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Testing. Advising. Assuring.

Title:

The Fire Resistance
Performance A Non-
Loadbearing, Partition Wall
Assembly When Tested In
Accordance With BS EN
1364-1:2015

Report No: 396400



Prepared for:

British Gypsum

East Leake,
Loughborough,
Leicestershire
LE12 6HX.

Date: 23rd October 2018

Notified Body No:



Summary

Objective To determine the fire resistance performance of a specimen of a non-loadbearing, partition wall assembly when tested in accordance with BS EN 1364-1:2015.

Test Sponsor **British Gypsum.** East Leake, Loughborough, Leicestershire, LE12 6HX.

Summary Of Tested Specimen Briefly the specimen had overall nominal dimensions of 3000 mm high by 3000 mm wide. The partition comprised of a British Gypsum 48S50 'C' stud supporting framework clad on each face with a single layer of 15 mm thick 'Gyproc SoundBloc 15 mm TE' plasterboard. A single layer of 25 mm thick glass mineral wool insulation was friction fitted into the cavity.

Full details of the specimen's construction can be found in the Schedule of Components section in this report.

Test Results:

Integrity performance	Sustained flaming	66 minutes*
	Gap gauge	66 minutes*
	Cotton Pad	66 minutes*

Insulation performance	58 minutes
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*The test duration. The test was discontinued after duration of 66 minutes.

Date of Test 18th March 2018.

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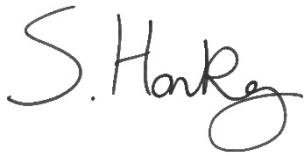
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* For and on behalf of **Exova Warringtonfire**.

Report Issued

Date : 23rd October 2018

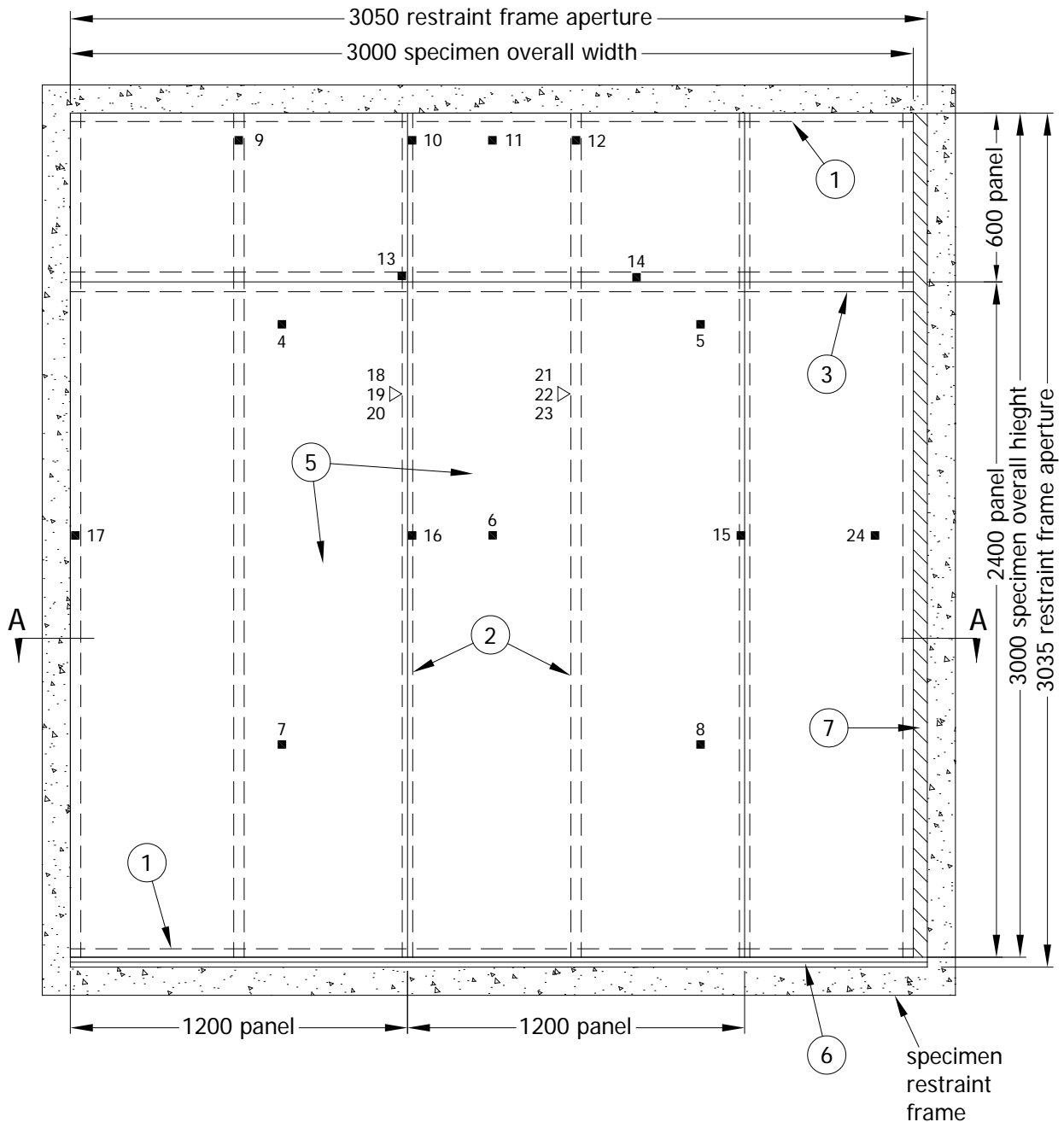
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Test Procedure

