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Testing. Advising. Assuring.

**Title:**

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

**WF Report No:**

322589



**Prepared for:**

**Enviroboards Limited**

New Lodge,  
Conholt,  
Hampshire Gate,  
Andover,  
Hampshire  
SP11 9HF

**Date:**

26<sup>th</sup> March 2013

**Notified Body No:**

0833



## Summary

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**Objective** To determine the fire resistance performance of a non-loadbearing wall assembly when tested in accordance with BS 476: Part 22: 1987.

**Sponsor** **Enviroboards Limited**, New Lodge, Conholt, Hampshire Gate, Andover, Hampshire, SP11 9HF.

**Summary of Tested Specimen** The partition had overall nominal dimensions of 3035 mm high by 3010 mm wide by 73 mm thick. The partition consisted of steel stud framework, lined on each face with two layers of '6mm Fireboard' and in-filled with mineral fibre. The vertical steel studs had a nominal cross-section size of 50mm deep by 32mm deep, positioned at 610mm centres. The boards were formed from magnesium oxide reinforced with fibreglass mesh and were nominally 6mm thick. The cavity in the partition was filled with mineral fibre, 'RW3', nominally 60mm thick by 60kg/m<sup>3</sup> density.

The specimen satisfied the requirements for the following periods.

### Test Results:

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**Integrity** 37 minutes

**Insulation** 34 minutes

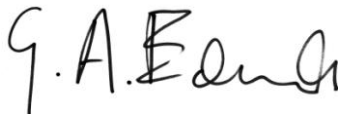
The test was discontinued after a period of 44 minutes.

**Date of Test** 3<sup>rd</sup> October 2012

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## Signatories

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Responsible Officer  
**G. Edmonds \***  
Deputy Operations Manager



**PP. D. Yates**  
Approved  
**C. Johnson\***  
Principal Certification Engineer

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

Report Issued  
Date : 26<sup>th</sup> March 2013

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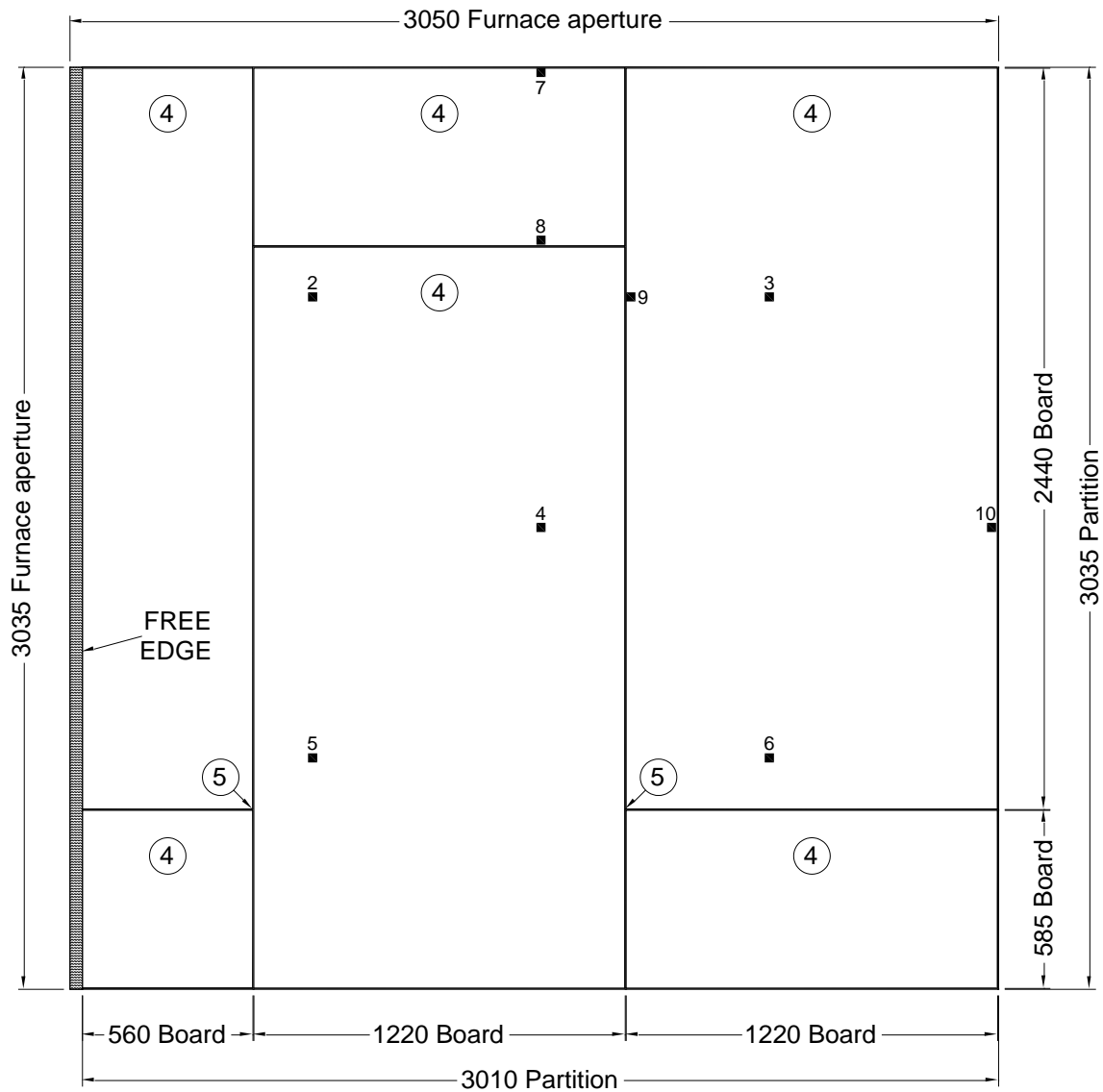
# Test Procedure

