453	133	205	240	21	26	231
22	-0.9	819	771	770	728	770	826	798	814	821	14	7.8	357	221	194	467	132	228	244	21	26	238
23	0.5	822	777	771	737	774	829	802	819	824	14	8.1	362	207	222	462	134	272	251	21	28	255
24	0.2	829	786	781	743	783	834	806	824	833	14	8.4	363	224	216	447	133	196	249	21	27	292
25	0.5	833	793	784	746	788	843	816	830	836	14	8.6	371	298	142	474	134	482	258	23	29	229
26	1.3	843	802	796	758	795	844	817	835	843	14	8.8	379	165	145	471	283	485	263	22	30	235
27	0.5	850	809	803	766	804	851	830	842	849	14	9.1	386	151	147	483	310	280	263	24	30	313
28	1.5	854	815	806	770	809	860	829	848	853	14	9.4	388	164	151	476	323	492	259	23	30	304
29	0.1	855	819	812	777	816	860	838	851	858	14	9.6	391	160	153	484	340	500	258	22	29	242

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Chan 11	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	kw/m²	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
30	0.8	861	825	815	783	820	865	837	853	862	14	9.9	399	209	156	490	272	336	270	24	32	251
31	1.3	863	829	822	788	823	869	845	860	866	14	10	400	336	159	498	152	317	260	24	31	229
32	-0.4	868	834	822	793	830	869	845	862	869	14	10.2	403	339	162	483	167	259	273	25	32	208
33	0.6	874	841	827	797	833	879	852	871	876	14	10.4	407	336	166	517	156	261	278	25	33	205
34	-0.4	881	849	836	804	841	886	851	875	883	14	10.6	410	347	167	513	155	526	251	25	32	214
35	0.6	886	853	839	807	848	891	856	879	884	14	11	415	345	170	510	176	409	19	24	33	232
36	-0.2	890	859	847	815	854	898	866	883	890	14	11.1	426	336	173	500	187	350	20	25	34	199
37	0.9	894	864	851	818	856	900	866	887	894	15	11.1	434	316	176	516	171	485	21	27	35	249
38	0.5	897	868	853	821	862	903	867	892	898	15	11.7	441	312	184	528	175	479	20	27	36	219
39	0.9	901	872	860	830	866	904	873	895	904	15	11.9	445	316	190	521	173	416	21	27	36	455
40	1	903	877	865	837	870	905	875	897	907	15	12	451	324	193	522	172	514	21	27	36	243
41	0.4	907	882	869	839	873	913	881	903	910	15	12.1	457	347	195	525	171	361	21	26	35	220
42	0.6	911	886	872	843	877	918	886	906	914	15	12.2	460	354	190	529	177	495	21	27	36	222
43	0.5	915	890	876	849	882	922	889	908	915	15	12.1	465	342	193	531	513	413	22	28	37	227
44	0.2	917	892	881	852	887	925	889	915	924	15	12.5	439	354	196	537	468	462	22	29	39	229
45	1	921	897	885	855	889	929	895	915	922	15	12.7	442	353	199	554	519	517	21	28	37	134
46	1.3	924	901	888	860	893	930	895	920	928	15	13	450	361	202	561	520	484	21	27	37	135
47	1.4	926	904	891	861	895	936	897	922	929	16	12.6	450	354	205	565	364	532	22	28	38	-1199
48	1.1	930	906	895	862	896	940	900	926	932	16	13	455	357	208	572	309	568	21	27	37	-1199
49	-0.7	931	907	892	868	900	935	903	926	932	16	13.3	459	355	211	558	277	336	22	29	38	-1199
50	-0.4	933	910	895	866	902	939	907	929	935	16	13.1	460	310	214	558	409	275	22	28	38	610
51	0	937	913	896	868	903	943	911	929	936	16	13.4	461	257	236	575	273	301	22	28	39	245
52	0.8	940	917	901	869	904	944	902	935	943	16	13.5	454	254	235	568	226	282	23	29	40	538
53	1.6	942	919	904	875	910	945	910	935	941	16	13.6	456	231	231	567	254	266	23	30	42	1094