Introduction	<p>The wall assembly is required to provide a fire separating function and was therefore tested in accordance with BS EN 1364-1: 2015 'Fire resistance tests for non-loadbearing elements – Part 1: Walls'. This test report should be read in conjunction with that Standard and with BS EN 1363-1: 2012, 'Fire resistance tests – Part 1: General requirements' and BS EN 1363-2: 1999, 'Fire resistance tests – Part 2: Alternative and additional procedures'.</p> <p>The specimen was judged on its ability to comply with the performance criteria for integrity and insulation, as required by BS EN 1364-1: 2015.</p>
Fire Test Study Group/EGOLF	<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>
Instruction To test	<p>The test was conducted on the 18th March 2018 at the request of British Gypsum, the sponsor of the test.</p>
Test Specimen Construction	<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>
Installation	<p>The storage, installation, and test preparation took place in the test laboratory between the 16th and 18th March 2018.</p>
Sampling	<p>Exova Warringtonfire was not involved in the sampling or selection of the tested specimen or any of the components.</p>
Conditioning	<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 both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 8°C to 18°C and 36.5% to 60.5% respectively.</p>

Test Specimen

Figure 1- General elevation of test specimen and unexposed face thermocouples

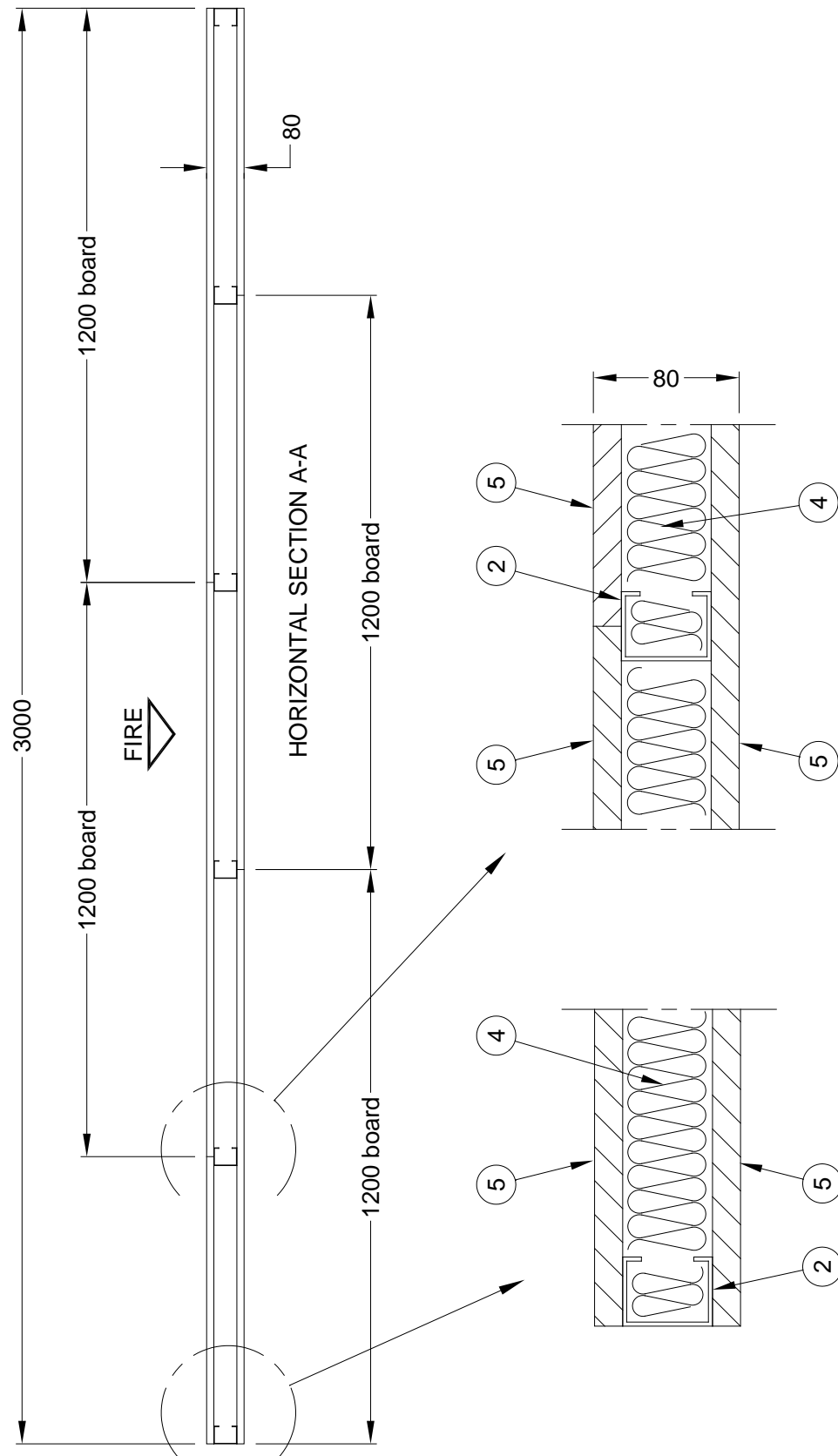


Positions of thermocouples

- surface mounted thermocouples on plasterboard at unexposed face (nos.4 to 17 & 24)
- ▷ mineral insulated thermocouples on internal studs (nos.18 to 23)

Do not scale. All dimensions are in mm

Figure 2 – Typical Details of Test Specimen



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 and 2)

(All values are nominal unless stated otherwise)

(All other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Head and base channel	
Reference	: Gypframe 50FEC50 standard floor and ceiling channel
Material	: Galvanised mild steel formed channel
Overall section size	: 50 mm wide x 28 mm deep
Details of fixings to masonry surround	
i. head channel	: 60 mm long 'Hilti HUS' anchor bolts at 600 mm maximum centres.
ii. base channel	: 80 mm long 'Hilti HUS' anchor bolts at 600 mm maximum centres through the base boards (item 6).
2. Vertical studs	
