The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Report Number BTC 13298F

A FIRE RESISTANCE TEST ON A 6m HIGH BRITISH GYPSUM SHAFTWALL CLAD WITH A TRIPLE LAYER OF 15mm GYPROC FIRELINE BOARD FIRED FROM THE SHAFT SIDE, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 1999.

Test Date: 21st April 2004
(*Report Amended: 15th June 2020*)
www.btconline.co.uk

Customer: **British Gypsum Limited**
East Leake
Loughborough
Leicestershire
LE12 6HX

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

A FIRE RESISTANCE TEST ON A 6m HIGH BRITISH GYPSUM SHAFTWALL CLAD WITH A TRIPLE LAYER OF 15mm GYPROC FIRELINE BOARD FIRED FROM THE SHAFT SIDE, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 1999.

TABLE OF CONTENTS

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

FOREWORD

This test report details a fire resistance test conducted on a sheet and stud partition system. The test sponsor was British Gypsum Limited.

The test specimen was installed by British Gypsum Limited. The construction of the specimen took place between on the 19th and 20th April 2004. British Gypsum Limited designed the partition system and selected the materials for the test specimen.

The test was carried out on the 21st April 2004.

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 procedures outlined in EN 1363-1, and where appropriate EN 1363-2. Any significant deviation with respect to size, construction details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in EN 1364-1 is not covered by this 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.

REPORT AUTHORISATION

Report Author

Robert Evans
MEng. (Hons), AMIMechE, AIFireE
Project Leader

Authorised by

Eur Ing. Paul Howard
BSc. (Hons.), CEng., MIOA
Head of Laboratory

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST REPORT AMENDMENTS

Page	Amendments	Date
1	Report amended added to title page	15/6/2020
5	Test report amendments page added to report	15/6/2020
45	Increase in the thickness of the wall corrected	15/6/2020
1-45	Extra page added to report	15/6/2020

Report Amendments Author

Liam Woodford
Scientist

Amendments Authorised by

Paul Miller
BSc. (Hons.)
Fire Test Manager

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST CONSTRUCTION

The test specimen was constructed in a refractory concrete lined steel restraint frame having an overall opening of 6000mm (high) x 3000mm (wide).

A Gypframe 94C70 Standard Floor & Ceiling Channel was fixed to the base of the frame using 60mm fire resistant fixings at 600mm centres.

A continuous strip of Gyproc FireStrip was placed along the centreline of a 3000mm long x 94mm wide strip of Gyproc CoreBoard. The board was positioned on the web of a Gypframe 94EDC70 Extra Deep Channel and attached to the head of the frame using two rows of staggered 60mm fire resistant fixings spaced at 600mm centres.

A Gypframe 92SC90 Starter Channel was shortened by 15mm and positioned between the head and base channels at the left-hand end of the frame (viewed from the unexposed face). The channel was fixed in position at 600mm centres using 60mm fire resistant fixings.

A Gypframe 92I90 I Stud was shortened by 15mm and positioned between the head and base channels at the right-hand end of the frame (viewed from the unexposed face). The stud wasn't fixed to the frame and the gap was filled with 25mm rock mineral wool gasket.

Gypframe 92I90 I Studs shortened by 15mm were positioned between the head and base channels at 600mm centres.

One layer of 19mm Gyproc CoreBoard was inserted between the studs with horizontal joints at 1500mm and 4500mm height. The boards positioned at the head of the specimen were reduced in height by 15mm. Two 68mm Gyproc CoreBoard firestops were positioned horizontally into the web of the head channel and behind the vertical flanges of the studs. The firestops were fixed in position through the head channel using 2 x 42mm Gyproc drywall screws.

Gypframe G105 Retaining Channels were positioned between the Gyproc CoreBoard and the stud flanges/Gypframe 92SC90 Starter Channel.

Gypframe GA3 Steel Angles were placed in every horizontal board joints. Two beads of Gyproc Sealant (one top and one bottom) were applied to the backs of 122mm Gyproc CoreBoard firestops and these were then fixed to the Gypframe GA3 Steel Angles using 3 x 32mm Gyproc drywall screws.

The unexposed face metal framework was clad with a triple layer of 15mm Gyproc FireLine. All the boards were reduced by 15mm at the head of the specimen.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

The inner layer of boards was screw fixed at 300mm centres to all framing members, except to the head channel, using 35mm Gyproc Jack-Point Screws.

The middle layer of boards was screw fixed at 300mm centres to all framing members, except to the head channel, using 41mm Gyproc Jack-Point Screws.

The outer layer of boards was screw fixed at 300mm centres to all framing members, except to the head channel, using 60mm Gyproc Jack-Point Screws. All joints were staggered between layers.

Horizontal joints were located at 3000mm from the base on the inner and outer layers and 900mm and 3900mm from the base on the middle layer. Gypframe GFS1 Fixing Strap was used behind the outer layer horizontal joint.

All unexposed face joints were finished using Gyproc Tape and Gyproc Joint Filler. All screw heads were spotted using Gyproc Joint Filler.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

