

Report Number: **BTC 21551F**

A FIRE RESISTANCE TEST ON A HORIZONTAL  
BRITISH GYPSUM SHAFTWALL SYSTEM CLAD WITH  
A DOUBLE LAYER OF 15 MM GYPROC FIRELINE  
INCORPORATING 25 MM ISOVER ACOUSTIC  
PARTITION ROLL IN THE CAVITY CONDUCTED IN  
ACCORDANCE WITH BS EN 1364-2: 2018

Test Date: 6<sup>th</sup> November 2020

Report Issue Date: 11<sup>th</sup> November 2020

Report Amendment Date: 22<sup>nd</sup> June 2023

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

# The Building Test Centre

Fire Acoustics Structures

The Building Test Centre

British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

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Fire Acoustics Structures

The Building Test Centre  
British Gypsum  
East Leake  
Loughborough  
Leicestershire, LE12 6NP  
Tel: (0115) 945 1564  
Fax: (0115) 945 1562  
Email: btc.testing@saint-gobain.com

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### **FOREWORD**

This test report details a fire resistance test conducted on a British Gypsum horizontal ShaftWall.

The test sponsor was British Gypsum.

The test specimen was installed by PVR Joinery. The construction of the specimen took place between the 1<sup>st</sup> November and 4<sup>th</sup> November 2020. The Building Test Centre played no role in the design or selection of materials comprising the test specimen.

The test was conducted on the 6<sup>th</sup> November 2020.

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, constructional details, loads, stresses, edge of end conditions other than those allowed under the field of direct application in EN 1364-2 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.” (BS EN 1363-1: 2012, section 12.1)

### **REPORT AUTHORISATION**

Report Author



**Lindsey Watson**  
Scientist

Authorised by



**Paul Miller**  
BSc. (Hons.)  
Fire Test Manager

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# The Building Test Centre

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British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: btc.testing@saint-gobain.com

## TEST REPORT AMENDMENTS

Page	Amendments	Date
1	Report amendment date added to title page. Date of standard corrected – changed from 2015 to 2018.	22/06/23
5	Report amendment table updated.	22/06/23

Report Amendments Author



**Matthew Porter**

MEng. (Hons.), MIFireE

*Technical Lead Assessor*

Amendments Authorised by



**Paul Miller**

BSc. (Hons.)

*Fire Test Manager*

Customer: **British Gypsum**

Page Amended: 22<sup>nd</sup> June 2023

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### **TEST CONSTRUCTION**

#### **Description of Construction**

The specimen was constructed in a refractory concrete lined steel restraint test frame having an opening of 4000 mm long x 3000 mm wide. The steel frame was lined with brickwork to accommodate the overall depth of the system.

Gypframe 148EDC80 Extra Deep Flange Floor & Ceiling Channels were fixed to the 3000 mm edges of the test frame aperture using two staggered rows of 60 mm fire resistant fixings at 600 mm centres. Gypframe 146TSC90 Tabbed Starter Channels were fixed to the 4000 mm edges of the test frame aperture using two staggered rows of 60 mm fire resistant fixings at 600 mm centres. Gypframe 146TI90 Tabbed 'I' Studs were positioned between the Gypframe 148EDC80 Extra Deep Flange Floor & Ceiling Channels at 600 mm centres spanning 4000 mm.

One layer of 19 mm Gyproc CoreBoard was positioned between the studs and secured in position with Gypframe G102 Retaining Channels inserted between the back of the Gyproc CoreBoard and the lower flange of the stud. The Gypframe 146TI90 Tabbed 'I' Studs and the Gypframe 148EDC80 Extra Deep Flange Floor & Ceiling Channel were fixed together using two 13 mm British Gypsum Wafer Head Jack-Point Screws through the lower flange of the channel, one fixing either side of the stud web.

Horizontal joints in the Gyproc CoreBoard were positioned at mid-span, i.e. 2000 mm. Sections of Gypframe GA3 Steel Angle were inserted between the board joints and 122 mm wide Gyproc CoreBoard fire stops, with beads of Gyproc Sealant along both edges, were fixed to the angle using three 35 mm British Gypsum Drywall Screws.