Reference	: Gypframe 48S50 'C' studs
Material	: Galvanised mild steel formed channel
Overall section size	: 48 mm wide x 37 mm deep, with approx 6 mm returns
Fixing method	: Spaced at 600 mm centres and friction fit within the head and base channel. One end stud was fixed to the masonry surround using 60 mm long 'Hilti HUS' anchor bolts at 600 mm maximum centres. The other end stud was not fixed to the masonry surround, but was kept as a free edge.
3. Horizontal board joint reinforcement plate	
Reference	: Gypframe GFS1 fixing strap
Material	: Galvanised mild steel flat plate
Thickness	: 0.7 mm
Overall size	: 70 mm wide x 3000 mm long
Quantity	: 2 no. plates (one at each face of the partition frame)
Fixing method	: Fitted behind the horizontal board joints positioned at 2400 mm from base of the partition, at both faces of the partition framework. See Figure 1
4. Cavity insulation	
Manufacturer	: Isover St. Gobain
Reference	: Acoustic Partition Roll
Thickness	: Single layer, 25 mm thick
Density	: 18 kg/m ³ (stated)
Fixing method	: Friction fit within all the voids between the partition framework members.

5. Cladding boards

Reference	:	Gyproc SoundBloc 15 mm TE
Thickness	:	15 mm
Supplied board size	:	1200 mm wide x 2400 mm high
Density	:	923 kg/m ³ (stated)
Fixing method	:	Single layer screw fixed to both faces of all framework channels and studs using 25 mm long drywall screws at 300 mm centres. The vertical panel joints on one face of the studs were staggered a distance of 600 mm with respect to those on the opposite face of the studs, with a full board fitted at the free edge (viewed from the exposed face).
Details of board joint filler	:	All board butt joints finished with Gyproc joint paper tape and Gyproc joint filler. All screw heads also finished with the joint filler

6. Base board packing strips

Reference	:	Glasroc
Material	:	Non-combustible glass reinforced gypsum board
Overall size	:	2 no. strips, each 20 mm thick x 200 mm wide x 3000 mm long.
Fixing method	:	Via the base channel partition fixings.

7. Free edge packing

Manufacturer	:	Rockwool
Reference	:	FireBatt 825
Material	:	Rock fibre insulation
Density	:	110 kg/m ³ , uncompressed
Fitting method	:	Packed into the gap along the free edge between the concrete lining of the specimen restraint frame and the right hand edge of the partition (as viewed from the unexposed face).