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<b>Introduction</b>	<p>The specimen was of a non-loadbearing wall construction and the test was conducted in accordance with Clause 5 of BS 476: Part 22: 1987 'Methods for determination of the fire resistance of non-loadbearing elements of construction'. This test report should be read in conjunction with that Standard and with BS 476: Part 20: 1987, 'Methods for determination of the fire resistance of elements of construction (general principles)'.</p> <p>The specimen was judged on its ability to comply with the performance criteria for integrity and insulation, as required by BS 476: Part 22: 1987, Clause 5.</p>
<b>Fire Test Study Group/EGOLF</b>	<p>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.</p>
<b>Instruction To Test</b>	<p>The test was conducted on the 3<sup>rd</sup> October 2012 at the request of <b>Enviroboards Limited</b>, the test sponsor.</p> <p>Mr. A. Edgington a representative of the test sponsor witnessed the test.</p>
<b>Test Specimen Construction</b>	<p>A comprehensive description of the test construction is given in the Schedule of Components. The description is based on a detailed survey of the specimen and information supplied by the sponsor of the test.</p>
<b>Installation</b>	<p>The assembly was installed into a refractory concrete lined, steel restraint frame. Representatives of Iceberg Building Systems conducted the installation on the 2<sup>nd</sup> October 2012.</p>
<b>Conditioning</b>	<p>The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 3 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 16°C to 21°C and 37% to 71% respectively.</p>

# Test Specimen

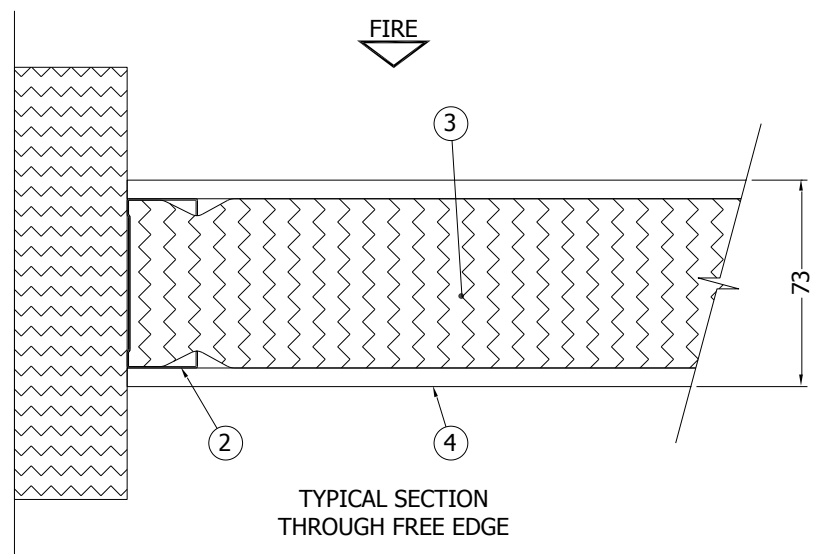
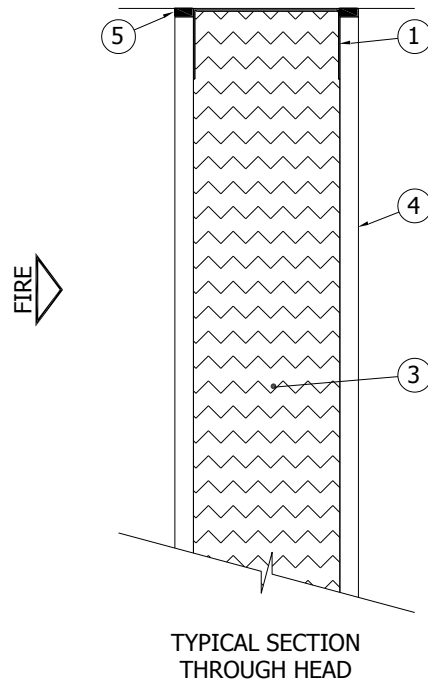
Figure 1- General Elevation of Test Specimen