54	0.8	944	923	908	875	911	949	914	937	945	16	13.6	458	230	236	573	293	358	23	29	41	507
55	0.6	947	925	912	879	914	952	916	937	944	16	13.6	458	259	229	588	274	315	23	30	41	189
56	0.3	947	927	915	885	916	954	920	940	949	16	13.9	484	288	232	564	280	264	22	28	39	-334
57	0.4	952	930	917	885	919	955	920	944	949	17	13.9	489	253	235	579	277	393	24	32	42	82
58	0.4	953	932	919	891	923	955	923	946	953	17	14.2	488	255	237	568	406	590	23	28	39	-501
59	0.2	954	934	921	893	925	957	921	948	953	17	14.2	488	264	240	568	409	499	23	28	40	-68
60	1.1	960	940	929	896	929	964	926	952	957	17	14.5	494	297	244	574	412	256	25	31	42	1266
61	0.8	962	942	932	899	932	968	931	956	959	17	14.5	495	310	246	572	415	475	24	32	42	909
62	-0.4	964	943	926	901	935	968	933	957	961	17	14.6	497	310	250	574	422	473	25	32	43	921
63	0.7	967	947	930	902	936	969	930	960	965	17	14.7	499	326	253	575	424	358	25	33	44	801
64	0	969	949	934	907	940	974	936	961	966	17	14.8	500	327	255	577	464	334	23	28	41	398
65	0.5	971	952	939	910	943	973	939	963	967	17	14.9	499	315	259	578	411	347	23	29	40	388
66	0.1	976	957	942	912	947	977	935	967	972	17	14.8	502	323	263	581	371	543	24	30	41	500
67	0	979	959	942	911	946	981	942	969	973	18	15.2	505	326	264	585	475	383	26	34	45	370

Time	Chan 0	Chan 1	Chan 2	Chan 3	Chan 4	Chan 5	Chan 6	Chan 7	Chan 8	Chan 9	Chan 11	Chan 13	Chan 14	Chan 15	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	Pa	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	kw/m²	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
68	0.2	980	961	944	913	948	985	941	969	975	18	15.3	507	317	268	586	581	339	26	34	46	993
69	1.5	983	963	947	917	950	982	945	973	977	18	15.3	507	296	271	587	545	298	25	33	46	1171
70	1.4	982	965	950	918	953	988	952	973	976	18	15.4	506	261	276	588	592	301	25	33	45	854
71	0	985	967	954	922	956	985	950	976	981	18	15.5	505	298	279	590	593	347	25	32	43	708
72	-0.1	987	969	955	923	957	989	953	977	983	18	15.5	504	302	281	590	594	480	24	30	42	856
73	0.2	990	971	958	927	961	992	957	979	982	18	15.5	503	286	285	590	596	431	22	30	41	679
74	0.6	991	974	959	928	961	993	955	982	985	19	15.7	508	283	290	591	597	394	25	33	43	769
75	0.2	994	976	961	929	963	996	955	982	987	19	15.6	507	284	282	593	543	437	26	34	45	679
76	-0.3	994	976	963	932	964	999	959	982	987	19	15.9	510	260	278	595	545	339	29	36	48	-1191
77	-0.2	996	979	969	936	967	998	960	987	991	19	16.2	510	270	276	596	454	358	28	34	47	-1191
78	0	997	980	972	939	970	1000	962	990	991	19	16.3	508	270	277	597	349	292	26	32	43	1271
79	0.7	1000	983	971	939	971	1002	964	989	994	19	16.2	511	273	273	597	274	311	28	35	47	244
80	0.6	1001	985	971	941	973	1007	964	991	994	19	16.4	510	294	284	599	281	299	26	32	44	216
81	0.6	1002	986	973	941	974	1006	970	993	996	19	16.5	512	303	285	600	272	312	28	34	47	-1189
82	0.5	1004	988	978	945	976	1005	970	994	997	19	16.4	516	298	285	601	249	307	28	34	49	-1189
83	0.5	1008	991	979	946	978	1009	968	997	999	19	16.8	516	301	277	604	230	343	27	34	48	-1189