Instrumentation

General	The instrumentation was provided in accordance with the requirements of the Standard. BS EN 1363-1: 2012.
Furnace	The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2012 using nine mineral insulated thermocouples distributed over a plane 100 mm from the surface of the partition.
Thermocouple Allocation	<p>Thermocouples were provided to monitor the unexposed surface of the partition assembly and the output of all instrumentation was recorded at no less than one minute intervals as follows:</p> <p>The locations and reference numbers of the various unexposed surface and internal thermocouples are shown in Figure 1.</p>
Roving Thermocouple	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.
Integrity criteria	Cotton pads and gap gauges were available to evaluate the impermeability of the test construction to hot gases.
Furnace Pressure	The furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1363-1: 2012. Clause 5.2. The calculated pressure differential relative to the laboratory atmosphere at the top of the specimen was 17 (± 3) Pa.

Test Observations

Time		All observations are from the unexposed face unless noted otherwise.
mins	secs	
00	00	The test commences.
14	00	Viewed from the exposed face: The plasterboard turns black in colour with glowing embers swirling around the furnace chamber.
17	00	Viewed from exposed face: The vertical joints begin to widen over their entire length, fissures are evident around the fixing points. The board glows a bright orange in colour.
20	00	Steam releases from the head of the partition.
25	00	The Specimen visibly distorts at its mid-axis.
30	00	The Specimen continues to satisfy the Integrity and Insulation criteria of the test.
45	00	Viewed from the exposed face: The board begins to pull away from its original position with the core now visible and begins to melt.
52	00	The plasterboard begins to discolour along its third stud to the left.
56	00	Smoke/steam release is evident from the discolouration.
56	30	An area of glowing is visible along the top horizontal joint.
58	30	A cotton wool pad is applied to the glowing but it fails to ignite. Glowing is visible from the two vertical joints also.
60	00	The Specimen satisfies its integrity.
66	20	Test Discontinued.

Test Photographs

The exposed face of the specimen prior to testing



The unexposed face of the specimen prior to the start of the test



**The unexposed
face of the
specimen after a
test duration of
20 minutes**



**The unexposed
face of the
specimen after a
test duration of
50 minutes**



**The unexposed
face of the
specimen after a
test duration of
60 minutes**



**The unexposed
face of the
specimen after a
test duration of
66 minutes**



**The exposed face
of the assembly
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	16
2	445	456
4	544	550
6	603	595
8	646	631
10	678	678
12	706	705
14	728	725
16	748	743
18	766	758
20	781	777
22	796	796
24	809	809
26	820	821
28	832	834
30	842	846
32	852	857
34	860	868
36	869	878
38	877	886
40	885	895
42	892	897
44	899	895
46	906	900
48	912	904
50	918	915
52	924	922
54	930	929
56	935	930
58	940	934
60	945	941
62	950	948
64	955	955
66	960	958

Individual And Mean Temperatures Recorded On The Unexposed Surface Of The Specimen

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	10	10	11	11	10	10
2	11	11	11	11	10	11
4	11	11	11	11	10	11
6	13	15	12	12	16	14
8	21	23	17	17	30	22
10	29	32	24	24	44	31
12	35	40	32	31	53	38
14	40	48	40	39	59	45
16	45	55	48	46	63	51
18	50	58	54	51	64	55
20	53	58	58	55	65	58
22	55	60	59	56	64	59
24	57	65	60	57	65	61
26	63	71	62	60	66	64
28	70	77	65	65	69	69
30	77	80	68	69	72	73
32	81	82	71	72	75	76
34	83	83	73	74	78	78
36	84	85	74	76	80	80
38	86	86	77	79	80	82
40	89	88	79	81	81	84
42	91	90	80	81	83	85
44	93	92	80	82	86	87
46	93	95	81	84	90	89
48	95	96	82	86	94	91
50	95	96	84	88	95	92
52	96	98	85	90	95	93
54	102	107	87	94	97	97
56	114	122	89	97	113	107
58	136	159	96	97	141	126
60	196	233	98	98	229	171
62	258	294	98	107	303	212
64	307	339	98	127	349	244
66	334	358	114	198	382	277

Individual Temperatures Recorded On The Unexposed Surface of the Specimen

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	11	11	12	12	11	11
2	11	12	12	12	12	11
4	13	12	12	12	11	11
6	22	19	19	30	12	13
8	35	37	35	54	17	21
10	46	51	49	66	24	31
12	54	61	59	72	31	39
14	60	67	65	74	38	44
16	63	71	69	74	42	46
18	65	73	69	73	46	48
20	65	73	69	71	48	49
22	64	70	69	69	50	50
24	67	67	68	69	50	54
26	72	66	67	72	52	60
28	77	67	68	77	56	66
30	83	69	70	79	65	71
32	87	71	74	81	75	77
34	89	74	78	82	83	81
36	91	76	81	83	86	84
38	92	77	83	84	88	88
40	93	79	83	85	89	90
42	93	81	84	86	90	91
44	95	82	85	88	90	92
46	96	83	87	89	91	94
48	98	85	89	90	93	95
50	100	86	90	92	95	96
52	103	87	90	93	96	103
54	106	88	91	95	97	115
56	109	89	92	99	103	127
57	111	89	93	102	108	144
58	113	90	93	105	111	191
60	117	92	94	114	121	334
62	123	98	95	127	139	410
64	131	106	103	137	183	428
66	138	118	114	168	244	433

