

Title:

The fire resistance performance of a specimen of a non-loadbearing, partition wall assembly tested in accordance with BS 476: Part 22: 1987, Clause 5

Date Of Test:

21st May 2019

Issue No. 1:

9th September 2019

WF Report No:

411164



Prepared for:

Enviroboards Ltd

New Lodge
Conholt
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0249

Test Specimen

Summary of Tested Specimen

The partition had overall nominal dimensions of 3000 mm high by 3000 mm wide by 107 mm thick. The partition was formed from a softwood timber frame with studs at nominally 370 mm centres. The timber frame was clad on both faces with a single layer of 9 mm thick 'Enviroboard Magnesium Oxide Fireboard'. The cavity was insulated with 100 mm thick Rockwool mineral wool insulation fitted between the timber framework, density 45kg/M³. The partition was installed with one unrestrained vertical edge.

Detailed drawings of the test specimen(s) and a comprehensive description of the test construction based on a detailed survey of the specimen(s) and information supplied by the sponsor of the test are included in the Test Specimen and Schedule of Components sections of this report.

Performance Criteria and Test Results

Test Results:	
Integrity	67 minutes No failure*
Insulation	67 minutes No failure*


- Integrity: It is required that there is no collapse of the specimen, no sustained flaming on the unexposed surface and no loss of impermeability.
- Insulation: It is required that the mean temperature rise of the unexposed surface shall not be greater than 140°C and that the maximum temperature rise shall not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure.

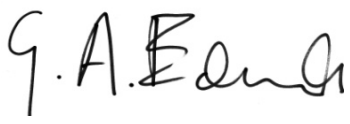
*The test was discontinued after a period of 67 minutes

Date of Test 21st May 2019

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* For and on behalf of **Warringtonfire**.

Report Issued: 9 th September 2019

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Revision History

Issue No:	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	

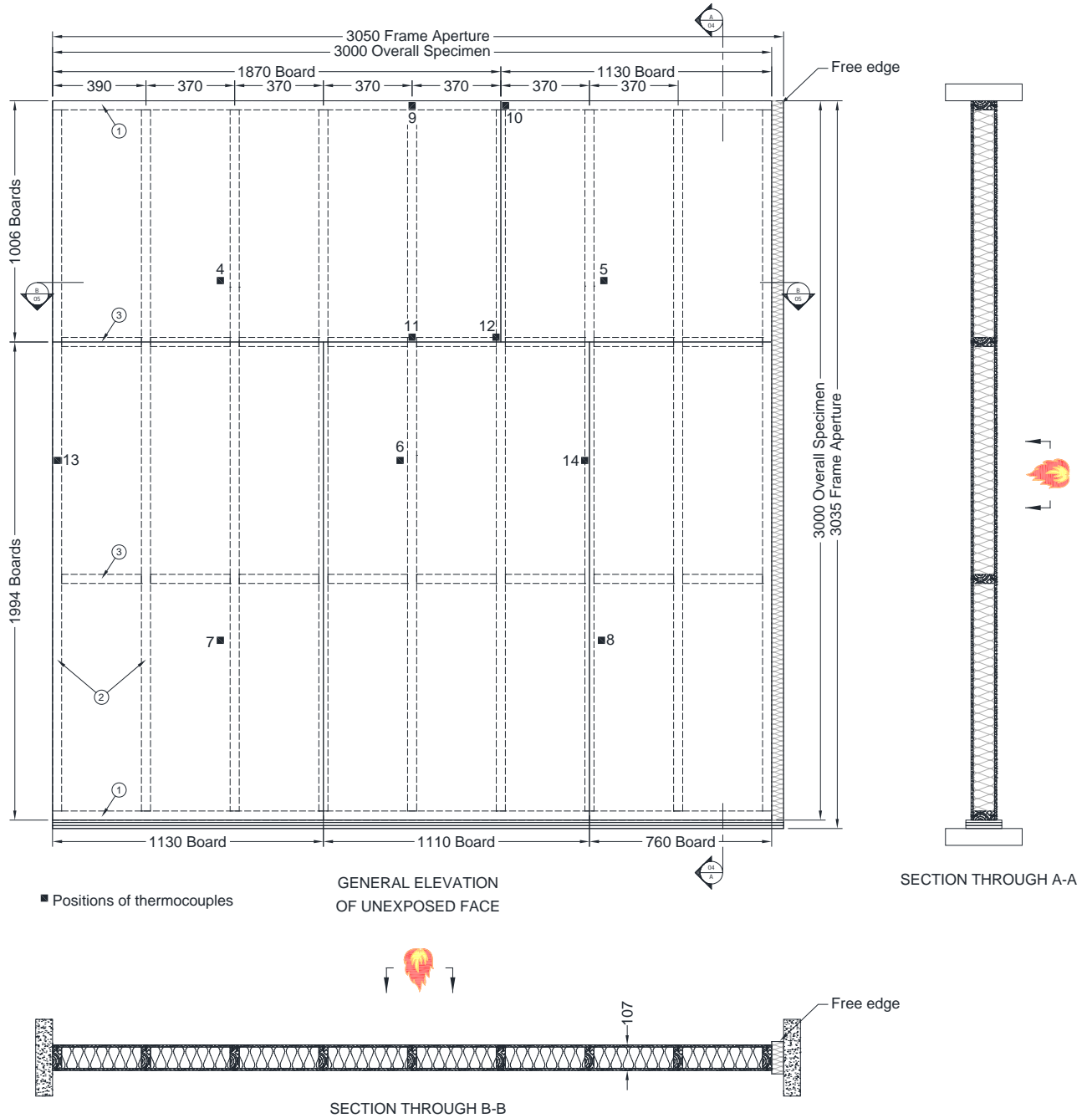
Issue No:	Re-issue Date:
Revised By:	Approved By:
Reason for Revision:	