Gypframe MF6 Perimeter Channels were fixed to the perimeter of the test frame using 60 mm fire resistant fixings at 600 mm centres. The channels were fixed flush to the underside of the Gypframe 148EDC80 Extra Deep Flange Floor & Ceiling Channel /146TSC90 Tabbed Starter Channel framework.

Gypframe MF5 Ceiling Sections were positioned in the Gypframe MF6 Perimeter Channels at 450 mm centres perpendicular to the Gypframe 146TI90 'Tabbed' 'I' Studs. The Gypframe MF5 Ceiling Sections were fixed to the Gypframe 146TI90 Tabbed 'I' Studs using two 13 mm British Gypsum Wafer Head Jack-Point Screws. The Gypframe MF5 Ceiling Sections were extended by overlapping two sections by 150 mm and were fixed together using two 13 mm British Gypsum Wafer Head Screws.

A layer of 25 mm Isover Acoustic Partition Roll (APR 1200) was positioned in the cavity.

A double layer of 15 mm Gyproc FireLine was fixed perpendicular to the Gypframe MF5 Ceiling Sections.

The inner layer was fixed at 234 mm centres (6 fixings per board width) within the field of the board. The ceiling perimeter was fixed at 234 mm centres along the long edges of the frame and at 225 mm centres along the short edges of the frame using 25 mm British Gypsum Drywall Screws.

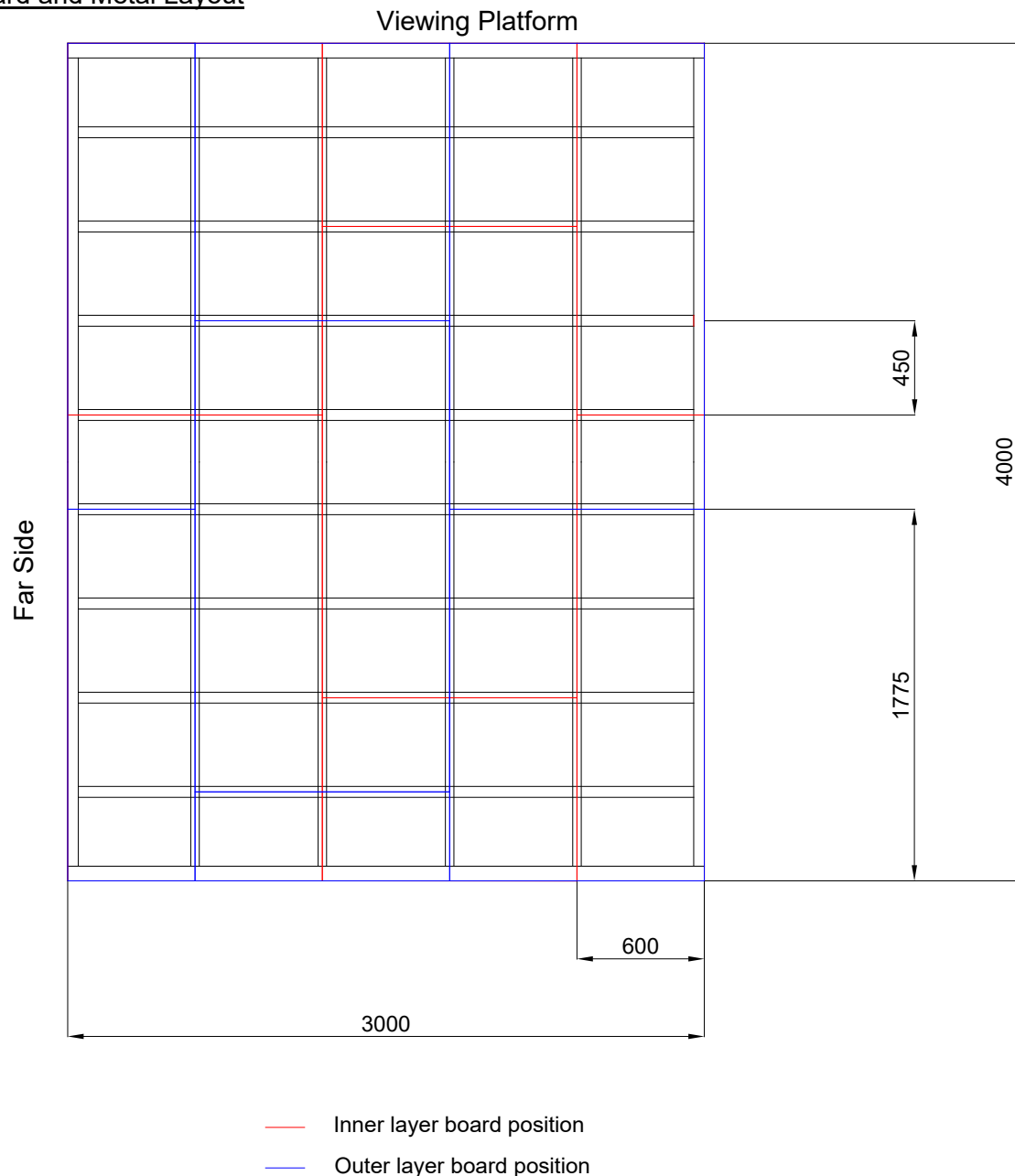
The outer layer was fixed at 234 mm centres (6 fixings per board width) within the field of the board. The ceiling perimeter was fixed at 234 mm centres along the long edges of the frame and at 225 mm centres along the short edges of the frame using 40 mm British Gypsum Drywall Screws.