Individual Temperatures Recorded on the Unexposed Surface Of The Specimen (Continued)

Time Mins	T/C Number 15 Deg. C	T/C Number 16 Deg. C	T/C Number 17 Deg. C	T/C Number 24 Deg. C
0	11	11	12	11
2	11	11	12	11
4	11	11	12	11
6	12	13	14	14
8	18	20	23	23
10	27	30	36	34
12	37	41	47	43
14	47	50	55	51
16	54	56	60	57
18	58	59	63	60
20	59	60	64	59
22	60	57	63	59
24	63	56	62	61
26	68	56	62	63
28	74	57	63	66
30	79	59	65	69
32	82	62	67	71
34	84	64	68	72
36	86	65	70	74
38	87	66	72	74
40	90	66	74	74
42	92	66	75	74
44	93	67	77	75
46	94	68	78	77
48	95	70	79	78
50	96	71	80	79
52	98	73	81	80
54	106	76	82	82
56	125	79	82	85
57	147	81	83	88
58	182	84	83	93
60	267	87	84	95
62	331	88	85	98
64	*	99	86	118
66	*	147	88	141

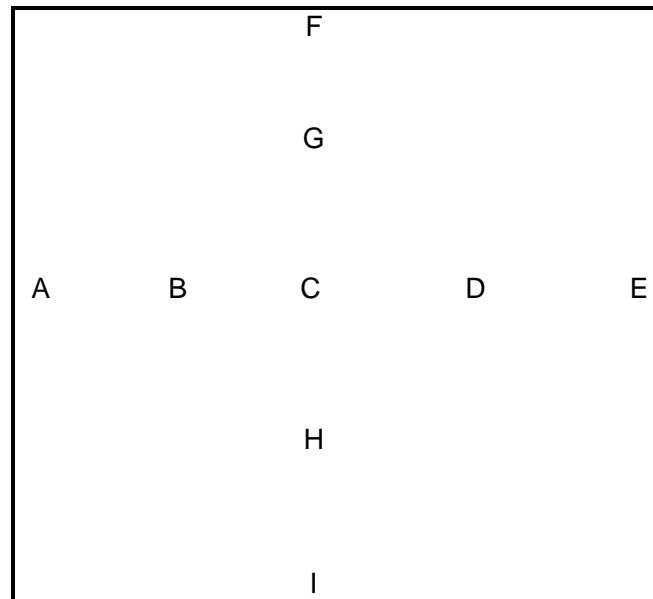
*Thermocouple Malfunction

Individual Temperature Measured On The Internal Studding

Time Mins	T/C Number 18 Deg. C Hot flange	T/C Number 19 Deg. C Web	T/C Number 20 Deg. C Cold flange	T/C Number 21 Deg. C Hot flange	T/C Number 22 Deg. C Web	T/C Number 23 Deg. C Cold flange
0	11	12	12	12	11	11
2	21	13	12	23	13	12
4	81	50	32	86	57	29
6	98	94	81	97	86	66
8	98	95	86	99	88	74
10	100	95	87	101	88	76
12	102	94	89	111	86	76
14	106	93	89	129	88	79
16	116	93	89	165	91	81
18	129	95	89	233	100	80
20	158	97	84	356	129	87
22	231	121	84	458	226	130
24	312	172	89	562	347	184
26	386	225	110	590	398	217
28	436	276	152	623	425	238
30	470	324	202	646	448	264
32	500	364	244	664	469	289
34	526	395	276	679	489	318
36	549	421	304	687	509	349
38	570	448	331	679	524	375
40	589	470	358	674	536	401
42	605	489	381	669	540	422
44	617	505	402	668	535	431
46	643	524	477	661	547	457
48	629	544	468	637	546	473
50	642	559	494	640	551	487
52	658	610	552	792	747	678
54	766	754	657	830	816	760
56	946	932	861	924	884	829
58	1053	877	1000	*	811	935
60	1039	938	1059		897	966
62	1099	*	1076		901	963
64	1023		1005		894	941
66	999		926		951	929