84	0.5	1010	993	981	950	979	1013	969	999	1003	19	16.5	515	317	287	608	242	310	27	35	45	-1189
85	1	1012	996	984	953	983	1016	977	1001	1004	19	16.8	518	347	288	610	243	303	27	35	46	-1032
86	0.4	1013	997	987	955	986	1017	978	1001	1005	20	17.1	520	408	292	605	235	318	28	36	49	-1188
87	-0.2	1018	1002	989	958	989	1016	979	1005	1010	20	17.1	522	417	303	602	239	319	30	39	51	-603
88	-0.1	1020	1004	993	963	993	1022	986	1007	1012	20	17.5	521	441	308	579	249	304	28	37	49	-1188
89	0.1	1024	1006	996	965	995	1027	990	1012	1013	20	-0.1	522	413	306	257	245	309	28	38	50	-473
90	-4.5	1025	1009	999	970	999	1023	988	1015	1019	20	0	523	417	322	258	263	302	28	39	49	-1187

Time	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39	Chan 40	Chan 41	Chan 42	Chan 43
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	15	14	16	15	15	16	15	15	15	15	15	15	15	15	13	15	14	14	14	14
1	96	40	141	136	120	101	145	73	23	40	39	117	96	97	20	162	128	14	37	55
2	125	48	282	275	234	188	280	122	42	90	96	248	150	118	40	305	215	17	66	61
3	230	61	386	381	346	224	385	207	72	139	164	268	280	228	65	420	309	21	96	28
4	316	78	463	452	418	243	458	301	132	207	236	399	392	339	81	504	378	26	108	21
5	386	100	505	514	469	311	497	384	155	268	241	158	489	472	84	359	432	29	116	19
6	136	110	512	475	507	325	512	435	160	293	297	182	506	451	92	402	207	32	129	18
7	157	117	505	456	511	507	520	424	174	352	325	195	499	436	98	300	491	35	144	24
8	153	125	505	458	465	422	527	440	125	266	379	189	511	448	103	527	229	39	158	64
9	156	126	513	466	382	216	541	451	230	276	383	189	513	465	153	567	401	42	171	26
10	162	130	520	256	266	338	549	451	144	284	398	563	509	477	173	551	279	45	185	18

Time	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39	Chan 40	Chan 41	Chan 42	Chan 43
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
11	170	135	529	243	407	475	553	456	152	399	378	578	514	482	120	552	322	48	198	16
12	177	142	538	266	226	452	560	463	156	295	395	570	523	161	154	585	335	51	208	15
13	178	144	536	279	454	427	563	466	163	283	375	264	532	155	162	593	344	54	216	15
14	204	148	453	260	328	422	571	474	162	297	387	348	541	150	181	607	358	57	223	14
15	197	152	363	492	246	254	579	486	176	213	401	292	278	157	158	618	357	61	230	15
16	196	157	166	269	166	267	588	494	181	200	435	296	254	155	114	620	251	65	236	14
17	202	157	381	283	168	262	595	256	199	206	430	275	249	172	141	623	212	68	242	14
18	217	163	280	301	173	287	602	505	199	212	444	279	239	174	169	629	233	71	246	14
19	227	166	186	320	182	266	195	513	205	225	450	288	246	226	186	641	250	74	250	15
20	224	167	588	289	187	314	199	289	201	365	453	297	268	182	138	648	379	78	256	14
21	238	169	337	231	195	454	204	327	220	363	465	313	279	203	155	656	379	80	261	15
22	272	175	179	303	212	470	195	534	212	232	467	680	280	210	129	663	389	83	267	15
23	280	179	186	324	221	466	202	541	237	257	477	685	290	206	123	667	387	86	271	15
24	452	185	177	351	216	491	236	546	249	393	483	693	290	210	145	677	403	194	277	15
25	560	198	179	196	236	491	265	556	244	404	487	698	308	222	203	689	413	200	283	15