All joints were staggered and the board ends coincided with the Gypframe MF5 Ceiling Sections.

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

### Test Construction Drawings

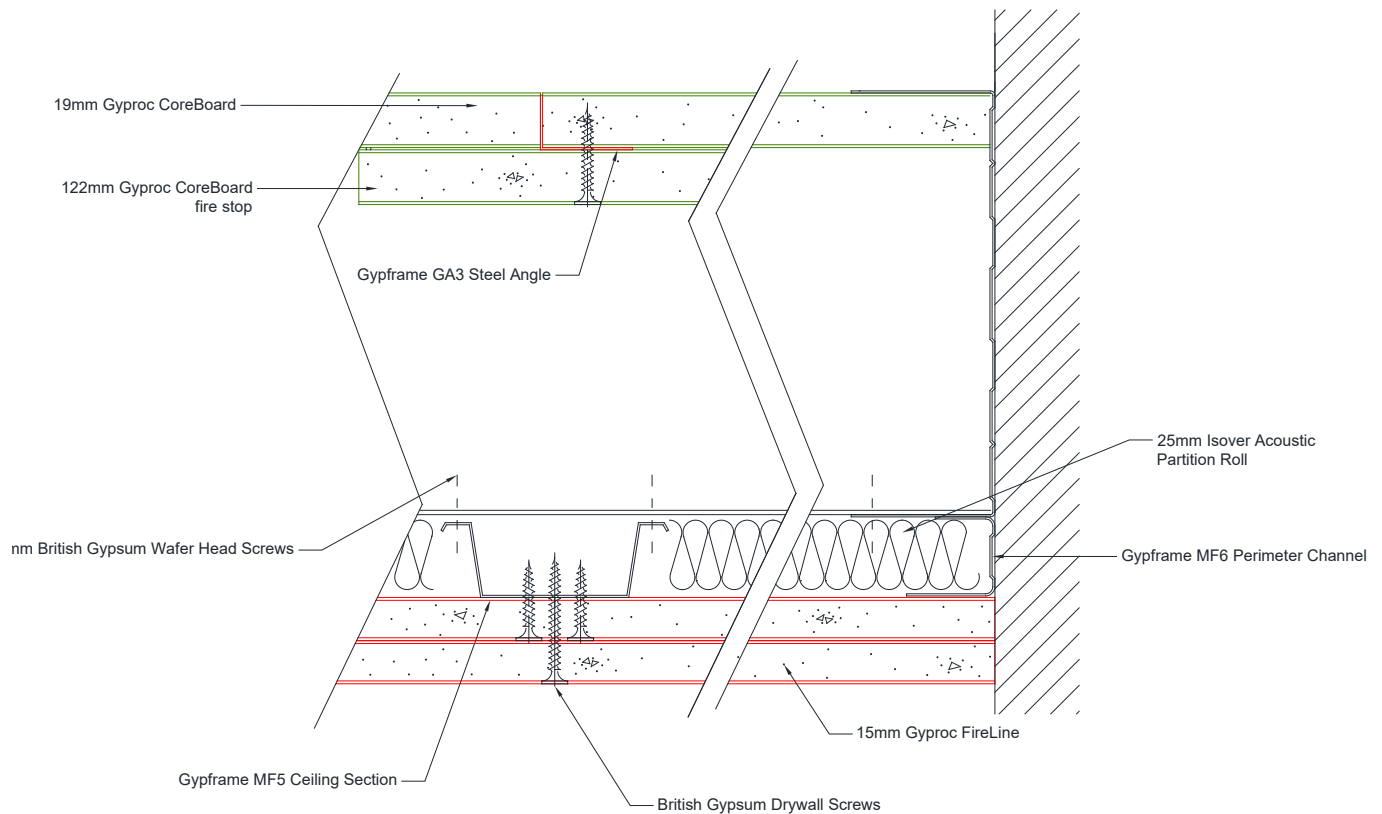
### Board and Metal Layout



**Figure 1** – Board and metal layout (viewed from below)



### Horizontal Cross Section



**Figure 2** - Horizontal cross sectional view through floor construction

### TEST MATERIALS

#### Plasterboard

- i) Nominally, 2400 mm (long) x 1200 mm (wide) x 15 mm (thick), Gyproc FireLine (TE), manufactured and supplied by British Gypsum, ex Sherburn.

Measured mass per unit area:	12.8 kg/m <sup>2</sup>
Measured thickness:	15.5 mm
Board identification numbers:	31 205 20 10.59 31 205 20 11.00 31 205 20 11.00
Measured moisture content:	0.44 %

- ii) Nominally, 3000 mm (long) x 598 mm (wide) x 19 mm (thick), Gyproc CoreBoard (SE), manufactured and supplied by British Gypsum, ex East Leake.

Measured mass per unit area:	16.2 kg/m <sup>2</sup>
Measured thickness:	19 mm
Board identification numbers:	18 344 19 18:48 18 344 19 18:49 18 344 19 18:49
Measured moisture content:	0.45 %

The surface density and board thickness were calculated using the actual weight and size of a selection of boards used in the test specimen. The moisture content of plasterboard was determined using samples dried to constant weight in an oven at 50 °C.

Material dimensions were supplied by British Gypsum.

#### Metal Components

- iii) Gypframe 148EDC80 Extra Deep Flange Floor and Ceiling Channels, supplied by British Gypsum.
- iv) Gypframe 146TSC90 Tabbed Starter Channels, supplied by British Gypsum.
- v) Gypframe 146TI90 'Tabbed' I Studs, supplied by British Gypsum.
- vi) Gypframe G102 Retaining Channels, supplied by British Gypsum.
- vii) Gypframe GA3 Steel Angle, supplied by British Gypsum.
- viii) Gypframe MF6 Perimeter Channels, supplied by British Gypsum.
- ix) Gypframe MF5 Ceiling Sections, supplied by British Gypsum.

All metal components were supplied by British Gypsum.

### Insulation

- x) Nominally, 25 mm (thick) Isover APR 1200, manufactured by Saint-Gobain Isover and supplied by British Gypsum.