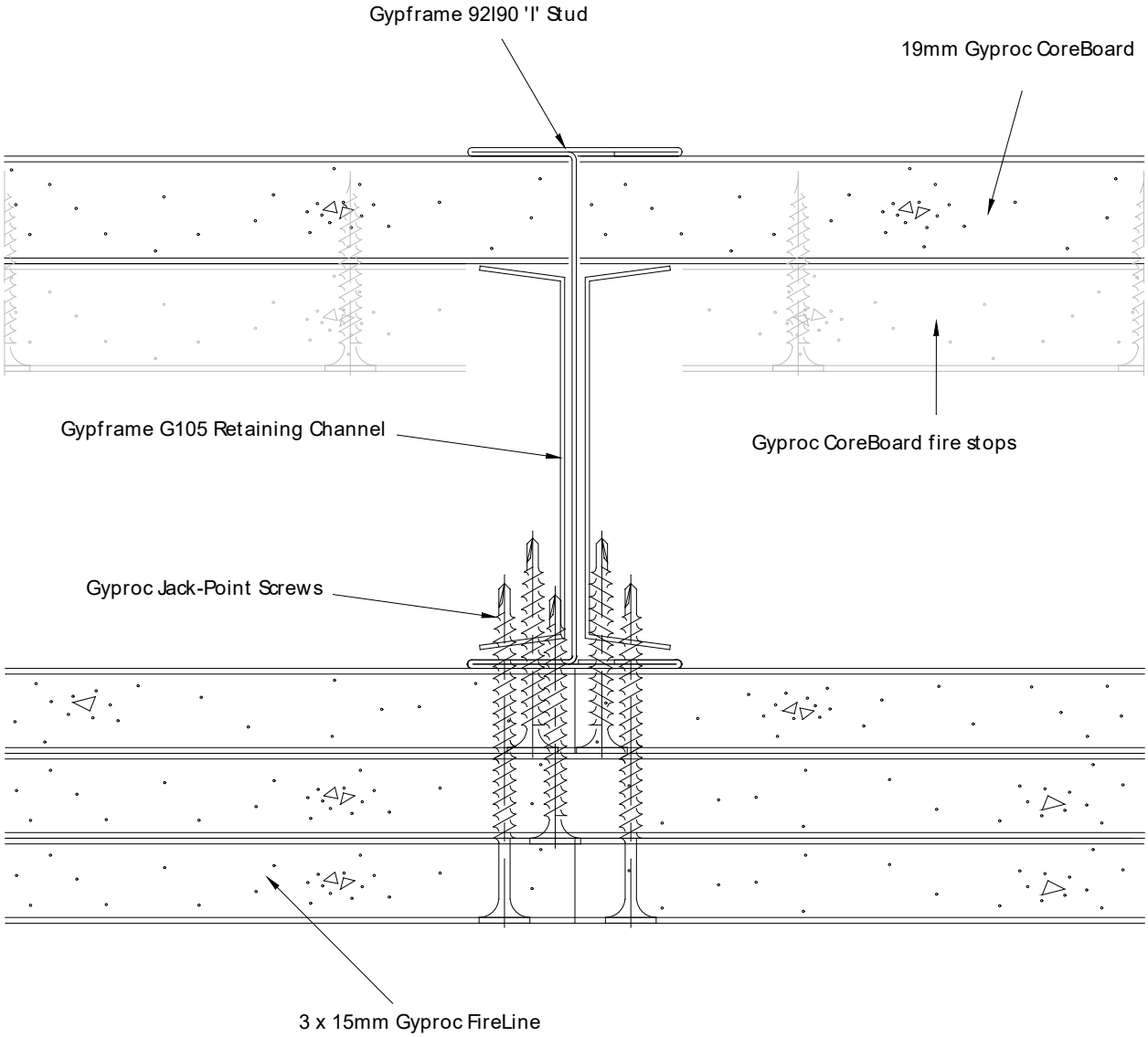

Figure 1. Cross-section of partition specimen.

The descriptions of individual components making up the test specimen were provided by the customer and were checked for accuracy wherever possible.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST MATERIALS

Gyproc FireLine

Nominally, 3000mm (long) x 1200mm (wide) x 15mm (thick), Gyproc FireLine board manufactured by British Gypsum Limited, ex East Leake.

Actual surface density:	11.59kg/m^2.
Actual thickness:	15.33mm.
Board identification numbers:	16 242 3 03:11
Actual moisture content:	0.74%.

The surface density was calculated using the actual weight and size of a selection of the boards used in the test specimen. The moisture content of the plasterboard used in construction was established from measurements made using samples dried to a constant weight in an oven at 40°C.

Gyproc CoreBoard

Nominally, 3000mm (long) x 598mm (wide) x 19mm (thick), Gyproc CoreBoard manufactured by British Gypsum Limited, ex Robertsbridge.

Actual surface density:	16.88kg/m^2.
Actual thickness:	18.89mm.
Board identification numbers:	24 233 3 16:33
Actual moisture content:	0.55%.

The surface density was calculated using the actual weight and size of a selection of the boards used in the test specimen. The moisture content of the plasterboard used in construction was established from measurements made using samples dried to a constant weight in an oven at 40°C.

Metal components

i) Gypframe 92I90 'I' Studs manufactured from galvanised mild steel using the 'Ultrasteel' process.
ii) Gypframe 94C70 Standard Floor & Ceiling Channel manufactured from galvanised mild steel using the 'Ultrasteel' process.
iii) Gypframe 94EDC70 Extra Deep Channel manufactured from galvanised mild steel using the 'Ultrasteel' process.
iv) Gypframe 92SC90 Starter Channel manufactured from galvanised mild steel.
v) 0.7mm thick Gypframe GA3 Steel Angle.
vi) Gypframe G105 Retaining Channel.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

vii) Gypframe GFS1 Fixing Strap.

All metal components supplied by British Gypsum Limited.

Fasteners

i) 32mm Gyproc drywall screws supplied by British Gypsum Limited.
ii) 42mm Gyproc drywall screws supplied by British Gypsum Limited.
iii) 35mm Gyproc Jack-Point Screws supplied by British Gypsum Limited.
iv) 41mm Gyproc Jack-Point Screws supplied by British Gypsum Limited.
v) 60mm Gyproc Jack-Point Screws supplied by British Gypsum Limited.
vi) 60mm fire resistant fixings.

Miscellaneous components

i) Gyproc Paper Joint Tape.
ii) Gyproc Joint Filler.
iii) Gyproc FireStrip.
iv) Gyproc Sealant.

All miscellaneous components were supplied by British Gypsum Limited.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST PROCEDURE

The test was conducted fully in accordance with BS EN 1364-1:1999. The specimen was subjected to fire from one side, as specified in BS EN 1364-1:1999. The test specimen was not symmetrical and should therefore be tested in both orientations. No performance can be claimed for the partition system if installed with the corridor side exposed to the furnace without a separate test being undertaken to substantiate this orientation.

The test procedure used was EN 1364-1 Issue 2.

The ambient temperature at the commencement of the test was 20°C.

The furnace pressure was set to control at –7.5±2 Pa positive with respect to atmosphere, at 3m height of the specimen, except during the first 5 minutes of the test. This equated to a pressure of 18±2 Pa positive with respect to atmosphere at the head of the specimen.

The allowable tolerances are ±5 Pa from 5 minutes to 10 minutes and ±3 Pa from 10 minutes onwards. It is of the opinion of the laboratory that the variations in the furnace pressure exceeding the tolerances stated in BS EN 1363-1:1999 have not unduly influenced the results of this test. Furnace pressure data is shown on page 18.

The test conditions did not meet the full requirements of BS EN 1363-1:1999 as the test frame stiffness did not fully comply. The test centre is of the opinion that these deviations from the documented method will not unduly effect the result of the test.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST RESULTS

The requirements of the standard were satisfied for the following periods:

Integrity -25mm diameter gap gauge.	**141 minutes**	No failure (test discontinued)
Integrity –6mm x 150mm gap gauge.	**141 minutes**	No failure (test discontinued)
Integrity –Sustained flaming.	**141 minutes**	No failure (test discontinued)
Integrity -Cotton pad.	**123 minutes**	
Insulation	**123 minutes**	By virtue of integrity

The test was terminated at 141 minutes at the request of the customer.

LIMITATIONS

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. 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.

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

TEST DATA

Observations

Observers: Unexposed face R Evans
Exposed face P Cao

Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
	0	Test started.
	10	The face paper had started to char and approximately 80% had fallen into the furnace. The lower horizontal joint had opened to approximately 2-3mm.
	20	All the face paper had charred and fallen into the furnace. The lower horizontal joint had opened to approximately 5-6mm.
	30	The lower horizontal joint had opened to approximately 8-10mm.
	40	The lower horizontal joint had opened to approximately 10-15mm.
	45	*Unexposed face* A glow was visible from the fixed end of the specimen at approximately mid-height.
	50	The boards above the lower horizontal joint had bowed into the furnace by approximately 50mm at approximately 1500mm height.
1	00	The middle and left of middle boards above the lower horizontal joint had started to peel into the furnace between approximately 1500mm-2400mm height. *Unexposed face* The jointing material and jointing tape had cracked along the horizontal joint. The horizontal joint had opened to approximately 2-3mm where exposed.
1	10	A section, approximately 700mm x 500mm, of the middle board above the lower horizontal joint fell into the furnace.