Test Conditions

Standard	Clause 5 of BS 476: Part 22: 1987 'Methods for determination of the fire resistance of non-loadbearing elements of construction'.
Sampling	Warringtonfire was not involved in the sampling or selection of the tested specimen or any of the components.
Installation	The specimen was received on the 13 May 2019 and installed into a refractory concrete lined steel restraint frame, with one vertical edge unrestrained, by representative of the test sponsor on the 20 May 2019
Conditioning	The specimen's storage, construction, and test preparation took place in the test laboratory over a total combined time of 9 days. Throughout this period both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 16°C to 26°C and 34% to 58.5% respectively.
Instruction to Test	<p>The test was conducted on the 21 May 2019 at the request of Enviroboards Ltd, the test sponsor.</p> <p>Sharlene White, Riza Fuentes and Paul Hewish, representatives of the test sponsor witnessed the test.</p>
Ambient Temperature	The ambient air temperature in the vicinity of the test construction was 22°C at the start of the test with a maximum variation of -1°C during the test.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS 476: Part 20: 1987, Clause 3.1. using nine mineral insulated thermocouples distributed over a plane 100 mm from the surface of the test construction.
Thermocouples	Thermocouples were provided to monitor the unexposed surface of the specimen. The output of all instrumentation was recorded at no less than one minute intervals. The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1.
Furnace Pressure	After the first five minutes of testing and for the remainder of the test, the furnace atmospheric pressure was controlled so that it complied with the requirements of BS 476: Part 20: 1987, Clause 3.2.2 (including allowance for transient occurrences in-line with Clause 12(I)). The calculated pressure differential relative to the laboratory atmosphere at the top of the assembly was 17 (± 2) Pa equating to 0 Pa at a point 1m above the notional floor level.