Measured surface density: 0.427 kg/m<sup>2</sup>

### Fasteners

- xi) 25 mm British Gypsum Drywall Screws, supplied by British Gypsum.
- xii) 35 mm British Gypsum Drywall Screws, supplied by British Gypsum.
- xiii) 40 mm British Gypsum Drywall Screws, supplied by British Gypsum.
- xiv) 13 mm Wafer Head Jack-Point Screws, supplied by British Gypsum.
- xv) 60 mm Fire Resistant Fixings, supplied by The Building Test Centre.

### Miscellaneous Components

- xvi) Gyproc Paper Joint Tape, supplied by British Gypsum.
- xvii) Gyproc Joint Filler, supplied by British Gypsum.
- xviii) Gyproc Sealant, supplied by British Gypsum.
- xix) Rock mineral fibre gasket, supplied by The Building Test Centre.

*Where measurements could not be taken then mass and dimensions were provided by the customer or the manufacturer e.g. from material labelling. Material information was recorded according to procedure AP070 vs. 1.1.*

## TEST PROCEDURE

The test was conducted fully in accordance with BS EN 1364-2: 2018. The asymmetrical specimen was subjected to fire from the underside, this being the required direction of fire resistance as specified in BS EN 1363-1: 2012.

The test procedure used was AP106 Issue 1.2.

The ambient temperature at the commencement of the test was 15 °C.

The furnace pressure was set to control at  $17.7 \pm 2$  Pa positive with respect to atmosphere, at a point 0.03 mm below the underside of the specimen, equating to  $18 \pm 2$  Pa at the underside of the specimen. Furnace pressure data is shown in **Figure 4**.

The specimen and associated construction were not conditioned in accordance with clause 8 of BS EN 1363-1: 2012.

## TEST RESULTS

The requirement of the standard was satisfied for the following periods:

<b>Integrity</b>	<b>Sustained Flaming</b>	<b>81 minutes, no failure.</b>
	<b>6 mm Gap Gauge</b>	<b>81 minutes, no failure.</b>
	<b>25 mm Gap Gauge</b>	<b>80 minutes.</b>
	<b>Cotton Pad</b>	<b>80 minutes.</b>
<b>Insulation</b>		<b>74 minutes.</b>
<b>Test Terminated</b>		<b>81 minutes, at the request of the sponsor.</b>

## LIMITATIONS

The scope of the Field of Direct Application of the results and construction details in this test report is explained in BS EN 1364-2: 2018, section 13.