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time		*Observations*
hrs	mins	All observations refer to exposed face unless otherwise stated.
1	15	*Unexposed face* Smoke was issued from the horizontal joint above the lower centreboard.
1	20	All of the left of middle, middle and right of middle boards fell into the furnace. The horizontal joint of the second layer (first layer of Gyproc FireLine) had opened to approximately 20-30mm where exposed.
1	30	No further board had fallen into the furnace. The surface of the second layer of boards appeared crazed. *Unexposed face* Screw heads were visible through the jointing material on the left-hand vertical joint between 300mm-3000mm height.
1	35	The lower half of the left-hand board above the lower horizontal joint fell into the furnace. The horizontal joint in the second layer had opened to approximately 40-50mm. *Unexposed face* Screw heads were visible through the jointing material on the left-hand vertical joint between 3000mm-6000mm height. Screw heads were visible through the jointing material on the right-hand vertical joint between 300mm-6000mm height.
1	40	The remaining left-hand boards fell into the furnace. Large cracks, approximately 3-4mm wide, had developed in the second layer boards. *Unexposed face* The jointing material had discoloured over the screw head positions in the middle of the lower centreboard. The screws had been pulled through the board.
1	45	The cracks in the second layer boards had increased in size. The second layer horizontal joint had opened to approximately 50-100mm. Cracks were visible (through the horizontal joint) in the exposed third layer boards.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time		*Observations* All observations refer to exposed face unless otherwise stated.
hrs	mins	
1	50	A section, approximately 600mm x 2000mm, from the right-hand side of the lower second layer centreboard fell into the furnace. A large horizontal crack, approximately 3-4mm wide, was visible in the third layer (second layer of Gyproc FireLine). *Unexposed face* A glow was visible at the head of the specimen above the middle of the upper centreboard.
1	55	A section, approximately 200mm x 1500mm, of the lower second layer centreboard fell into the furnace. *Unexposed face* The jointing tape on the left-hand vertical joint had split at approximately 2000mm height.
1	57	*Unexposed face* The left-hand vertical joint had started to char at approximately 1200mm height.
2	00	A further section of the lower centreboard fell into the furnace.
2	03	*Unexposed face* **INTEGRITY FAILURE.** The cotton pad glowed when placed at the head of the specimen above the upper centreboard. The left-hand vertical joint had discoloured adjacent to the lower centreboard.
2	05	The crack in the third layer of boards had opened to approximately 8-10mm wide.
2	07	*Unexposed face* A horizontal discolouration appeared in the lower centreboard at approximately 900mm height. A vertical discolouration appeared in the middle of the lower centreboard. The roving thermocouple exceeded a temperature rise of 180°C when placed on the middle of the lower centreboard approximately at 1200mm height.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time		*Observations*
hrs	mins	All observations refer to exposed face unless otherwise stated.
2	09	*Unexposed face* The left-hand vertical joint had opened approximately 10mm at approximately 1200mm height.
2	13	*Unexposed face* A glow was visible on the left-hand vertical joint at approximately 2500-2800mm height.
2	21	**TEST TERMINATED** at the request of the customer.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Furnace Temperature Graph

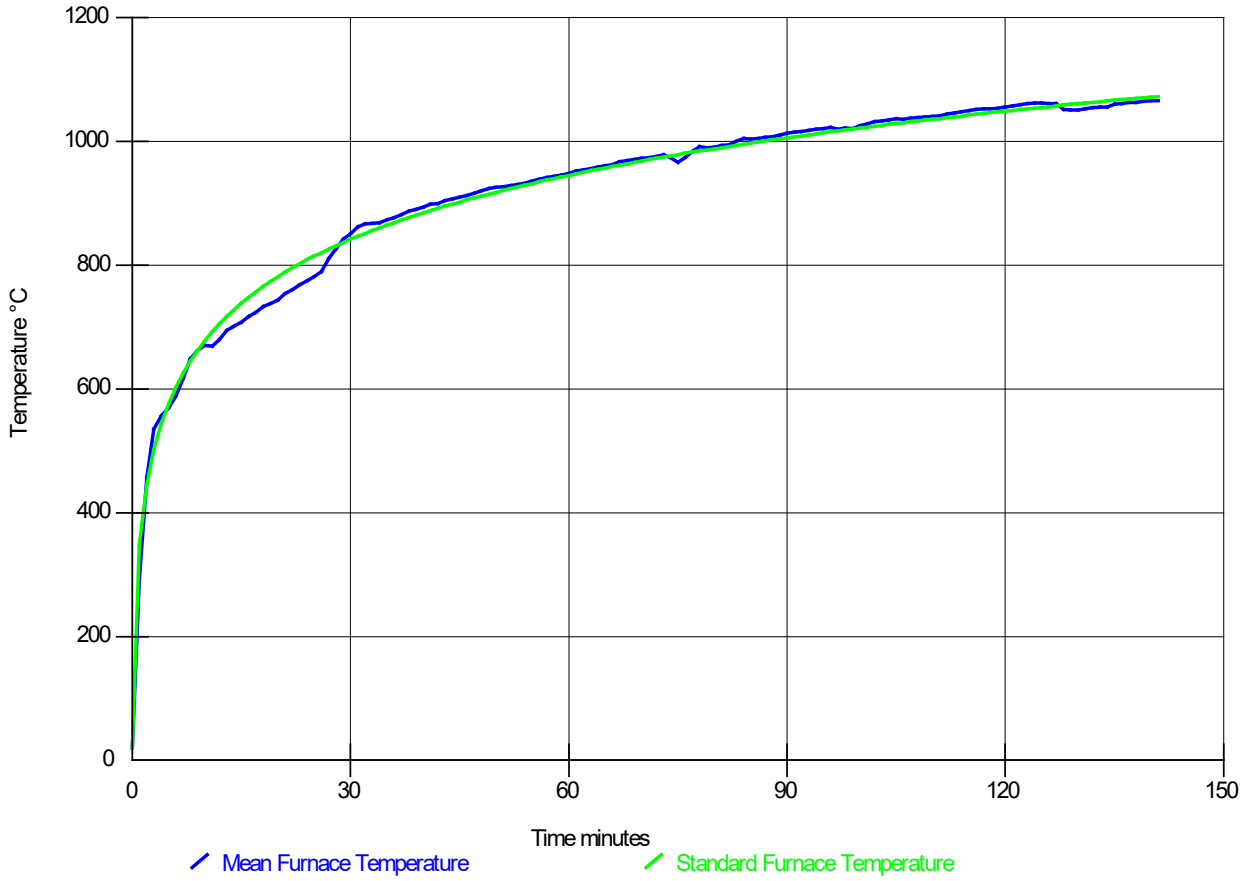

Figure 2. Furnace temperature graph.

The following furnace thermocouples were out of the allowed tolerance stated in BS EN 1363-1: 1999 due to a technical problem with the furnace.