■ Positions of thermocouples

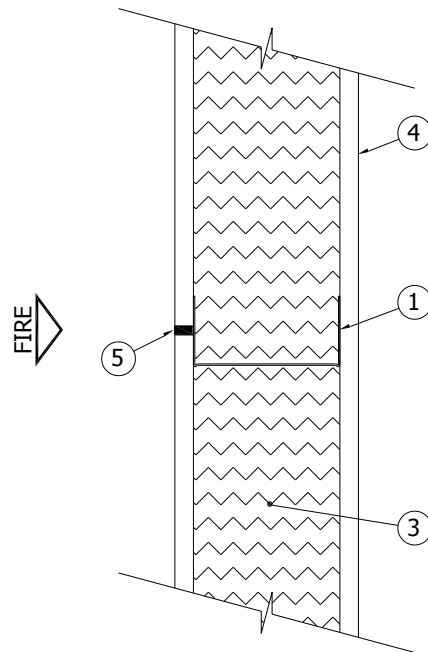
Do not scale. All dimensions are in mm

**Figure 2 – Details of Partition**

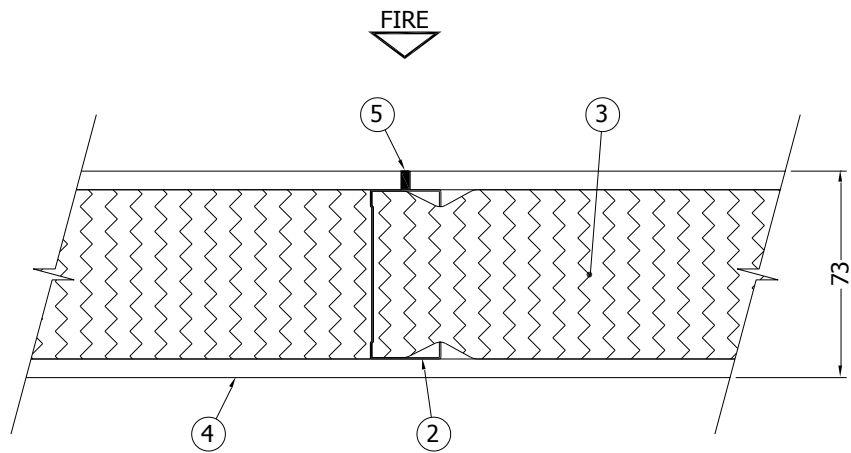


Do not scale. All dimensions are in mm

**Figure 3 – Details of Partition**



TYPICAL SECTION  
THROUGH HORIZONTAL PANEL  
JOINT ON EXPOSED FACE

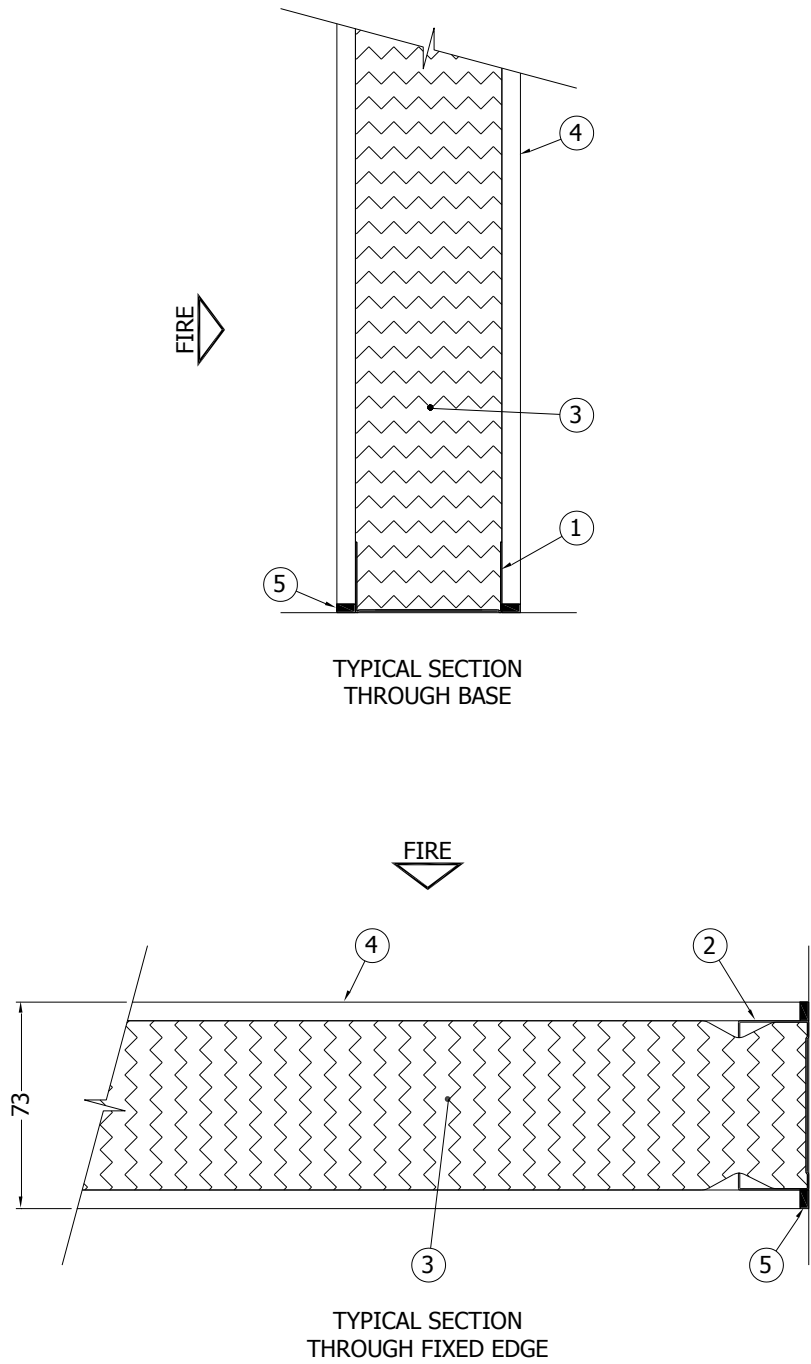


TYPICAL SECTION  
THROUGH VERTICAL PANEL  
JOINT ON EXPOSED FACE

Do not scale. All dimensions are in mm

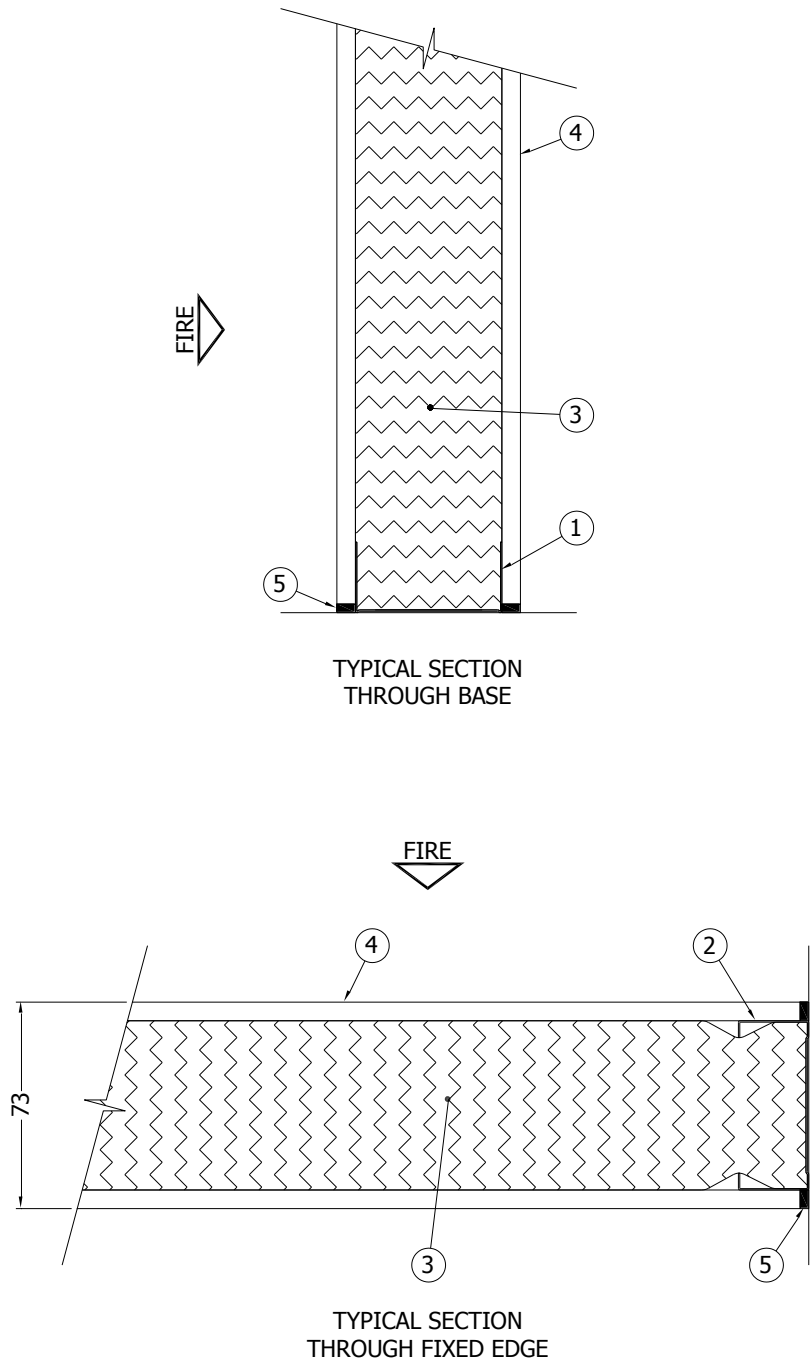


**Figure 4 – Details of Partition**



Do not scale. All dimensions are in mm

**Figure 5 – Details of Partition**



Do not scale. All dimensions are in mm

# Schedule of Components

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

<b><u>Item</u></b>	<b><u>Description</u></b>
<b>1. Partition Framework Track</b>	
Manufacturer	: Libra Systems Ltd
Reference	: FT52
Material	: Cold rolled galvanised mild steel
Thickness	: 0.5 mm
Overall size	: 52 mm wide x 25 mm deep
Fixing method	: The sections were bedded on a bead of mastic as described in item 5 and were then through screwed to the lining of the restraint frame across the head and base
Fixings	
i. manufacturer	: Fischer
ii. type	: Countersunk head concrete fixing screws
iii. material	: Steel
iv. reference	: FBS 6/5 SK
v. overall size	: 62 mm long x 7.6 mm diameter
vi. centres	: 600 mm
<b>2. Partition Framework Stud</b>	
Manufacturer	: Libra Systems Ltd
Reference	: FS50
Material	: Cold rolled galvanised mild steel
Thickness	: 0.5 mm
Overall size	: 50 mm wide x 32 mm deep with 6 mm returned edges