*Thermocouple Malfunction

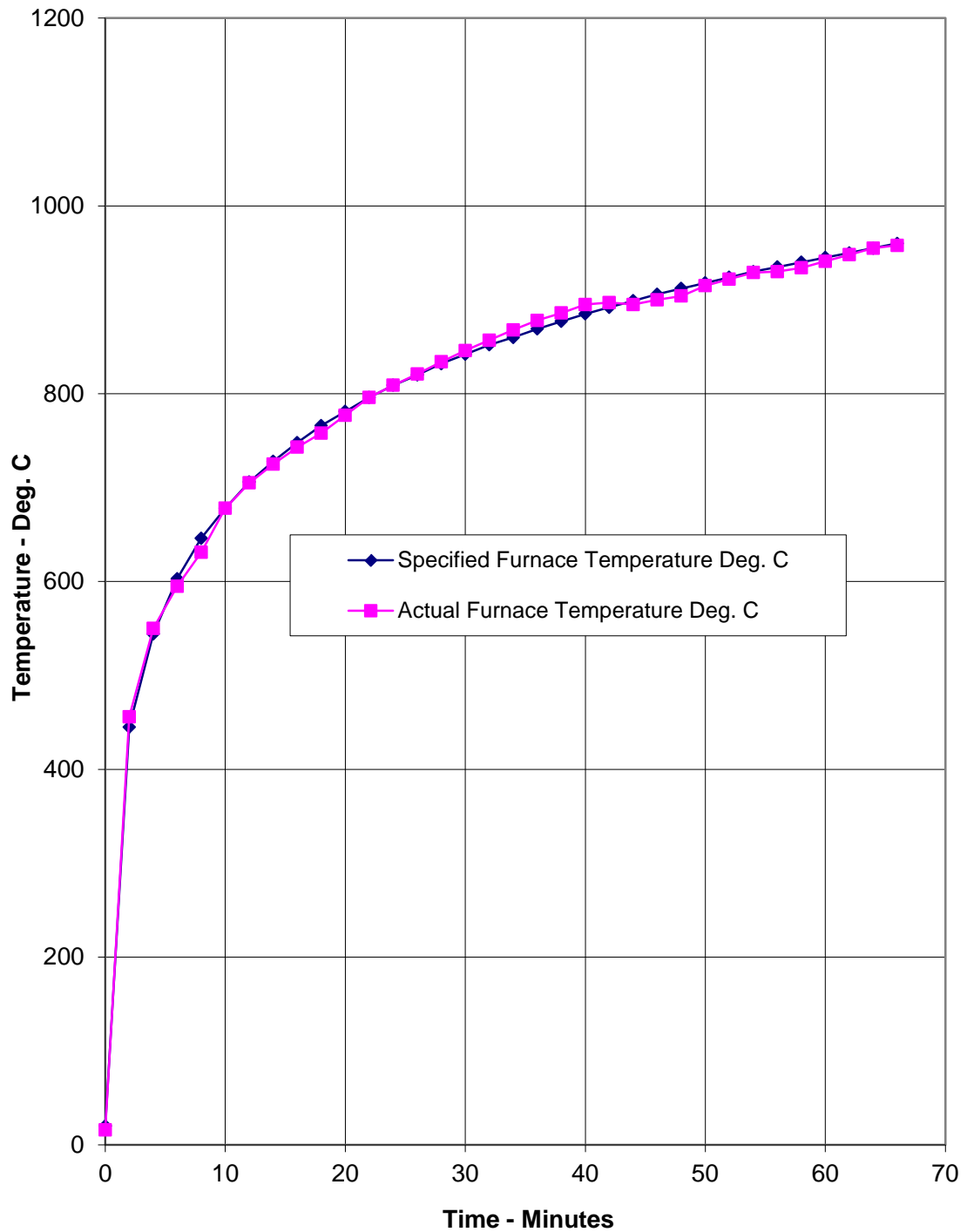
Horizontal deflections of the Specimen



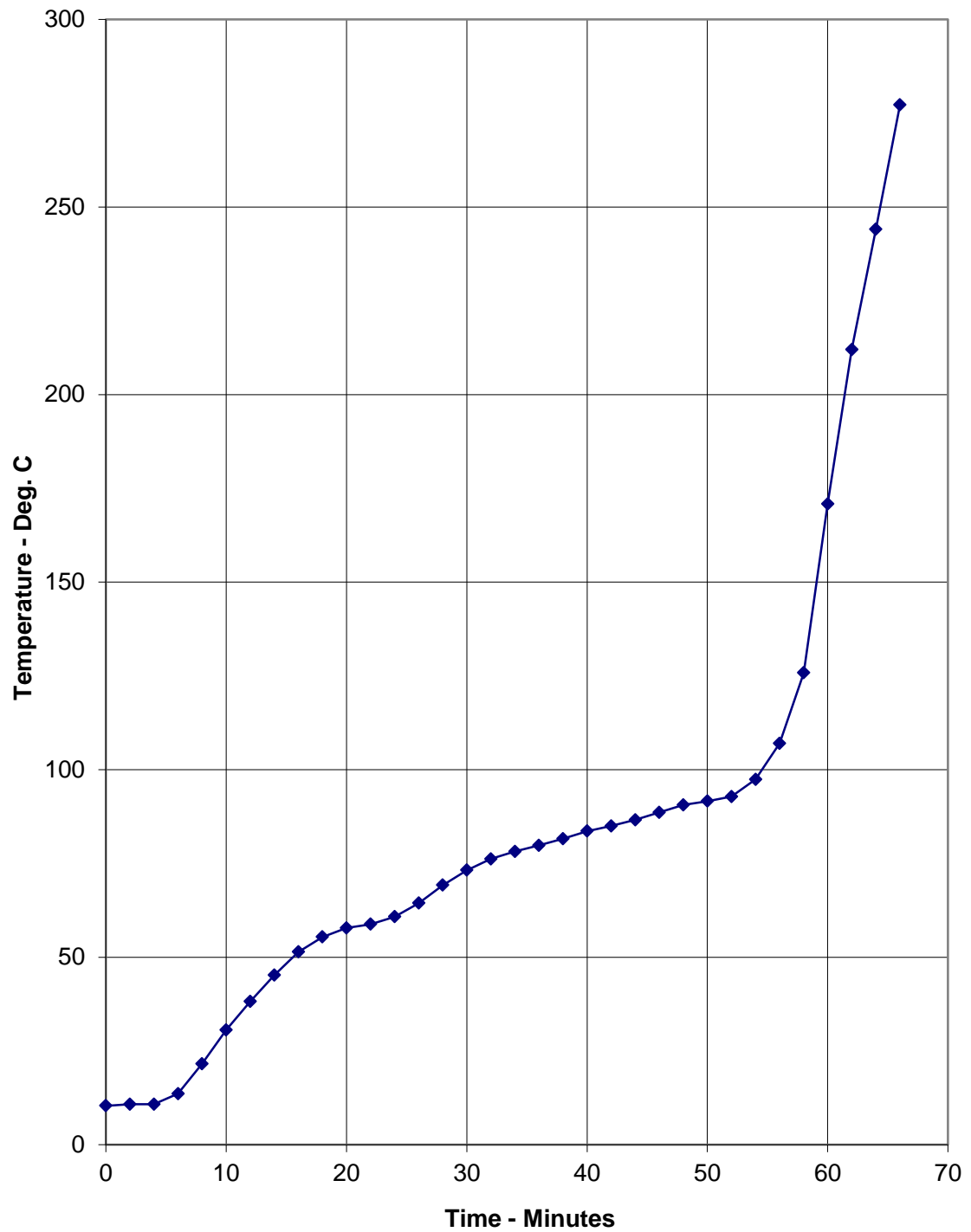
Deflections - mm									
TIME mins	A	B	C	D	E	F	G	H	I
0	0	0	0	0	0	0	0	0	0
10	3	16	11	15	3	11	15	12	-11
20	9	47	50	55	8	11	41	45	-7
30	13	70	81	76	7	15	63	73	-3
40	11	68	87	77	4	13	58	70	-6
50	12	63	77	74	0	12	60	66	-6
60	11	43	44	48	-3	19	36	57	-7