26	532	189	177	208	243	471	314	216	320	402	510	636	312	233	220	699	412	202	289	15
27	573	197	193	229	249	483	288	571	263	405	506	642	315	237	242	707	432	203	295	15
28	602	202	191	212	256	477	331	219	297	401	523	717	315	194	166	709	431	144	223	15
29	594	214	196	210	286	484	477	495	249	416	523	387	318	195	191	711	430	209	218	15
30	639	209	214	215	299	491	680	248	255	282	530	369	327	203	162	703	440	215	230	16
31	644	203	220	225	307	499	686	249	276	285	516	431	323	233	92	719	477	211	290	15
32	649	210	219	229	610	484	364	240	299	423	536	586	325	194	105	640	591	218	326	16
33	274	214	213	235	619	518	459	265	308	433	541	387	333	282	107	714	689	216	241	16
34	661	225	226	245	630	515	594	283	318	426	550	479	337	340	85	726	696	218	244	16
35	666	210	231	238	637	513	638	261	340	492	557	462	338	201	107	554	704	221	346	16
36	672	212	226	243	640	510	696	272	365	550	556	368	348	217	147	688	711	231	353	16
37	678	241	222	252	645	517	705	305	394	555	559	670	365	272	190	735	713	230	238	16
38	684	211	239	258	648	529	709	313	407	559	568	700	361	214	155	751	719	237	243	16
39	689	212	235	274	651	523	554	324	421	564	574	769	352	285	169	706	725	236	247	16
40	694	220	256	431	660	526	539	325	423	574	577	775	387	222	248	609	729	240	208	16
41	698	204	265	413	664	541	728	324	423	569	571	779	374	239	90	633	730	122	207	16
42	702	206	259	321	667	556	733	339	443	575	587	775	388	292	102	328	735	121	220	17
43	707	221	262	299	671	597	734	356	408	585	591	742	394	315	92	272	738	122	222	17
44	711	210	263	386	675	555	737	348	392	593	601	209	353	382	102	285	744	123	287	17
45	707	207	261	671	681	561	740	352	412	588	596	478	356	276	102	284	746	123	246	17
46	718	214	272	685	685	566	746	360	393	593	597	787	221	493	126	276	750	125	230	17
47	721	211	264	663	686	569	748	273	362	589	613	94	225	487	222	289	755	126	234	17
48	724	210	279	696	690	580	750	349	375	601	609	784	214	469	153	282	757	125	380	17

Time	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39	Chan 40	Chan 41	Chan 42	Chan 43
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
49	726	211	268	695	692	562	751	371	374	595	618	409	214	371	164	280	755	127	375	17
50	726	211	277	635	694	562	752	369	379	599	616	173	438	233	94	266	754	127	243	17
51	728	209	264	540	696	583	753	280	374	609	609	551	224	239	104	283	757	127	263	17
52	731	212	275	580	698	574	755	303	385	611	613	291	221	248	109	288	760	126	287	17
53	735	219	286	655	701	573	757	375	395	612	621	514	216	243	120	288	764	127	252	18
54	737	220	300	597	704	579	759	380	396	619	622	329	221	246	209	296	767	128	325	18
55	740	217	271	483	704	606	762	391	404	616	619	366	225	252	132	302	769	129	294	18
56	742	214	288	516	708	571	764	375	409	617	628	813	234	248	405	312	766	129	383	17
57	744	217	302	475	709	588	765	325	412	617	636	817	228	271	425	326	772	130	396	18
58	746	219	297	475	710	592	768	289	418	618	638	821	243	269	409	329	775	132	432	17
59	749	216	303	479	712	577	771	341	421	632	623	825	250	267	422	343	779	132	423	17
60	752	222	302	460	718	604	774	389	419	638	634	829	229	262	422	380	776	132	423	18