Fixing method	: The right hand stud as viewed from the unexposed face was bedded on mastic and through fixed to the lining of the restraint frame in the same way as the track sections above. The remaining studs were friction fitted at 610 mm centres. The studs were cut short of the head by nominally 10 mm head to allow for expansion into the head track
<b>3. Partition Insulation</b>	
Manufacturer	: Rockwool
Reference	: RW3 Slab
Material	: Mineral fibre based insulation
Density	: 60 kg/m <sup>3</sup> , manufacturers stated
Overall size	: 1200 mm x 600 mm x 60 mm thick
Fixing method	: Friction fitted between partition studs and retained by the cladding boards on each face

**Item**

**Description**

**4. Partition Cladding Boards**

Manufacturer : Enviroboards Ltd  
Reference : 6mm Fireboard  
Material : Magnesium oxide based boards  
Density : 890 kg/m<sup>3</sup>, stated  
Overall size : 2440 mm x 1220 mm x 6.6 mm thick  
Fixing method : Butted with a bead of mastic around the perimeter and through screwed to the partition framework track and studs. The joints in the boards were staggered with respect to those on the opposite face

Fixings

i. manufacturer : Nevill Long  
ii. type : Countersunk head drywall screws  
iii. material : Zinc plated steel  
iv. reference : 53EDWZ0251  
v. overall size : 25 mm long x 3.5 mm diameter  
vi. centres : 300 mm

**5. Cladding Board Joint Sealant**

Manufacturer : Hilti  
Reference : CP 611A  
Material : Intumescent Firestop Mastic  
Application method : Cartridge gunned

# Instrumentation

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<b>General</b>	The instrumentation was provided in accordance with the requirements of the Standard.