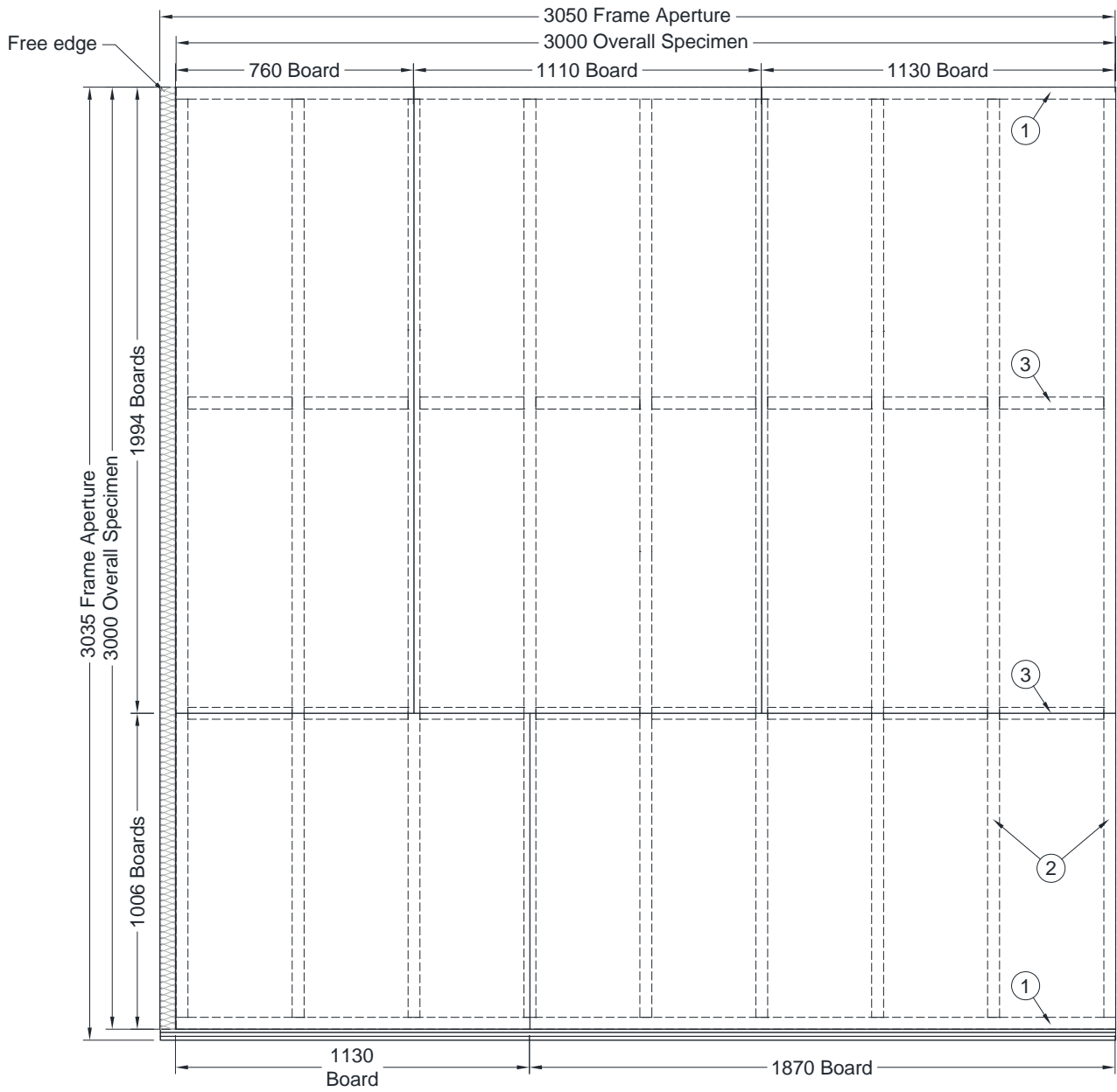
Test Specimen

Figure 1- General Elevation of Unexposed Face



Do not scale. All dimensions are in mm

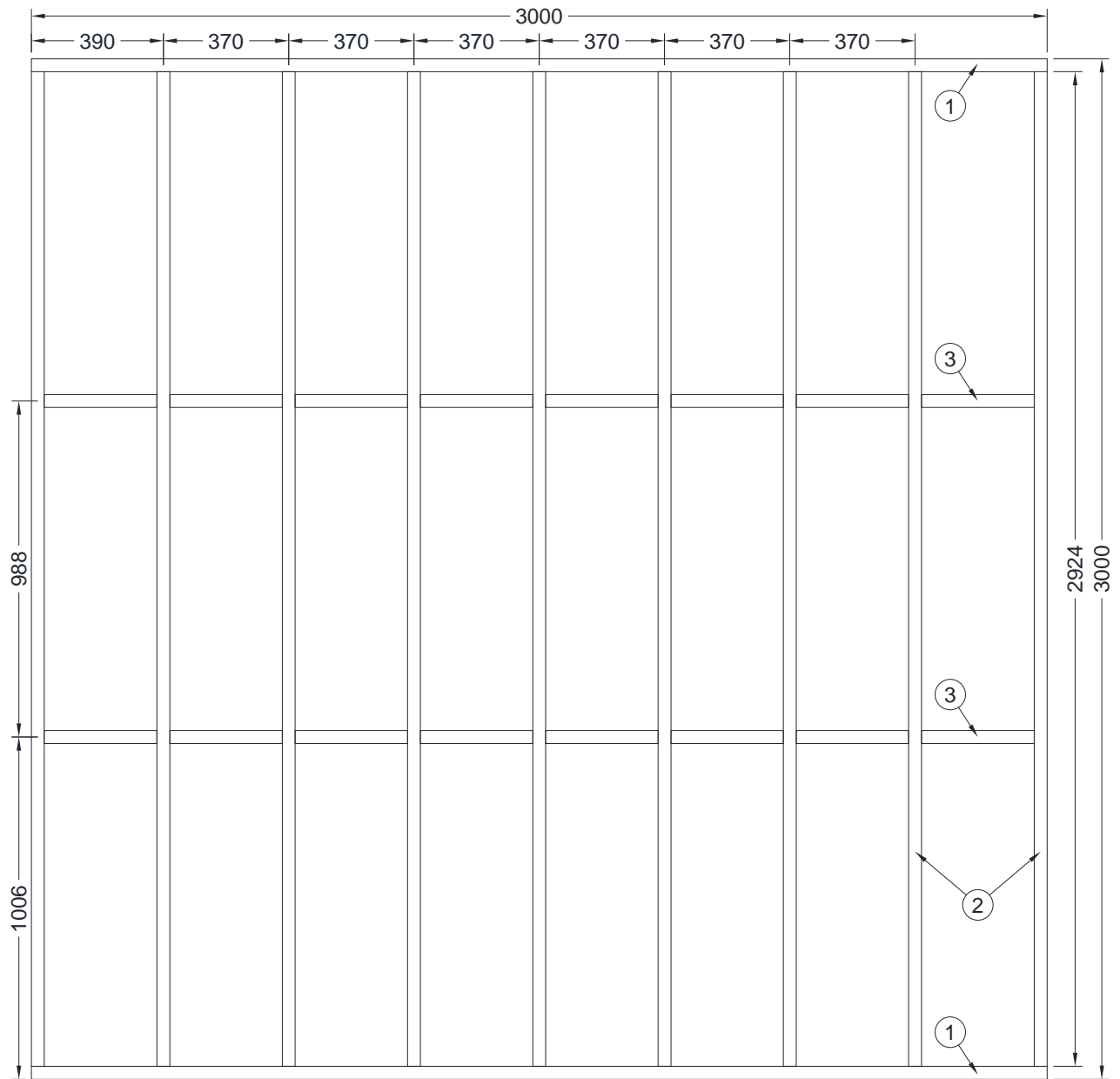
Figure 2 – General Elevation of Exposed Face