61	755	226	312	445	720	623	777	303	429	629	647	833	236	271	444	357	786	133	422	18
62	755	219	292	448	720	613	777	403	427	632	647	224	248	276	414	340	788	134	420	18
63	757	229	309	448	721	601	754	298	430	638	645	242	257	288	433	359	790	135	243	18
64	766	220	302	444	722	595	781	299	425	644	638	263	265	407	333	343	792	136	226	18
65	767	222	306	446	725	625	786	300	435	637	651	262	262	313	431	352	795	141	234	18
66	768	226	299	452	726	611	788	329	434	641	649	284	277	310	448	350	799	146	261	18
67	771	236	298	455	722	618	791	399	438	640	663	316	289	752	449	345	801	148	277	19
68	773	237	309	464	728	609	794	396	416	646	658	410	294	504	446	339	800	151	280	19
69	664	232	324	462	731	623	798	392	380	652	660	366	297	758	447	351	799	156	287	19
70	303	232	308	474	731	620	801	402	386	647	663	359	295	758	472	360	719	156	294	19
71	510	233	299	486	734	623	804	393	405	646	665	343	305	762	463	352	811	157	316	18
72	470	232	300	448	734	636	806	383	426	661	667	349	305	772	477	366	815	160	258	18
73	321	232	309	486	738	629	811	381	438	663	678	821	301	774	477	340	815	161	254	18
74	500	241	318	481	691	645	815	394	396	656	675	878	303	355	487	353	817	163	296	18
75	230	249	307	487	722	650	818	405	352	658	686	880	307	341	446	357	820	165	294	19
76	650	283	301	492	587	644	819	424	346	665	691	880	319	337	430	354	823	166	290	20
77	208	283	325	486	709	644	825	415	407	676	674	739	318	325	421	346	825	167	343	19
78	297	263	317	493	704	642	828	556	390	421	674	876	315	319	418	347	829	168	357	19
79	557	274	283	480	632	644	827	596	408	451	669	699	308	311	413	351	828	169	339	19
80	227	264	317	481	646	642	832	686	464	444	681	534	315	322	408	348	830	170	327	19
81	206	273	314	487	619	653	834	759	456	441	683	491	308	313	410	364	834	172	343	20
82	210	272	328	483	634	654	834	761	456	425	695	471	308	283	247	378	836	174	405	20
83	390	269	304	496	605	665	839	764	446	435	703	478	316	310	259	384	839	176	385	20
84	358	275	315	681	582	671	841	767	451	453	701	472	298	299	233	375	843	178	415	21
85	211	275	314	757	567	673	843	348	448	454	701	457	309	337	217	380	845	178	415	21
86	344	269	325	761	538	675	846	337	417	466	691	591	323	339	223	376	847	179	414	22

Time	Chan 24	Chan 25	Chan 26	Chan 27	Chan 28	Chan 29	Chan 30	Chan 31	Chan 32	Chan 33	Chan 34	Chan 35	Chan 36	Chan 37	Chan 38	Chan 39	Chan 40	Chan 41	Chan 42	Chan 43
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
87	298	277	313	759	556	823	846	591	449	479	710	497	321	352	226	376	851	181	395	22
88	351	271	332	762	666	828	852	778	452	454	715	576	331	366	231	393	856	182	378	22
89	220	276	335	764	609	832	854	784	447	460	731	470	327	341	248	390	858	193	333	22
90	341	274	334	763	727	835	857	789	443	720	714	699	331	343	216	393	862	193	304	23

Time	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 57	Chan 58	Chan 59
min	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
0	14	14	14	15	15	14	13	14	14	14	14	13	14	14	14	14
1	54	26	15	44	69	50	40	14	45	58	50	16	14	38	20	38
2	100	25	17	74	114	90	59	16	70	97	86	21	16	57	32	65