Furnace thermocouple no.5 was 100°C above the standard temperature/time curve between 28-33 minutes and at 35 minutes.
Furnace thermocouple no.6 was 100°C above the standard temperature/time curve between 28-33 minutes.
Furnace thermocouple no.9 was 100°C below the standard temperature/time curve at 12 minutes and between 14-25 minutes.

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Furnace thermocouple no.10 was 100°C below the standard temperature/time curve between 12-25 minutes and at 27 minutes.
Furnace thermocouple no.11 was 100°C below the standard temperature/time curve between 10-30 minutes.
Furnace thermocouple no.12 was 100°C below the standard temperature/time curve between 10-31 minutes.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Furnace Pressure Graph

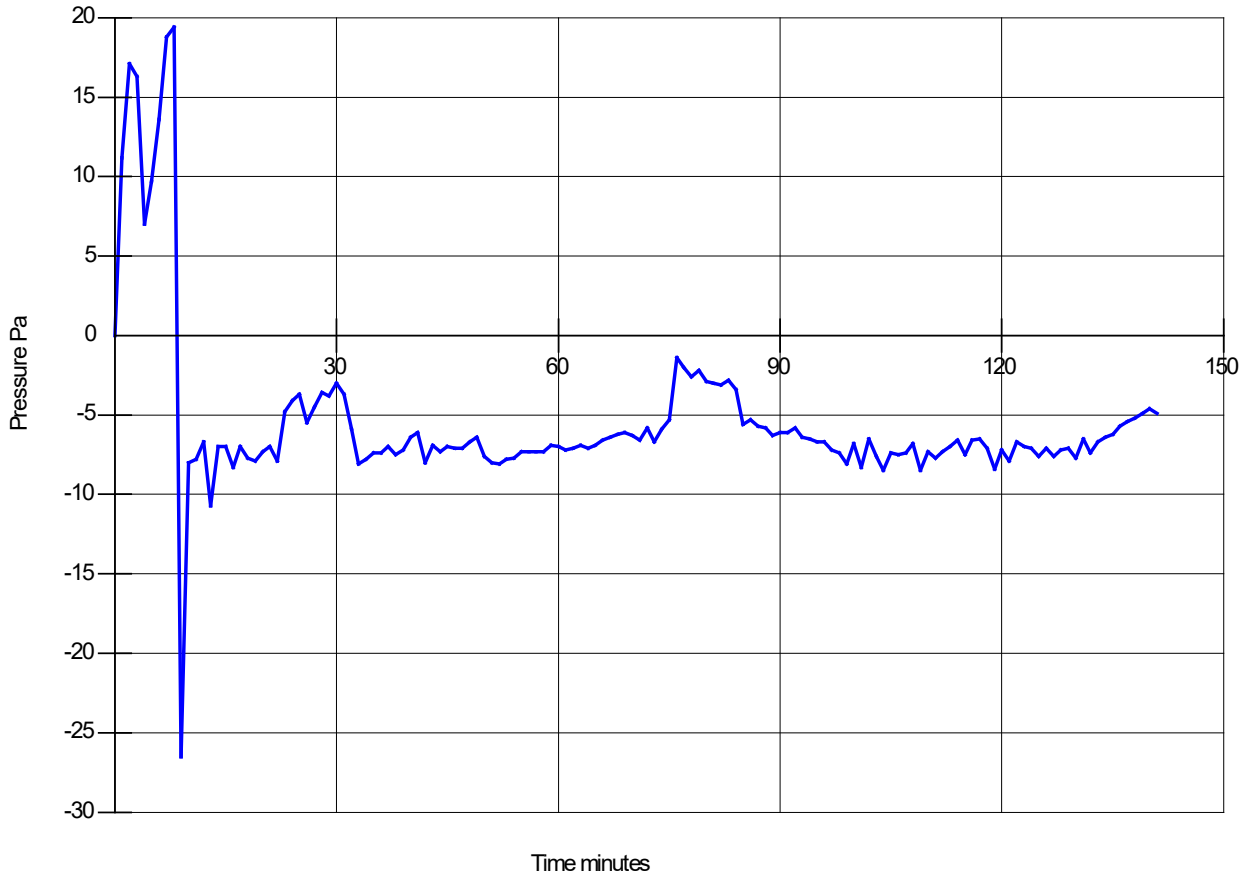

Figure 3. Furnace pressure graph.

The furnace pressure was out of the allowed tolerance between 5-9 minutes, at 13 minutes, between 24-25 minutes, between 28-31 minutes and between 76-84 minutes.

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Unexposed Face Temperature Graph