GENERAL ELEVATION
OF EXPOSED FACE

Do not scale. All dimensions are in mm

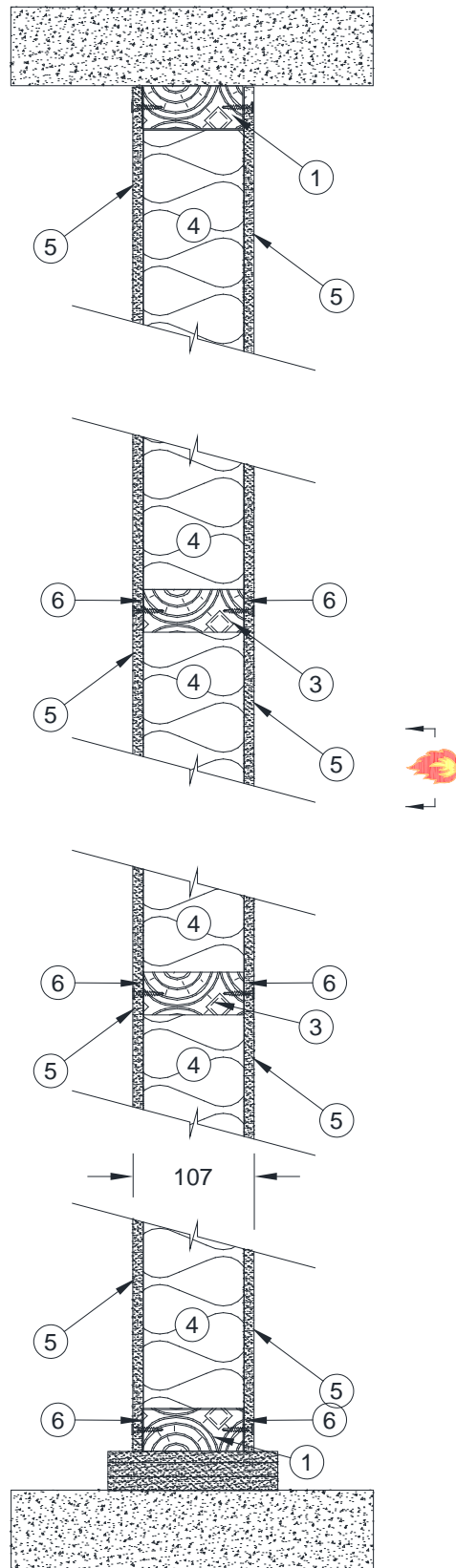
Figure 3 – General Elevation of the Framework (Items 1 to 3)



GENERAL ELEVATION
OF FRAMEWORK

Do not scale. All dimensions are in mm

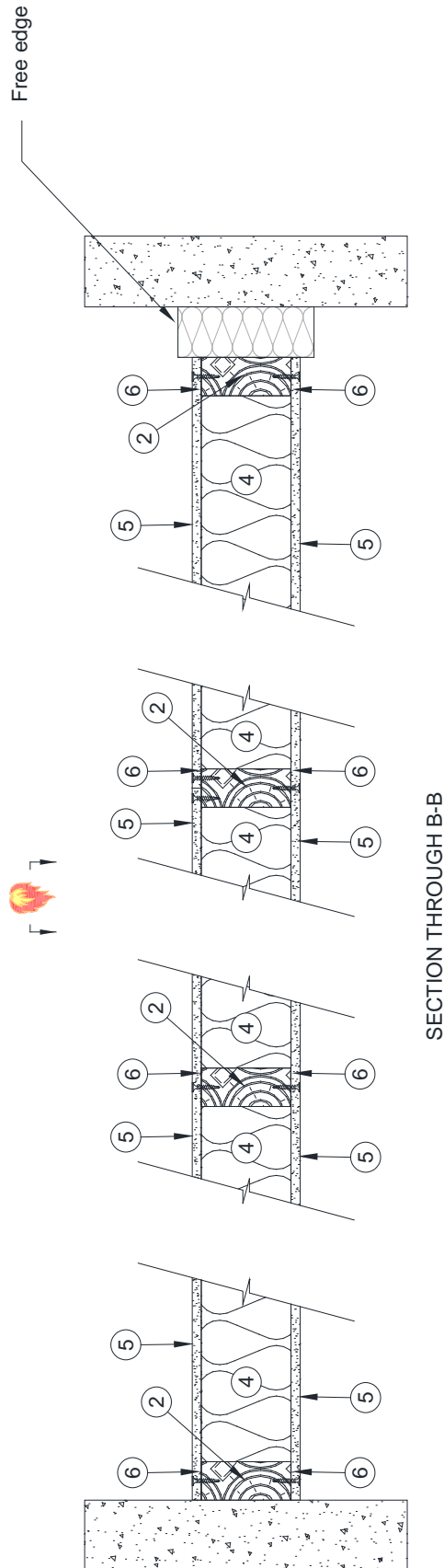
Figure 4 – Section Through A-A



SECTION THROUGH A-A

Do not scale. All dimensions are in mm

Figure 5 – Section Through B-B



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 5)
 (All values are nominal unless stated otherwise)
 (All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Top & Bottom Rail	
Material	: C16 grade general commercial softwood
Overall sizes	: 38 mm wide by 89 mm deep x 3000 mm long. See Figure 3 for layout configuration.
Fixing method to the restraint frame	: Through fixed to lining of restraint frame across the head and base with 7.5 mm dia. by 100 mm long screws at 580 mm centres.
2. Studs	
Material	: C16 grade general commercial softwood
Overall sizes	: 38 mm wide by 89 mm deep x 3000 mm long. See Figure 3 for layout configuration.
Fixing method to the restraint frame	: Through fixed to lining of restraint frame across one vertical edge with 7.5 mm dia. by 100 mm long screws at 580 mm centres.
Fixing method to the rails	: Spaced at 370 mm centres, butt jointed with top and bottom rails (item 1) and fixed with screws through the top & bottom rails
Fixings	
i. manufacturer	: Ulti-Mate II Stick-Fit
ii. type	: Multi-purpose Wood Screws
iii. material	: Zinc plated steel
iv. overall size	: 5 mm dia. by 80 mm long
v. quantity	: 2 off per stud at each end
3. Noggins	
Material	: C16 grade general commercial softwood
Overall sizes	: 38 mm wide by 89 mm deep x 3000 mm long. See Figure 3 for layout configuration.
Fixing method to studs	: Screw fixed to studs at positions shown on Figure 3.
Fixings	
i. manufacturer	: Ulti-Mate II Stick-Fit
ii. type	: Multi-purpose Wood Screws
iii. material	: Zinc plated steel
iv. overall size	: 5 mm dia. by 80 mm long
v. quantity	: 2 off per noggin at each end
4. Insulation	
Manufacturer	: Rockwool
Reference	: Rockwool Flexi insulation slab
Material	: Mineral Wool based insulation
Thickness	: 100 mm
Density	: 45 kg/m ³ , stated
Fixing methods	: Friction fitted between timber framework (items 1 to 3) and retained in place by cladding boards (item 5)