<b>Furnace</b>	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, Type K thermocouples distributed over a plane 100 mm from the surface of the test construction.
<b>Thermocouple Allocation</b>	Thermocouples were provided to monitor the unexposed surface of the specimen and the output of all instrumentation was recorded at no less than one minute intervals as follows:
<b>Thermocouples 2 to 6</b>	At five positions, one approximately at the centre and one at approximately the centre of each quarter section of the assembly.
<b>Thermocouple 7</b>	At the head of the specimen at mid-width of the test specimen.
<b>Thermocouple 8</b>	At a upper horizontal joint position at mid-width of the test specimen.
<b>Thermocouple 9</b>	At a vertical joint position approximately three quarters the height of the test specimen.
<b>Thermocouple 10</b>	At the fixed vertical edge of the test specimen at mid-height.  The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 1.
<b>Roving Thermocouple</b>	A roving thermocouple was available to measure temperatures on the unexposed surface of the specimen at any position, which might appear to be hotter than the temperatures indicated by the fixed thermocouples.
<b>Integrity criteria</b>	Cotton pads and gap gauges were available to evaluate the impermeability of the specimen to hot gases.
<b>Furnace Pressure</b>	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. The calculated pressure differential relative to the laboratory atmosphere at the top of the specimen was 17 ( $\pm 2$ ) Pa.