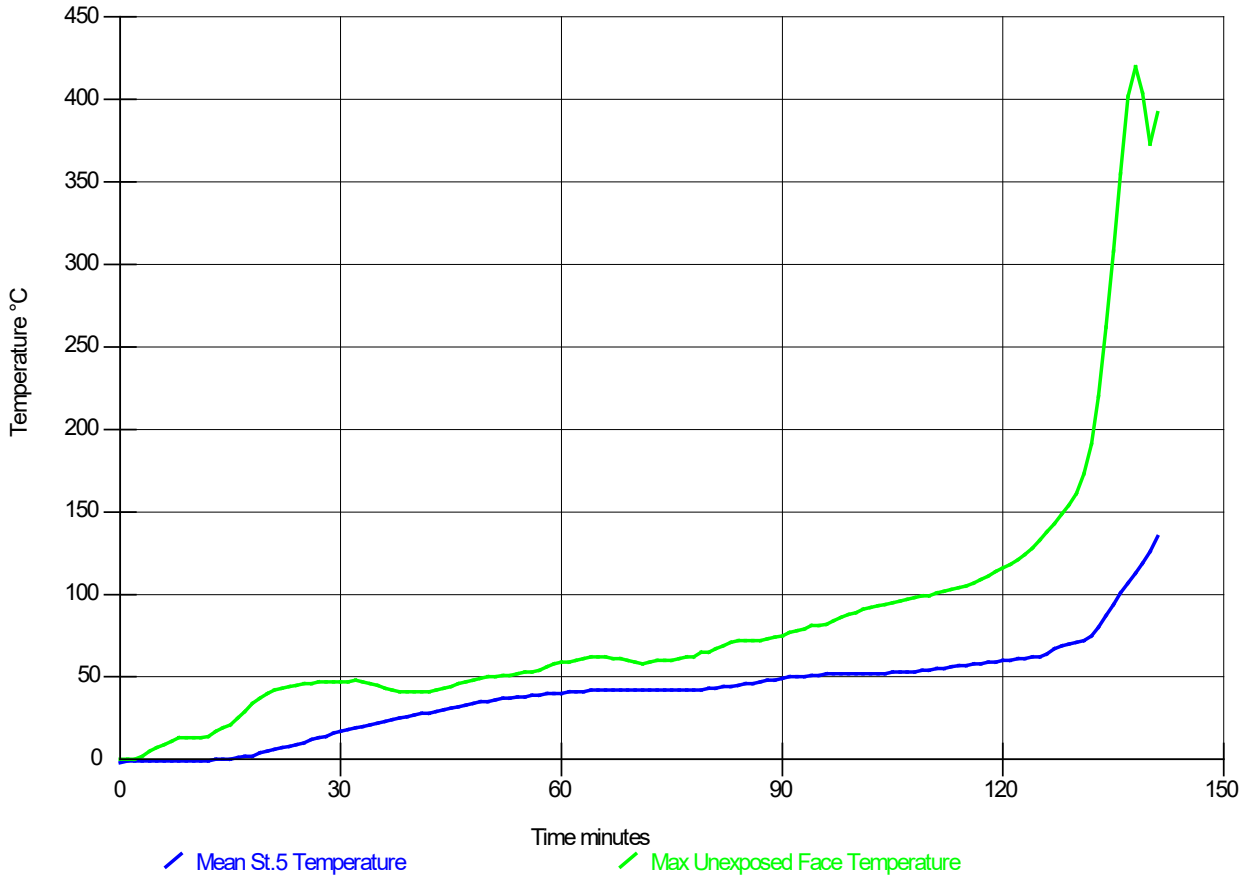

Figure 4. Unexposed face temperature graph.

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Unexposed Face Thermocouple Layout

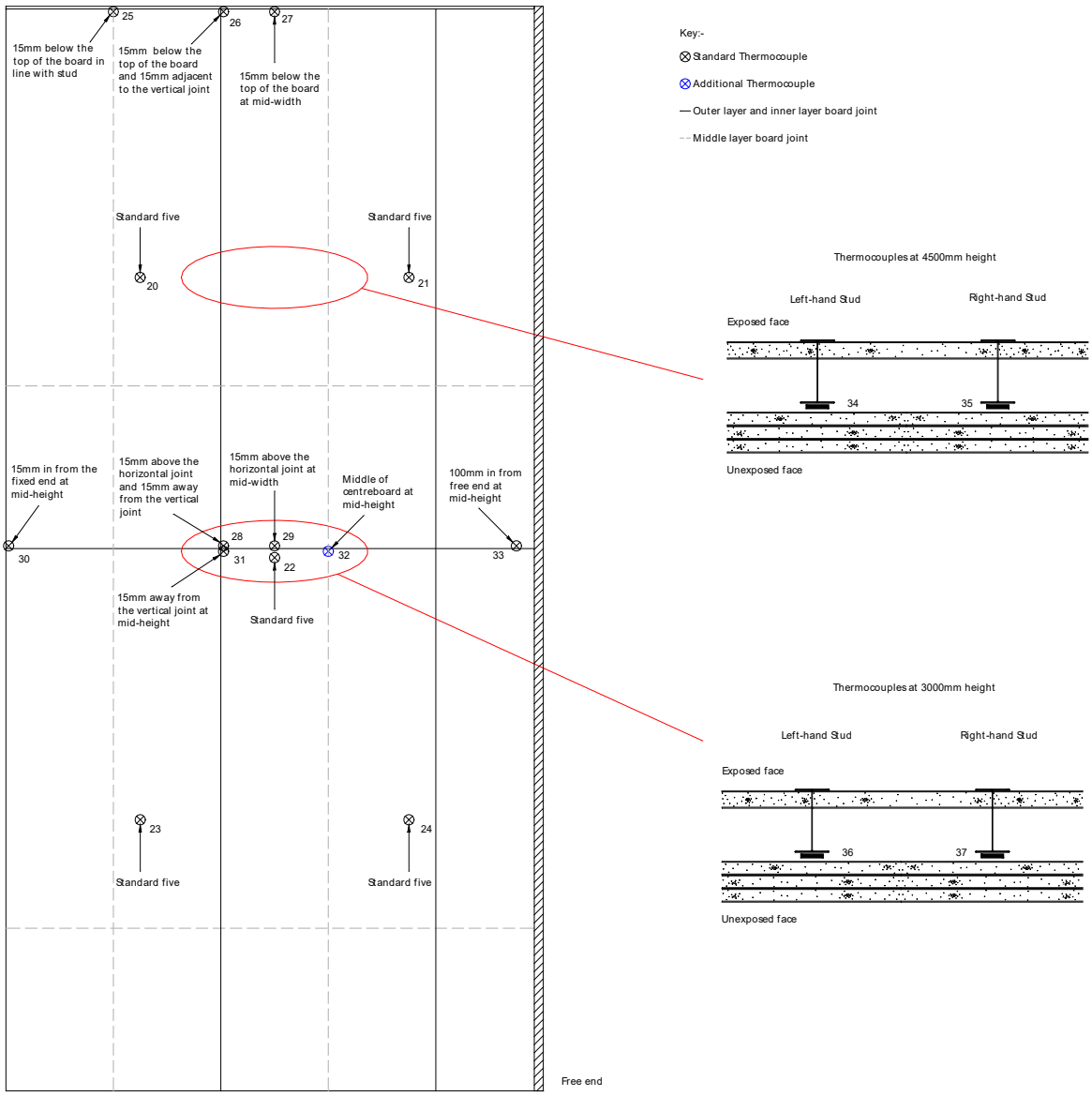

Figure 5. Unexposed face thermocouple layout.

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Unexposed Face Standard Five Thermocouple Data

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
0	-9	-1	0	0	0
1	-1	0	0	0	0
2	-1	0	0	0	0
3	-1	0	0	0	0
4	-1	0	0	0	0
5	-1	0	0	0	0
6	-1	0	0	0	0
7	-1	0	0	0	0
8	-1	0	0	0	0
9	-1	0	0	0	0
10	-1	0	0	0	0
11	-1	0	0	0	0
12	-1	0	0	0	0
13	-1	0	1	0	0
14	-1	0	1	1	0
15	-1	1	2	1	1
16	0	1	4	1	1
17	1	2	5	2	2
18	1	2	7	2	2
19	2	3	9	3	3
20	3	4	11	4	4
21	4	5	13	5	5
22	5	5	15	6	6
23	6	6	17	7	7
24	7	7	18	8	8
25	8	8	20	9	9
26	9	10	21	11	11
27	11	11	23	12	12
28	12	12	24	13	13
29	13	13	25	15	14
30	14	14	26	16	16
31	15	15	27	17	17
32	16	16	27	19	18
33	17	17	28	20	20
34	18	19	28	21	21
35	19	20	29	22	22

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
36	20	21	29	24	23
37	21	21	30	25	25
38	21	22	30	26	26
39	22	23	31	27	27
40	23	24	31	29	28
41	24	25	32	30	30
42	24	25	33	31	31
43	25	26	34	32	32
44	26	27	34	34	33
45	27	28	35	35	34
46	28	29	36	36	35
47	29	30	36	37	36
48	29	31	37	38	37
49	30	32	38	38	38
50	31	32	38	39	38
51	32	33	39	40	39
52	32	34	40	40	40
53	33	35	40	41	40
54	34	36	41	41	41
55	34	36	41	41	41
56	35	37	41	42	42
57	36	37	42	42	42
58	36	38	42	43	43
59	37	39	42	43	43
60	37	39	42	43	43
61	37	39	42	44	43
62	38	40	43	44	44
63	38	40	43	44	44
64	39	40	43	45	44
65	39	41	43	45	44
66	39	41	43	45	44
67	39	41	43	45	44
68	39	41	43	45	44
69	39	41	43	45	44
70	40	41	43	45	44
71	40	41	43	45	44
72	39	41	43	45	44
73	40	41	43	45	45