<u>Item</u>	<u>Description</u>
5. Cladding Boards	
Manufactured for	: Enviroboards Ltd
Reference	: 9 mm Fireboard
Type	: MgO based board
Thickness	: 9 mm
Density	: 1150 kg/m ³ , stated
Fixing methods	: Fitted in a single layer on each face and through screwed to the framework sections. All joints between boards and connections to the framework were sealed with jointing sealant (Item 6). For boards layout see Figures 1 & 2.
Fixings	
i. manufacturer	: UKFS Group Ltd
ii. type	: Chipboard screws
iii. material	: A2 Stainless steel
iv. overall size	: 4 mm dia. by 40 mm long
iv. centre	: 300 mm around the perimeter edges and field of each board.
6. Jointing Sealant	
Manufacturer	: Britchem Ltd for Enviroboards Ltd
Reference	: FR Intumescent & Acoustic Sealant
Material	: Acrylic based sealant
Application method	: Cartridge gunned to all boards connections to the framework and between boards.
Curing method	: Air cured

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	secs	
00	00	The test commences.
08	04	Slight smoke/steam release from the head of the specimen at the joint position, and one quarter in from fixed edge.
12	13	Light brown discolouration at the base of the specimen on the right hand side of the right vertical joint.
16	12	Light brown discolouration at the head mid width and ¼ in from the fixed edge (at smoke release locations).
16	50	Brown liquid discharging from horizontal joint approximately 30 mm in from fixed edge.
20	58	When viewed from the exposed face vertical joints are opening. The boards at the bottom left of the specimen have parted but not detached.
23	39	Discoloration is intensifying at smoke release location, at the head of the specimen one quarter in from fixed edge.
26	09	Intermittent crackling sounds can be heard.
28	07	Smoke/steam release is sustained.
31	38	When viewed from the exposed face, joints are widening. Flaming can be seen at joint location. Horizontal crack formed across the full width of the top right board.
42	41	When viewed from the exposed face, joints continue to widen and flaming is sustained. Small cracks are forming in all boards.
45	20	No significant visible change.
48	39	Discoloration at the base to the right of the right vertical joint is darkening.
54	53	When viewed from the exposed face, the cracks within the panels are widening. Panels have detached.
60	00	Specimen continues to satisfy integrity performance criteria.
62	08	Dark patch at the head is growing. (No glowing visible).
64	40	When viewed from the exposed face, no significant visible change.
67	00	Test discontinued at client's request.

Test Photographs

The exposed face of the test specimen prior to testing



The unexposed face of the test specimen after 5 minutes of testing



The unexposed face of the test specimen after 20 minutes of testing



The unexposed face of the test specimen after 30 minutes of testing



The unexposed face of the test specimen after 67 minutes of testing



The exposed face of the specimen immediately after the test



Temperature Deflection and Pressure Data

Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard

Time Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	42
2	445	435
4	544	549
6	603	599
8	646	641
10	678	671
12	706	703
14	728	726
16	748	749
18	766	769
20	781	778
22	796	790
24	809	800
26	820	822
28	832	839
30	842	840
32	852	854
34	860	863
36	869	870
38	877	877
40	885	885
42	892	891
44	899	898
46	906	905
48	912	909
50	918	917
52	924	921
54	930	926
56	935	932
58	940	939
60	945	943
62	950	948
64	955	952
66	960	959
67	962	960

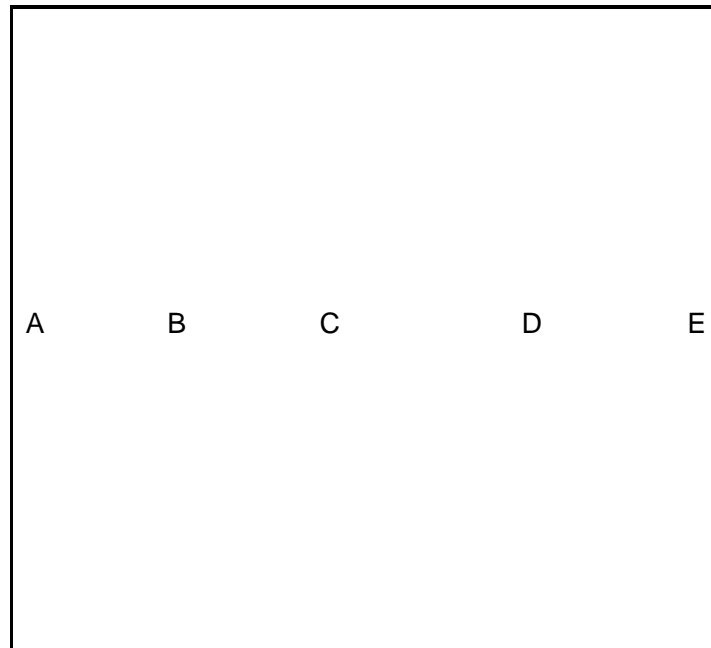
Individual And Mean Temperatures Recorded On The Unexposed Surface