## Test Observations

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Time		All observations are from the unexposed face unless noted otherwise.
<b>mins</b>	<b>secs</b>	The ambient air temperature in the vicinity of the test construction was 12°C at the start of the test with a maximum variation of -1°C during the test.
<b>00</b>	<b>00</b>	<b>The test commences.</b>
<b>07</b>	<b>00</b>	The test specimen is bowing slightly towards the furnace.
<b>08</b>	<b>00</b>	A slight amount of steam is being released from the top of the specimen.
<b>15</b>	<b>00</b>	The specimen is bowing towards the furnace the more. The steam release increases from the top of the specimen and in particularly the right hand joint position.
<b>18</b>	<b>00</b>	The specimen is radiating a light orange colour on the exposed face.
<b>24</b>	<b>00</b>	Cracks are visible on the right hand side of the board material on the exposed face.
<b>25</b>	<b>00</b>	There is differential movement of the board on the unexposed face around the right vertical joint position.
<b>35</b>	<b>00</b>	More smoke release is being released from the right hand joint position.
<b>37</b>	<b>00</b>	A large through gap has developed in the right hand joint at the position previously mentioned at 25 minutes on the unexposed face. The gap at the joint is approximately 50-60mm wide by 1.5m long. <b>Integrity and insulation failure occurs.</b>
<b>44</b>	<b>00</b>	<b>The test is discontinued at the request of the sponsor of the test.</b>

# Test Photographs

The exposed face of the test construction prior to testing



The unexposed face of the test construction prior to testing



The unexposed face of the test construction after a test duration of 15 minutes



The unexposed face of the test construction after a test duration of 20 minutes





The unexposed face of the test construction after a test duration of 30 minutes



The unexposed face of the test construction after a test duration of 37 minutes



The unexposed face of the test construction after a test duration of 40 minutes



The unexposed face of the test construction after a test duration of 44 minutes



The exposed face of the test construction immediately after the test



## Temperature and Deflection 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	23
2	445	399
4	544	526
6	603	597
8	646	640
10	678	679
12	706	705
14	728	729
16	748	756
18	766	763
20	781	788
22	796	807
24	809	809
26	820	815
28	832	835
30	842	847
32	852	856
34	860	851
36	869	867
38	877	868
40	885	897
42	892	893
44	899	900

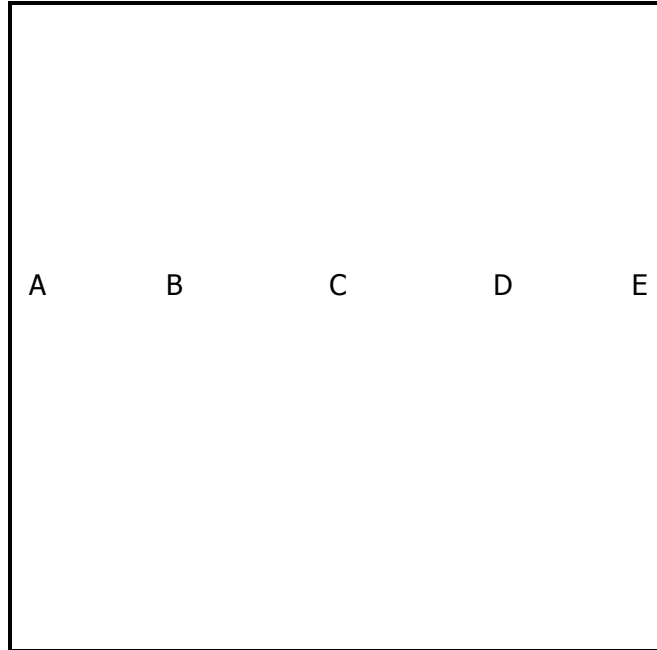
**Individual and mean temperatures recorded on the unexposed surface**

Time Mins	T/C Number 2 Deg. C	T/C Number 3 Deg. C	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	Mean Temp Deg. C
0	17	17	17	17	17	17
2	17	17	17	17	17	17
4	18	17	17	17	17	17
6	26	24	23	22	23	24
8	42	38	35	34	35	37
10	56	54	47	48	46	50
12	55	60	52	54	53	55
14	53	64	54	56	57	57
16	52	67	57	58	59	59
18	52	67	58	60	60	59
20	54	68	59	61	61	61
22	55	70	60	63	62	62
24	57	71	62	64	63	63
26	62	71	64	67	66	66
28	69	74	68	71	72	71
30	75	78	72	76	78	76
32	82	82	76	86	82	82
34	89	88	80	98	83	88
36	94	104	84	108	84	95
38	100	115	87	114	90	101
40	105	132	91	116	99	109
42	109	243	96	119	105	134
44	112	357	107	122	110	162