3	118	20	20	105	153	101	80	19	93	104	97	27	19	75	55	89
4	164	17	24	118	210	116	172	22	106	124	117	40	22	95	69	102
5	201	29	27	117	259	170	142	26	126	169	146	43	24	107	68	118
6	230	40	32	128	287	218	134	30	151	210	177	54	27	121	76	139
7	258	20	36	113	307	251	146	34	174	238	202	35	30	140	81	165
8	280	15	42	108	323	275	131	38	194	258	227	28	33	161	92	190
9	294	14	48	117	334	293	141	42	212	271	243	22	36	177	80	206
10	305	14	52	123	341	306	139	46	227	281	255	20	39	190	86	219
11	314	14	56	128	350	318	142	51	239	291	268	19	43	203	86	234
12	322	13	61	135	358	328	150	55	252	300	281	18	47	215	91	245
13	329	14	66	139	367	338	160	60	264	310	293	19	52	226	100	258
14	338	14	71	144	377	349	174	66	276	323	308	19	56	237	111	273
15	344	14	76	153	386	357	203	72	288	334	321	19	61	246	125	283
16	349	14	81	157	393	366	196	77	297	343	330	19	60	251	119	291
17	353	14	85	156	398	373	207	83	305	352	336	19	55	240	115	294
18	358	14	89	163	403	380	206	88	314	363	343	20	54	257	126	300
19	362	14	93	161	409	387	228	93	322	371	352	20	55	269	131	308
20	371	14	97	166	413	394	224	97	329	378	362	20	57	277	134	319
21	379	15	100	175	418	400	216	100	340	387	374	21	60	285	157	327
22	386	15	104	180	423	407	212	104	351	394	384	21	62	292	157	337
23	390	15	106	182	426	413	258	107	359	401	393	22	67	299	131	344
24	394	15	110	183	430	417	307	110	366	404	395	22	70	305	173	348
25	400	15	113	188	434	422	312	113	376	409	402	23	75	312	193	356
26	407	15	115	194	439	428	302	134	388	416	409	23	78	319	169	364
27	413	15	118	201	444	434	298	198	393	423	415	24	83	327	180	372
28	416	14	120	204	449	437	292	113	398	428	420	24	87	334	229	378
29	420	14	122	209	455	442	312	117	405	430	424	24	91	343	340	383

Time	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 57	Chan 58	Chan 59
min	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃
30	425	14	123	212	462	447	306	120	372	434	433	25	96	350	311	390
31	426	14	126	212	467	451	301	158	281	434	434	25	101	355	411	392
32	429	15	127	211	471	456	320	200	252	436	437	25	105	359	376	395
33	432	15	128	213	475	462	327	203	262	438	442	25	109	364	355	397
34	436	15	129	216	480	469	331	202	306	441	447	25	112	371	392	400
35	440	15	131	216	482	471	349	199	332	443	450	25	115	378	424	405
36	446	15	132	220	487	476	348	203	331	449	455	26	117	387	349	413
37	452	15	133	220	488	479	305	202	349	450	458	26	118	396	436	418
38	460	15	135	221	491	482	301	217	362	455	451	27	119	403	455	425
39	469	15	134	221	494	485	303	222	266	459	448	28	100	406	364	431
40	474	15	136	226	497	486	311	129	363	460	447	27	97	414	431	436
41	479	15	138	226	490	487	273	130	294	464	444	28	99	420	434	441
42	484	15	139	223	489	491	305	124	251	467	444	28	106	425	464	444
43	488	15	159	227	492	494	323	133	272	472	448	29	112	431	449	449
44	492	15	180	232	496	498	306	134	291	475	453	30	118	436	457	453
45	491	15	171	233	496	497	341	134	279	474	450	29	122	439	479	451
46	494	15	170	233	500	500	420	134	465	477	455	30	126	446	485	452
47	495	15	174	229	501	501	390	135	475	478	456	30	129	452	455	453