Time Mins	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	T/C Number 7 Deg. C	T/C Number 8 Deg. C	Mean Temp Deg. C
0	21	21	21	22	20	21
2	21	22	21	22	20	21
4	21	22	21	22	20	21
6	21	22	21	22	20	21
8	22	26	23	24	21	23
10	26	32	25	29	21	27
12	33	44	36	48	22	37
14	38	53	54	62	24	46
16	41	56	58	66	27	50
18	43	56	60	67	29	51
20	46	57	62	68	31	53
22	48	58	64	70	33	55
24	49	58	67	71	36	56
26	50	59	69	71	39	58
28	50	59	69	71	41	58
30	50	58	69	71	42	58
32	51	57	69	71	43	58
34	51	56	68	72	45	58
36	52	56	68	74	46	59
38	54	57	69	75	48	61
40	56	57	69	78	50	62
42	59	58	70	80	53	64
44	61	60	70	82	55	66
46	63	61	71	84	58	67
48	65	63	72	87	61	70
50	67	65	72	89	64	71
52	68	66	73	91	67	73
54	70	67	74	93	69	75
56	71	69	75	95	72	76
58	72	70	76	97	74	78
60	74	71	76	98	76	79
62	75	73	77	99	79	81
64	76	74	78	100	81	82
66	78	75	79	100	83	83
67	78	76	79	100	84	83

Individual Temperatures Recorded On The Unexposed Surface

Time Mins	T/C Number 9 Deg. C	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C	T/C Number 14 Deg. C
0	21	21	22	22	20	22
2	21	21	22	22	20	22
4	21	21	22	22	20	22
6	22	21	22	22	20	22
8	22	21	22	23	20	22
10	23	22	23	24	20	24
12	24	24	25	29	21	31
14	26	28	40	45	24	39
16	29	33	48	49	27	44
18	32	36	49	50	31	47
20	34	38	50	51	35	50
22	36	39	51	53	38	51
24	38	41	54	57	41	52
26	40	44	57	61	43	53
28	42	46	58	65	45	54
30	44	48	58	65	47	54
32	46	49	57	65	48	54
34	48	51	56	65	49	54
36	49	52	57	65	50	55
38	50	52	57	65	50	55
40	52	53	58	65	51	56
42	53	54	59	65	51	56
44	54	55	60	64	52	58
46	56	56	61	64	52	59
48	57	57	62	64	53	61
50	59	58	63	64	54	61
52	60	59	64	64	55	62
54	62	60	65	64	55	63
56	63	61	66	64	56	64
58	65	63	67	65	57	65
60	66	64	68	65	58	66
62	68	65	68	66	59	67
64	69	66	69	66	60	68
66	70	67	70	67	61	68
67	71	68	70	67	61	69

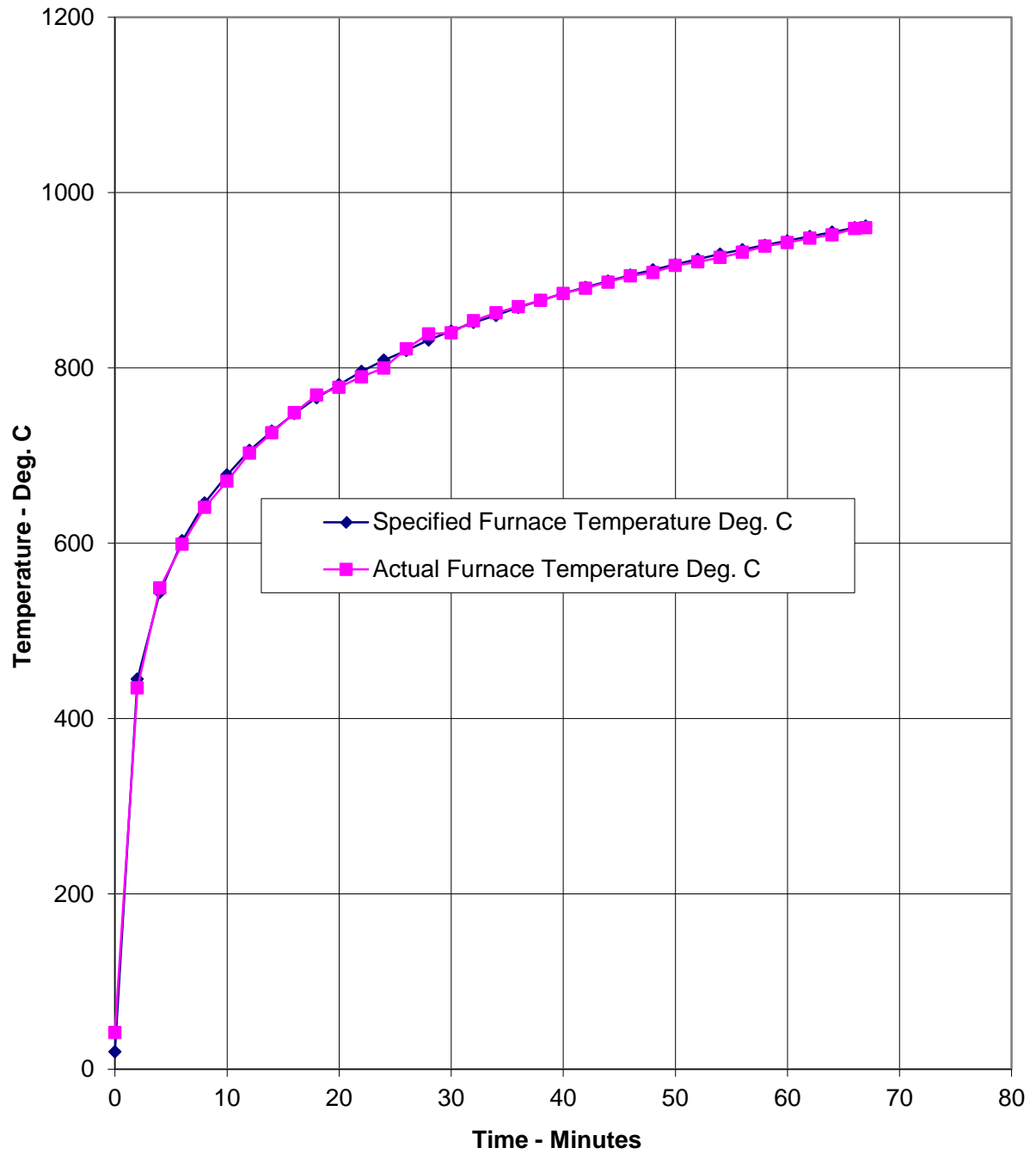
Deflections Of The Specimen During The Test