**Individual temperatures recorded on the unexposed surface**

Time Mins	T/C Number 7 Deg. C	T/C Number 8 Deg. C	T/C Number 9 Deg. C	T/C Number 10 Deg. C
0	18	18	17	18
2	18	18	17	18
4	19	19	21	18
6	23	27	62	21
8	39	49	84	28
10	74	72	87	60
12	80	78	85	64
14	82	78	85	54
16	85	79	85	48
18	88	81	87	44
20	90	82	90	41
22	95	85	93	39
24	99	94	93	38
26	102	99	99	38
28	105	102	113	39
30	106	103	120	41
32	110	104	134	43
34	116	106	167	47
36	123	106	307	50
38	125	109	367	53
40	129	110	413	56
42	133	112	459	59
44	142	116	511	61

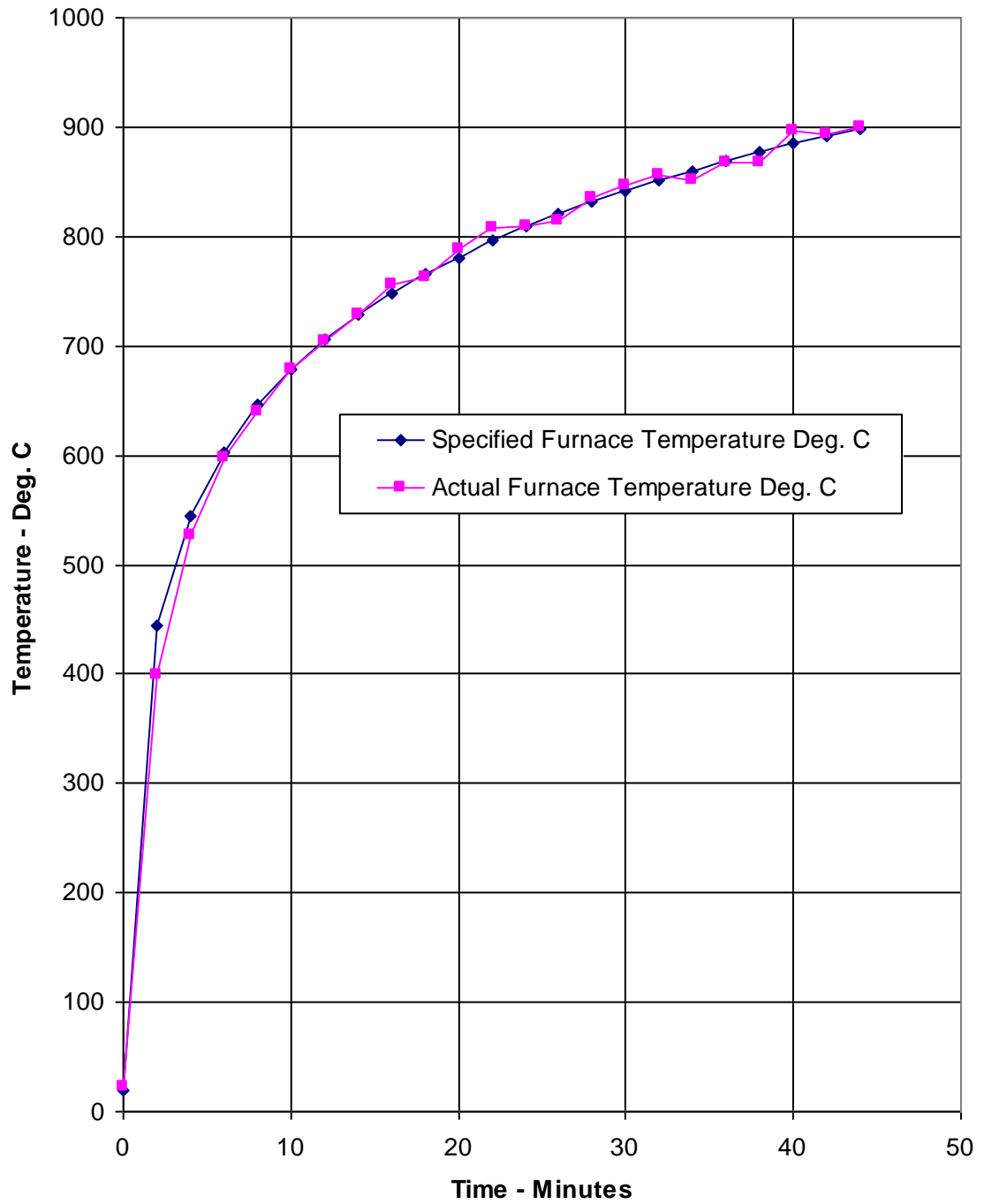
### Deflection Of The Specimen During The Test



TIME mins	A	B	C	D	E
0	0	0	0	0	0
10	8	16	19	30	3
20	-19	61	77	62	3
30	-58	91	118	89	3
40	-71	89	131	73	-6