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
74	40	41	43	45	45
75	39	41	43	44	44
76	39	42	43	44	45
77	39	42	43	44	45
78	39	41	44	43	44
79	39	41	45	44	45
80	39	41	46	44	45
81	39	41	47	46	45
82	41	41	48	47	45
83	41	40	48	48	45
84	43	40	49	49	46
85	44	41	49	50	46
86	45	42	50	51	46
87	46	43	50	52	47
88	47	44	50	52	47
89	47	45	50	52	49
90	48	46	51	53	50
91	48	47	51	53	51
92	48	48	51	53	51
93	48	48	52	54	51
94	49	49	52	54	52
95	49	49	53	55	52
96	49	49	54	55	53
97	49	49	54	55	53
98	49	49	54	55	53
99	49	50	54	55	54
100	49	50	54	56	54
101	50	50	54	56	54
102	50	50	53	56	54
103	50	50	52	56	55
104	50	50	53	56	55
105	51	51	54	56	55
106	50	50	55	55	56
107	50	50	56	55	56
108	50	50	57	55	57
109	51	50	59	55	57
110	50	50	60	56	56
111	51	50	61	58	56

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24
112	50	51	62	59	57
113	50	50	63	60	59
114	50	50	65	60	60
115	51	50	66	61	61
116	51	50	67	61	62
117	51	50	68	62	63
118	51	50	69	62	64
119	51	50	70	62	65
120	52	51	70	62	65
121	53	53	71	62	65
122	53	54	71	62	65
123	54	55	72	62	65
124	54	55	72	63	66
125	55	55	75	63	66
126	55	56	81	64	67
127	56	56	92	65	68
128	56	56	99	65	69
129	56	56	103	66	69
130	57	56	107	67	70
131	57	57	112	67	71
132	58	57	121	68	71
133	59	57	145	69	73
134	59	58	177	70	75
135	60	58	201	72	81
136	60	59	222	76	90
137	60	59	243	80	94
138	61	59	264	84	98
139	61	60	287	86	101
140	61	60	317	87	106
141	62	61	353	89	114

See figure 5 for the locations of the thermocouples.

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Additional Thermocouple Data

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25 Head In line with stud	Thermocouple No. 26 Head Next to V joint	Thermocouple No. 27 Head Mid-width	Thermocouple No. 28 H Joint Next to V joint	Thermocouple No. 29 H Joint Mid-width
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	1	0	0	0	0
4	2	1	1	0	0
5	3	1	1	0	0
6	4	2	1	0	0
7	5	3	2	0	0
8	6	5	2	0	0
9	7	7	2	0	0
10	8	10	2	1	0
11	8	12	3	1	1
12	8	14	3	1	1
13	8	17	3	2	2
14	9	19	4	2	3
15	9	21	4	3	4
16	9	24	5	4	6
17	10	26	6	5	8
18	10	28	6	5	9
19	11	30	7	6	11
20	12	32	8	7	13
21	13	34	9	8	14
22	14	35	10	9	16
23	15	37	11	11	17
24	15	39	12	12	19
25	16	40	13	13	20
26	17	41	15	14	21
27	18	41	16	15	22
28	20	42	18	16	23
29	21	42	20	18	24
30	22	42	22	19	25
31	23	42	24	20	26
32	24	42	26	21	27
33	24	42	27	22	27
34	25	42	29	23	28

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25 Head In line with stud	Thermocouple No. 26 Head Next to V joint	Thermocouple No. 27 Head Mid-width	Thermocouple No. 28 H Joint Next to V joint	Thermocouple No. 29 H Joint Mid-width
35	26	42	30	24	28
36	26	42	31	25	29
37	27	41	32	27	29
38	28	41	33	28	30
39	29	41	33	30	30
40	30	41	34	33	31
41	32	41	35	37	31
42	33	40	35	40	32
43	35	40	35	42	33
44	36	40	35	43	34
45	38	40	36	44	35
46	39	41	36	46	35
47	40	41	36	47	36
48	41	41	36	48	36
49	42	42	37	49	37
50	42	42	37	50	37
51	43	42	38	50	38
52	44	43	38	51	38
53	45	43	39	51	39
54	45	44	39	52	40
55	46	45	40	53	41
56	46	45	42	53	41
57	47	46	43	54	42
58	48	46	44	56	43
59	48	47	45	58	43
60	49	47	45	59	44
61	49	47	46	59	45
62	49	47	46	60	45
63	49	47	46	61	45
64	49	47	47	62	45
65	49	47	47	62	45
66	49	47	48	62	44
67	49	48	49	61	44
68	49	48	49	61	43
69	49	48	50	60	42
70	49	48	50	59	42

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25 Head In line with stud	Thermocouple No. 26 Head Next to V joint	Thermocouple No. 27 Head Mid-width	Thermocouple No. 28 H Joint Next to V joint	Thermocouple No. 29 H Joint Mid-width
71	49	49	50	58	41
72	49	49	51	59	40
73	49	50	51	60	40
74	50	50	52	60	41
75	50	51	51	60	43
76	50	51	50	61	45
77	51	52	51	62	46
78	52	53	50	62	46
79	53	54	50	65	46
80	53	55	50	65	47
81	54	56	53	67	48
82	54	57	56	69	50
83	55	57	58	71	54
84	56	58	59	72	57
85	57	58	61	72	56
86	57	59	62	72	54
87	57	59	64	72	51
88	58	59	66	73	47
89	58	60	67	74	43
90	59	60	69	75	40
91	59	60	71	77	39
92	60	60	74	78	38
93	60	60	76	79	39
94	60	61	78	81	39
95	61	61	80	81	41
96	62	61	82	82	43
97	62	62	84	81	44
98	62	62	86	80	45
99	63	62	88	76	45
100	63	62	89	78	46
101	64	62	91	77	48
102	65	63	92	78	49
103	66	63	93	78	50
104	67	64	94	82	52
105	68	64	95	82	53
106	69	65	96	82	53

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)				
	Thermocouple No. 25 Head In line with stud	Thermocouple No. 26 Head Next to V joint	Thermocouple No. 27 Head Mid-width	Thermocouple No. 28 H Joint Next to V joint	Thermocouple No. 29 H Joint Mid-width
107	70	65	97	81	53
108	71	66	98	82	54
109	73	67	99	82	55
110	74	68	99	82	55
111	75	70	101	82	56
112	76	71	102	81	56
113	77	72	103	81	56
114	78	74	104	82	57
115	79	76	105	83	57
116	80	78	107	85	58
117	81	80	109	87	59
118	82	82	111	90	61
119	82	83	114	93	62
120	83	86	116	97	66
121	84	88	118	102	68
122	85	90	121	106	70
123	86	92	124	110	73
124	86	93	128	114	75
125	88	95	133	118	77
126	89	97	138	122	79
127	90	98	143	126	81
128	91	100	149	130	83
129	93	102	154	134	86
130	95	104	161	137	88
131	96	106	167	140	91
132	98	108	173	142	94
133	100	111	179	146	95
134	102	114	184	148	96
135	104	118	189	151	98
136	106	124	195	154	102
137	109	131	200	156	106
138	112	139	205	158	113
139	116	146	210	159	123
140	121	154	216	161	133
141	128	162	221	162	143

See figure 5 for the locations of the thermocouples.