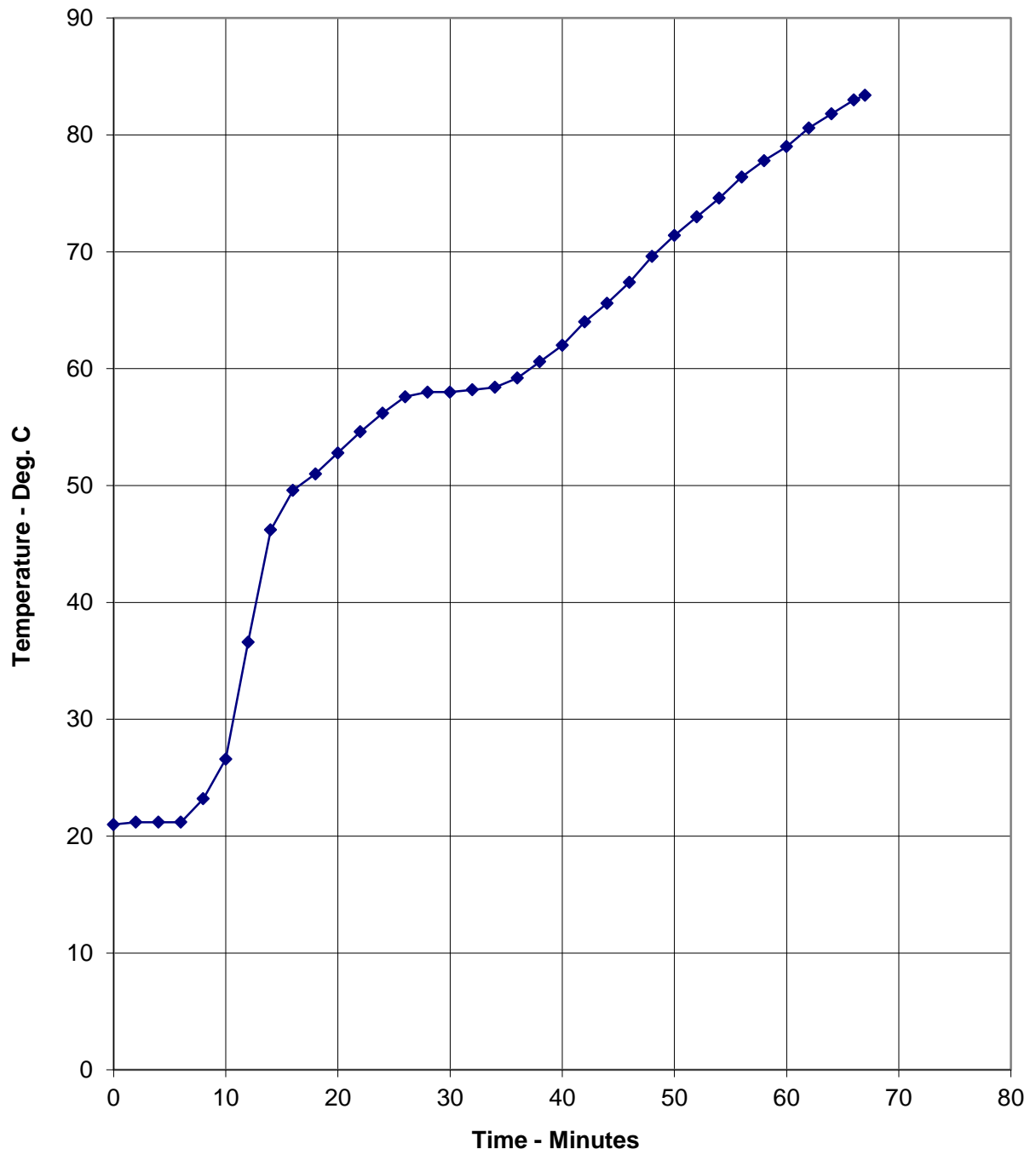
TIME mins	Deflections - mm				
	A	B	C	D	E
0	0	0	0	0	0
5	-2	-2	0	0	-5
10	-2	-2	-2	-2	-2
15	-1	-3	-3	-3	-3
20	-2	-6	-5	-3	-3
25	0	-9	-8	-4	-2
30	0	-8	-6	-4	-7
35	0	-8	-6	-3	-3
40	-2	-11	-7	-5	-7
45	-1	-12	-11	-8	-5
50	0	-14	-9	-9	-6
55	-1	-17	-14	-11	-5
60	-1	-19	-18	-9	-9
65	2	-24	-19	-12	-5