Positive values indicate deflection towards the heating conditions of the test

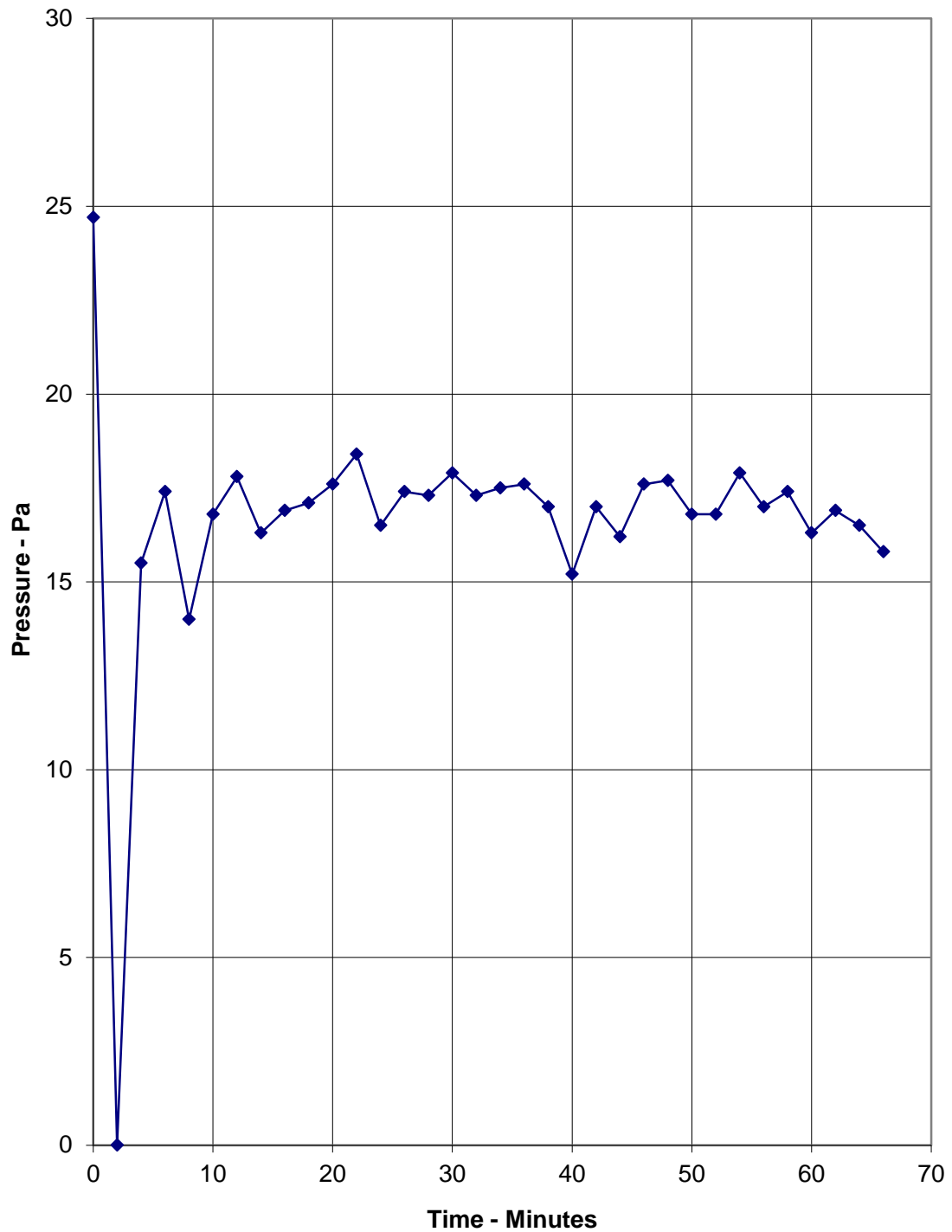
Graph showing mean furnace temperature, together with the temperature/time relationship specified in the Standard



Graph showing mean temperatures recorded on the unexposed surface of the Specimen



Graph showing recorded furnace pressure 300 mm below the head of the Specimen



Performance Criteria and Test Results

Integrity	It is required that the specimen retains its separating function, without either causing ignition of a cotton pad when applied, or permitting the penetration of a gap gauge as specified in BS EN 1363-1: 2012, or resulting in sustained flaming on the unexposed surface. These requirements were satisfied for the periods shown below:
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Sustained flaming	66 minutes*
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Gap gauge	66 minutes*
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Cotton pad	66 minutes*
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Insulation	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 as specified in BS EN 1363-1: 2012. These requirements were satisfied for the period shown below:
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Insulation performance	58 minutes
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*The test duration. The test was discontinued after duration of 66 minutes

Ongoing Implications

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 outlined in BS EN 1363-1: 2012, and where appropriate BS EN 1363-2: 1999. Any significant deviation with respect to size, constructional 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. Annex A of BS EN 1363-1: 2012, provides guidance information on the application of fire resistance tests and the interpretation of test data.

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.

Conclusions

Evaluation against objective

A non-loadbearing partition wall assembly has been subjected to a fire resistance test in accordance with BS EN 1364-1: 2015, 'Fire resistance tests for non-loadbearing elements - Part 1: Walls', BS EN 1363-1: 2012, 'General requirements' and BS EN 1363-2: 1999, 'Alternative and additional procedures'.

The specimen was judged on its ability to comply with the performance criteria for integrity and insulation, as required by BS EN 1364-1: 2015 and achieved the results detailed below:

Test Results:

Integrity performance	Sustained flaming	66 minutes*
	Gap gauge	66 minutes*
	Cotton Pad	66 minutes*
Insulation performance		58 minutes

*The test duration. The test was discontinued after duration of 66 minutes

Field of Direct Application

General

The field of direct application of results is restricted to governing the allowable changes to the test specimen following a successful fire resistance test. These variations can be introduced automatically without the need for the sponsor to seek additional evaluation, calculation or approval.

Materials And Constructions General

Unless otherwise stated in the following text the construction of the tested assembly shall be the same as that tested.

The results of the fire test are directly applicable to similar constructions where one or more of the changes listed below are made and the construction continues to comply with the appropriate design code for its stiffness and stability.

The height of the construction may be decreased.

The thickness of the construction may be increased.

The thickness of component materials may be increased.

The linear dimensions (but not thickness) of boards or panels may be decreased.

The spacing of studs may be decreased.

The number of fixings used to attach the panels to supporting constructions may be increased but shall not be decreased and the distance between fixings may be reduced but shall not be increased.

Permissible Size Variations General

The width of the construction may be increased.