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Additional Thermocouple Data

Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30 Fixed End	Thermocouple No 31 Next to Vertical Joint	Thermocouple No. 32 Centreboard	Thermocouple No. 33 Free End
0	0	0	-6	0
1	0	0	0	0
2	0	0	0	0
3	2	0	0	0
4	5	0	0	0
5	7	0	0	0
6	9	0	0	0
7	11	0	0	0
8	13	0	1	0
9	13	0	2	0
10	13	1	3	0
11	13	1	5	0
12	13	1	8	0
13	14	2	11	1
14	14	2	15	2
15	14	3	20	2
16	14	3	25	3
17	14	4	29	4
18	14	5	34	5
19	14	6	37	6
20	14	7	40	7
21	14	8	42	8
22	14	9	43	9
23	14	10	44	10
24	14	11	45	11
25	14	12	46	12
26	15	14	46	13
27	15	15	47	14
28	15	16	47	15
29	16	17	47	16
30	16	18	47	17
31	17	19	47	18
32	17	20	48	19
33	18	21	47	20
34	18	22	46	21
35	19	23	45	22

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30 Fixed End	Thermocouple No 31 Next to Vertical Joint	Thermocouple No. 32 Centreboard	Thermocouple No. 33 Free End
36	19	24	43	24
37	20	25	42	25
38	21	26	41	25
39	21	28	40	26
40	22	30	40	27
41	22	33	41	28
42	23	35	41	29
43	23	36	42	30
44	24	38	42	31
45	25	39	43	32
46	25	40	44	33
47	26	41	45	34
48	26	42	46	35
49	27	42	47	35
50	28	43	47	36
51	28	43	48	36
52	29	44	48	37
53	30	44	49	38
54	30	45	49	38
55	31	45	50	39
56	31	45	50	39
57	32	45	51	40
58	32	45	51	40
59	33	46	52	40
60	33	46	52	41
61	34	46	52	41
62	34	46	53	41
63	35	46	54	42
64	35	46	54	42
65	36	46	55	43
66	36	46	55	43
67	36	46	55	44
68	37	46	55	44
69	37	47	55	44
70	37	47	54	45
71	38	47	53	45
72	38	47	52	45
73	38	48	51	45

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30 Fixed End	Thermocouple No 31 Next to Vertical Joint	Thermocouple No. 32 Centreboard	Thermocouple No. 33 Free End
74	38	48	51	45
75	38	48	51	45
76	39	49	51	45
77	39	49	52	45
78	39	50	52	45
79	39	51	53	45
80	39	52	53	45
81	40	53	53	45
82	40	54	53	45
83	40	55	53	45
84	40	56	53	45
85	40	56	53	45
86	40	57	53	45
87	40	57	53	45
88	40	58	52	45
89	40	59	52	45
90	41	60	53	46
91	41	61	53	46
92	41	62	54	46
93	42	63	54	47
94	42	63	55	47
95	43	64	56	47
96	43	65	57	48
97	43	66	56	48
98	43	66	56	48
99	43	66	56	48
100	44	68	56	49
101	44	69	56	50
102	44	70	57	50
103	44	71	57	51
104	45	71	57	52
105	45	72	57	52
106	45	73	58	52
107	46	74	58	52
108	46	75	59	52
109	46	75	59	52
110	46	76	60	52
111	47	77	61	52

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Temperature Rise (°C)			
	Thermocouple No. 30 Fixed End	Thermocouple No 31 Next to Vertical Joint	Thermocouple No. 32 Centreboard	Thermocouple No. 33 Free End
112	47	78	61	52
113	47	79	61	52
114	47	81	63	52
115	48	83	65	52
116	48	85	66	53
117	48	88	67	54
118	48	90	69	54
119	48	92	71	55
120	49	96	73	56
121	49	99	76	56
122	50	102	78	57
123	50	106	81	58
124	50	109	84	59
125	51	114	88	59
126	51	120	92	60
127	52	128	95	61
128	52	137	98	61
129	52	148	102	61
130	52	160	107	62
131	53	173	114	62
132	54	191	123	62
133	55	220	144	63
134	56	262	171	63
135	57	308	201	64
136	58	355	233	64
137	59	402	268	65
138	60	420	304	66
139	61	404	342	66
140	62	371	373	67
141	63	323	392	67

See figure 5 for thermocouple locations.

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Internal Thermocouple Data

Time (mins)	4500mm height		3000mm height	
	Actual temperature (°C)		Actual Temperature (°C)	
	Thermocouple No.34 Left Cold flange	Thermocouple No. 35 Right Cold flange	Thermocouple No. 36 Left Cold flange	Thermocouple No. 37 Right Cold flange
0	20	20	20	20
1	22	21	20	20
2	43	30	21	20
3	66	49	25	23
4	74	65	33	28
5	79	75	44	36
6	81	79	56	48
7	84	80	68	61
8	85	81	84	75
9	92	87	88	81
10	98	93	88	86
11	103	100	90	89
12	108	109	93	92
13	113	119	95	94
14	117	128	101	100
15	123	136	109	107
16	129	144	116	114
17	134	152	122	120
18	140	159	128	126
19	145	165	133	131
20	150	170	138	135
21	156	176	143	139
22	161	181	147	143
23	166	187	151	145
24	176	193	155	148
25	185	199	159	150
26	191	205	163	154
27	197	210	167	158
28	202	214	172	164
29	207	218	177	171
30	212	221	183	177
31	218	225	190	182
32	224	229	198	189
33	230	232	206	196
34	236	235	215	203

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	4500mm height		3000mm height	
	Actual temperature (°C)		Actual Temperature (°C)	
	Thermocouple No.34 Left Cold flange	Thermocouple No. 35 Right Cold flange	Thermocouple No. 36 Left Cold flange	Thermocouple No. 37 Right Cold flange
35	241	239	223	209
36	247	244	232	216
37	253	250	241	224
38	259	258	250	232
39	266	269	259	241
40	274	281	269	250
41	282	290	278	259
42	289	299	288	267
43	295	306	296	275
44	301	313	303	283
45	306	318	310	291
46	311	323	316	299
47	315	328	321	309
48	319	331	327	323
49	324	335	333	341
50	328	338	339	354
51	333	343	345	353
52	337	348	351	357
53	342	353	357	363
54	345	360	363	392
55	350	368	369	400
56	354	376	376	408
57	360	384	384	416
58	365	393	391	425
59	371	403	397	436
60	379	414	405	447
61	391	429	413	455
62	409	451	421	463
63	433	468	432	471
64	457	482	442	480
65	479	495	451	488
66	496	512	458	499
67	509	567	465	505
68	521	657	474	576
69	531	753	488	723
70	559	826	522	822
71	749	850	741	863