48	497	15	186	231	504	501	375	136	493	475	457	29	130	455	478	453
49	501	15	189	238	509	504	379	136	493	474	458	30	130	459	486	456
50	505	16	168	238	510	506	353	198	493	473	457	30	130	463	505	456
51	506	15	173	236	512	506	370	191	493	472	459	30	131	467	495	456
52	511	15	185	236	516	509	384	186	494	473	461	31	131	470	443	459
53	516	16	190	241	518	513	364	137	495	473	464	32	131	473	509	462
54	518	16	195	243	519	514	370	176	423	475	465	32	133	478	496	463
55	518	16	185	246	520	513	371	141	488	476	464	32	134	480	495	465
56	508	16	186	240	521	513	355	144	496	476	462	31	135	482	318	463
57	496	16	206	246	525	516	376	175	432	478	468	32	137	486	497	468
58	493	16	191	250	524	515	346	201	366	478	466	31	138	479	342	466
59	493	16	194	249	526	517	372	190	500	479	467	31	138	487	262	468
60	497	16	191	254	531	521	363	239	503	483	471	33	139	492	353	474
61	498	16	211	252	532	523	378	265	502	485	474	33	142	497	354	476
62	500	16	205	256	535	525	367	255	502	487	475	34	143	498	239	477
63	503	16	211	257	538	527	362	205	505	488	478	35	145	502	187	481
64	503	16	186	256	535	527	400	204	508	487	475	33	146	503	231	477
65	501	16	201	252	535	525	428	210	510	489	473	32	148	505	318	477
66	507	16	210	253	540	526	407	216	512	492	477	33	149	506	300	481
67	512	17	211	258	544	530	417	215	514	494	483	34	151	507	294	488

Time	Chan 44	Chan 45	Chan 46	Chan 47	Chan 48	Chan 49	Chan 50	Chan 51	Chan 52	Chan 53	Chan 54	Chan 55	Chan 56	Chan 57	Chan 58	Chan 59
min	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃	℃
68	517	17	209	262	548	535	397	223	517	498	487	35	153	510	232	493
69	518	17	203	266	550	537	390	228	518	500	487	34	153	512	325	495
70	517	17	209	257	550	537	441	233	521	501	489	34	156	516	277	498
71	519	17	204	255	551	539	431	230	268	502	487	34	158	517	240	497
72	520	16	210	258	551	539	417	230	259	501	488	33	161	520	377	498
73	520	16	205	261	550	538	426	234	270	502	485	32	153	521	295	499
74	525	16	214	264	556	543	497	203	304	505	489	34	158	521	313	504
75	524	17	211	259	558	544	499	221	317	507	495	35	163	524	309	506
76	529	18	221	268	563	549	500	236	467	512	501	36	167	527	319	512
77	530	17	209	273	565	551	495	226	544	521	503	37	169	530	250	512
78	526	16	212	268	563	550	452	212	253	524	500	35	171	205	283	507
79	528	16	213	268	566	552	490	211	556	528	507	36	174	208	332	515
80	530	16	216	266	566	553	485	217	275	531	507	35	174	201	310	511
81	531	16	218	266	569	552	437	195	286	532	512	36	176	200	248	517
82	534	16	220	267	573	553	436	205	526	536	514	37	177	199	230	521
83	535	16	223	267	575	554	437	186	555	539	517	37	180	199	232	520
84	538	16	229	273	577	555	428	194	554	539	517	37	182	190	205	521
85	539	16	231	272	579	557	436	209	555	542	522	37	182	199	213	523
86	540	16	235	268	581	559	436	212	362	547	526	37	178	191	208	526
87	544	16	240	274	585	560	424	200	306	545	530	38	176	200	369	530
88	546	16	242	272	586	563	541	214	573	546	528	38	175	196	267	527
89	548	16	246	273	589	565	548	186	567	547	529	39	180	192	251	528
90	550	16	251	276	592	568	549	244	571	546	531	40	182	196	240	530