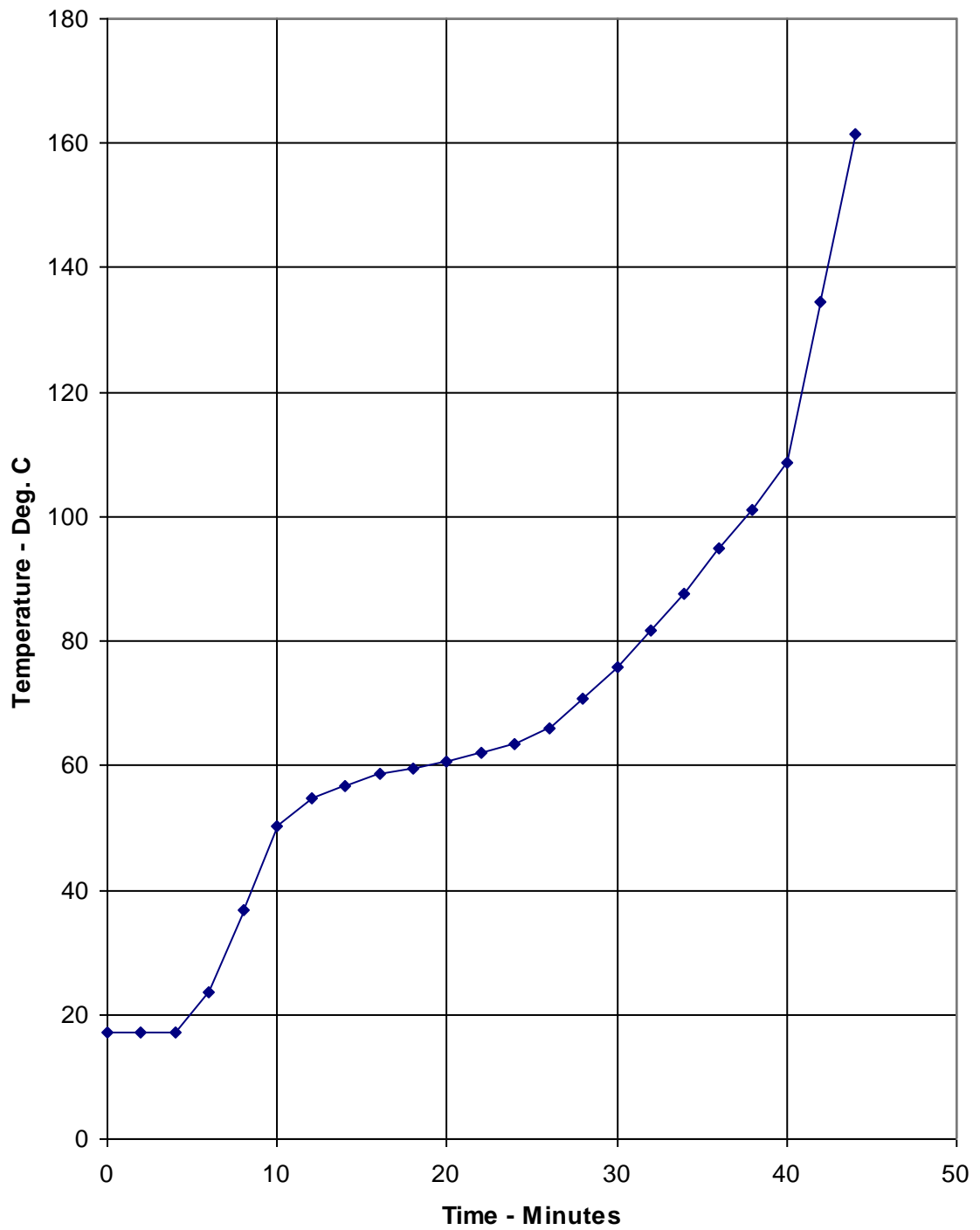
Positive measurements indicate movement towards the furnace

Graph showing mean furnace temperature, together with the temperature/time relationship specified in the Standard





Graph showing mean temperatures recorded on the unexposed surface



## Performance Criteria and Test Results

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**Integrity** It is required that there is no collapse of the specimen, no sustained flaming on the unexposed surface and no loss of impermeability. These requirements were satisfied for a period of 37 minutes.

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**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. These requirements were satisfied for a period of 34 minutes, after which time thermocouple 9 recorded a maximum temperature rise in excess of that allowable.

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## Ongoing Implications

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**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.

**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.

# Conclusions

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**Evaluation  
against  
objective**

A specimen of a non-loadbearing, wall assembly has been subjected to a fire resistance test in accordance with BS 476: Part 22: 1987, Clause 5.

The specimen satisfied the performance requirements specified in the Standard for the periods stated below:

**Test Results:**

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**Integrity**                      37 minutes

**Insulation**                      34 minutes

The test was discontinued after a period of 44 minutes.