Positive values indicate a deflection towards the heating conditions of the test.
Measurements in mm

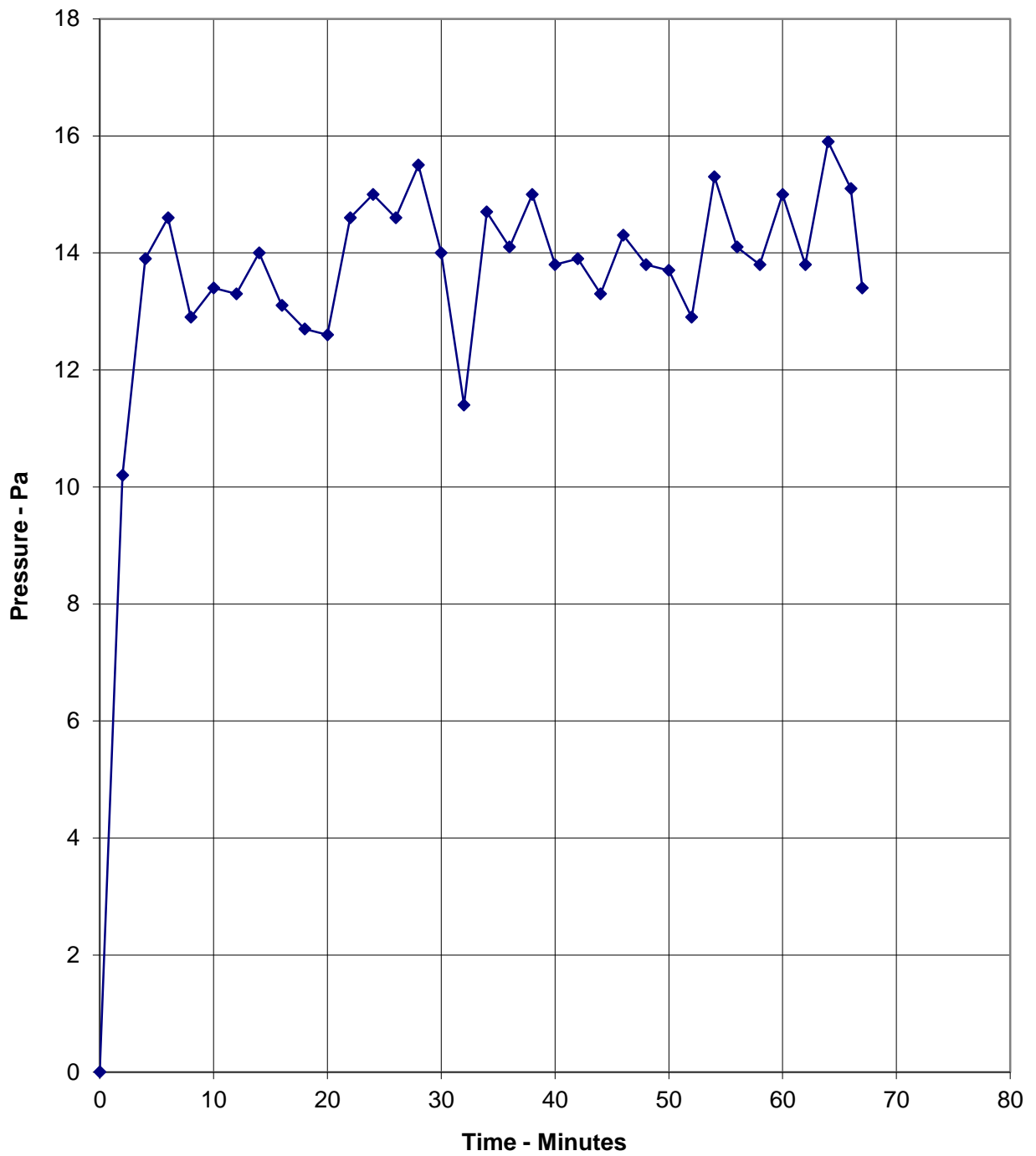
Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In BS 476 Part 20



Graph Showing Mean Temperatures Recorded On The Unexposed Surface



Graph Showing The Recorded Pressure 300 mm Below The Head Of The Specimen



On-going Implications

Limitations

The results relate only to the behaviour of the specimen 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 test results relate only to the specimen tested. Appendix A of BS 476: Part 20: 1987 provides guidance information on the application of fire resistance tests and the interpretation of test data. Application of the results to assemblies of different dimensions or incorporating different components should be the subject of a design appraisal.

The tested assembly was asymmetrical, the test results may not be appropriate to situations where the assembly is mounted in the opposite orientation to that tested.

Review

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 five years old should be considered by the user. The laboratory that issued the report 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.

Fire Test Study Group / EGOLF

Certain aspects of some fire test specifications are open to different interpretations. The Fire Test Study Group and EGOLF have identified a number of such areas and have agreed resolutions which define common agreement of interpretations between fire test laboratories which are members of the groups. Where such Resolutions are applicable to this test they have been followed