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	4500mm height		3000mm height	
	Actual temperature (°C)		Actual Temperature (°C)	
	Thermocouple No.34 Left Cold flange	Thermocouple No. 35 Right Cold flange	Thermocouple No. 36 Left Cold flange	Thermocouple No. 37 Right Cold flange
72	825	854	814	872
73	844	862	834	877
74	985	956	992	858
75	997	967	991	1016
76	986	985	1011	1014
77	997	1018	1021	1039
78	984	1013	1014	1045
79	976	1007	1025	1041
80	975	1006	1006	1022
81	1001	1022	-	1040
82	1019	1024	-	1038
83	987	1041	-	1051
84	983	1037	1004	1044
85	977	1026	1020	1041
86	985	1027	1027	1055
87	979	1029	1030	1059
88	978	1040	1040	1056
89	975	1022	1046	1053
90	957	1029	1026	1060
91	939	1037	1039	1065
92	941	1042	1034	1070
93	946	1052	1038	1074
94	967	1053	1042	1075
95	984	1057	1044	1079
96	955	1059	1040	1074
97	959	1061	1040	1079
98	961	1063	1037	1078
99	968	1063	1025	1080
100	969	1067	1026	1081
101	973	1068	1031	1087
102	980	1071	1035	1086
103	985	1073	1045	1091
104	991	1070	1085	1095
105	998	1073	1088	1096
106	1004	1075	1085	1093
107	1015	1076	1087	1095
108	1026	1078	1090	1098

UKAS TESTING
0296

The Building Test Centre
Fire Acoustics Structures

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	4500mm height		3000mm height	
	Actual temperature (°C)		Actual Temperature (°C)	
	Thermocouple No.34 Left Cold flange	Thermocouple No. 35 Right Cold flange	Thermocouple No. 36 Left Cold flange	Thermocouple No. 37 Right Cold flange
109	1033	1079	1092	1101
110	1039	1079	1095	1099
111	1032	1085	1084	1096
112	1029	1088	1091	1084
113	1030	1092	1095	1082
114	1032	1090	1098	1087
115	1037	1083	1097	1101
116	1039	1067	1102	1111
117	1038	1063	1102	1077
118	1041	1059	1100	1081
119	1044	1059	1098	1099
120	1045	1057	1101	1099
121	1048	1057	1096	1101
122	1051	1056	1101	1099
123	1055	1060	1098	1101
124	1055	1056	1099	1101
125	1055	1056	1101	1100
126	1056	1056	1097	1099
127	1056	1055	1099	1095
128	1052	1052	1096	1089
129	1048	1048	1092	1083
130	1044	1044	1085	1079
131	1040	1041	1081	1076
132	1038	1038	1078	1071
133	1032	1035	1078	1057
134	1028	1033	1077	1048
135	1027	1031	1081	1039
136	1026	1030	1082	1039
137	1025	1029	1083	1042
138	1025	1030	1085	1058
139	1024	1030	1085	1056
140	1024	1031	1086	1019
141	1024	1031	1088	1033

See figure 5 for the locations of the thermocouples.

Thermocouple no. 36 failed to record any data between 81 and 83 minutes.

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Specimen Lateral Deflection

Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
0	0	0
1	20.6	-
2	36.9	-
3	52.7	-
4	64.3	-
5	71.9	91.0
6	78.7	-
7	85.4	-
8	90.1	-
9	94.4	-
10	96.5	-
11	98.3	-
12	100.2	-
13	102.5	-
14	103.3	-
15	104.4	103.0
16	105.7	-
17	106.5	-
18	107.8	-
19	108.7	-
20	109.5	-
21	110.7	-
22	111.8	-
23	112.6	-
24	113.8	-
25	114.9	105.0
26	116.3	-
27	117.6	-
28	118.8	-
29	120.1	-
30	121.7	-
31	123.9	-
32	126.3	-
33	128.9	-
34	131.6	-
35	133.9	108.0

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
36	136.3	-
37	138.7	-
38	141.4	-
39	144.2	-
40	146.8	109.0
41	149.2	-
42	151.6	-
43	153.8	-
44	156.4	-
45	158.7	109.0
46	161.1	-
47	162.3	-
48	-	-
49	-	-
50	-	109.0
51	-	-
52	-	-
53	-	-
54	-	-
55	184.3	111.0
56	-	-
57	-	-
58	-	-
59	-	-
60	199.3	109.0
61	-	-
62	-	-
63	-	-
64	-	-
65	210.3	109.0
66	-	-
67	-	-
68	-	-
69	-	-
70	218.3	109.0
71	-	-
72	-	-
73	-	-

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Time (mins)	Deflection at centre of the specimen (mm)	Deflection 50mm from free end of the specimen (mm)
74	-	-
75	221.3	109.0
76	-	-
77	-	-
78	-	-
79	-	-
80	214.3	109.0
81	-	-
82	-	-
83	-	-
84	-	-
85	209.3	109.0
86	-	-
87	-	-

Both deflection measurements were taken at the mid-height of the specimen.

Negative values indicate that the specimen deflected out of the furnace.

The central deflection transducer ran out of travel after 47 minutes. Manual deflection measurements were taken at five-minute intervals from the end of the deflection transducer.

The free end lateral deflection was recorded by taking measurements relative to a fixed datum at ten-minute intervals for the first 30 minutes of the test then at five-minute intervals there after.

The deflection transducer was removed at 87 minutes in order to protect the equipment and no further manual deflection measurements were taken due to safety concerns.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

PHOTOGRAPHS

Photograph 1. Unexposed face prior to test

UKAS TESTING
0296

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Photograph 2. Unexposed face after 120 minutes duration.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Photograph 3. Position of integrity failure after 123 minutes duration.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

Photograph 4. Unexposed face after test termination at 141 minutes.

The Building Test Centre
British Gypsum Limited
East Leake
Loughborough
Leics. LE12 6NP
Tel (0115) 945 1564
Fax (0115) 945 1562
email btc.testing@bpb.com

FIELD OF DIRECT APPLICATION

General

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.

(i) Decrease in height from 6000mm.

(ii) Increase in the thickness of the wall (minimum thickness 139mm).

(iii) Increase thickness of component materials (minimum Gypframe stud depth 92mm, minimum Gypframe 'I' stud gauge 0.9mm).

(iv) Decrease in the linear dimensions of the boards but not thickness (≤ 3000mm long x ≤ 1200mm wide Gyproc FireLine).

(v) Decrease stud spacing from 600mm.

(vi) Decrease in fixing centres from 300mm.

(vii) Horizontal and vertical joints, of the type tested.

Extension of Width

The width of an identical construction may be increased as the specimen was tested at nominally 3000mm wide with one vertical edge without restraint.

Extension of Height

No extension in height above 6000mm is permitted under the field of direct application.

30 minutes	60 minutes	90 minutes	120 minutes
6000mm	6000mm	6000mm	6000mm