### TEST DATA

#### Observations

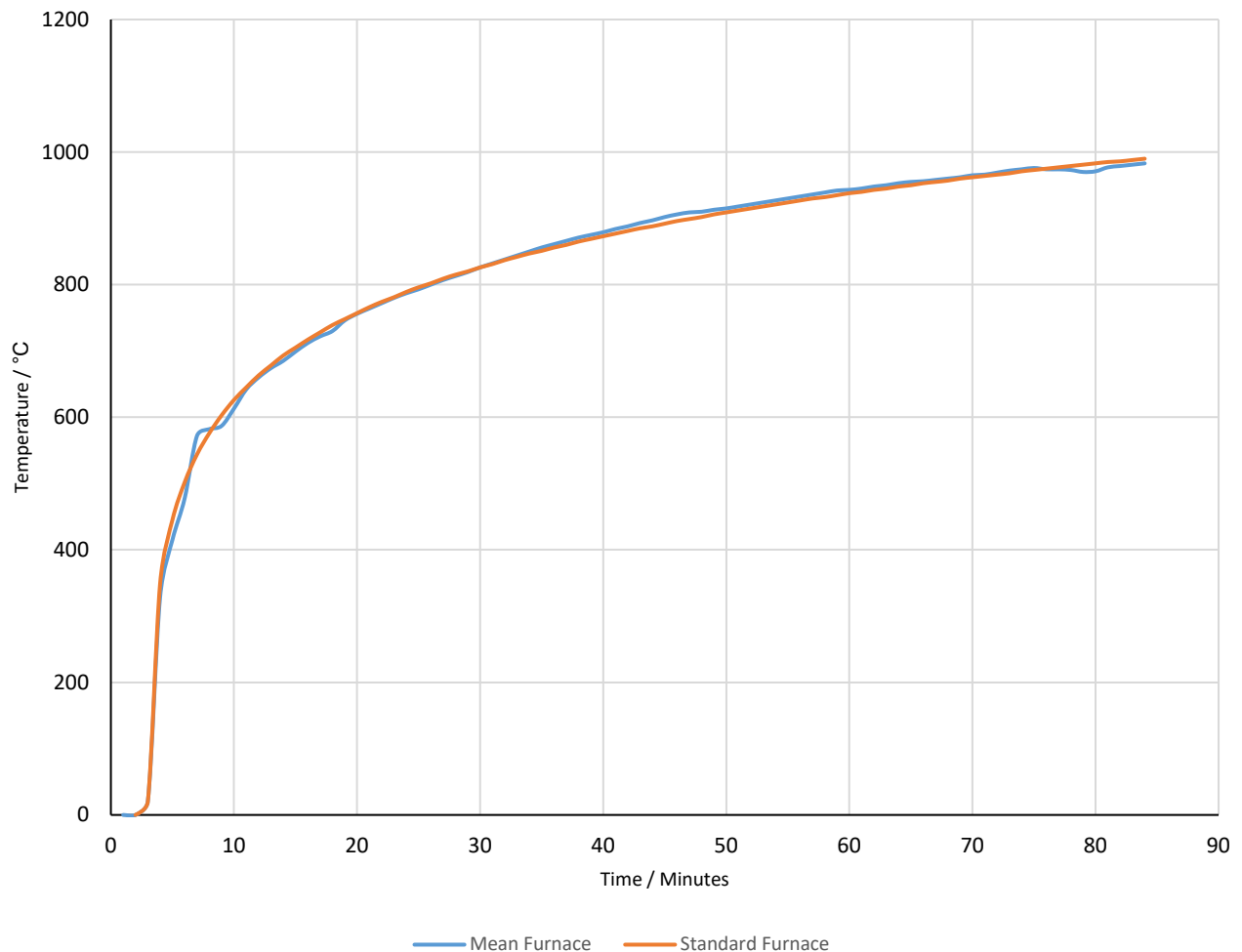
All observations refer to the exposed face unless stated.

Observers: Unexposed face: Mark Shortland and Lindsey Watson  
Exposed face: Danielle Yates and Eric Chee

Time		Observations
Hours	Minutes	
0	00	Test started.
0	10	Jointing material was flaking away. Face papers had charred.
0	20	All board joints visible had opened up to approximately 2-3 mm.
0	30	All board joints visible had opened up to approximately 6-7 mm.  <i>Unexposed face</i> No visible change.
0	40	All board joints visible had opened up to approximately 9-10 mm.
0	50	No visible change.
1	00	Centre board lower left corner had begun to bow into the furnace.  <i>Unexposed face</i> Smoke emissions all around the perimeter of the specimen.
1	04	Centre board had fallen into the furnace. Lower centre board had begun to bow into the furnace.
1	06	Lower centre board had fallen into the furnace. Left-hand short board had begun to bow into the furnace.
1	10	Second layer centre board vertical joints had opened up to approximately 8 mm.  <i>Unexposed face</i> Boards discoloured along the viewing platform edge of the specimen.

Time		Observations
Hours	Minutes	
1	13	Second layer lower centre board had fallen into the furnace.
1	14	<i>Unexposed face</i> <b>INSULATION FAILURE.</b> The temperature rise of thermocouple no.31 positioned at 1000 mm from the viewing platform and 1200 mm in from the far side exceeded 180 °C.
1	15	<i>Unexposed face</i> Board joint in centre of specimen opened to approximately 4-5 mm.
1	17	<i>Unexposed face</i> Cotton pad attempt on second board joint from far side of specimen, approximately 1000 mm from viewing platform – no failure.
1	19	<i>Unexposed face</i> Cotton pad attempt on second board joint from far side of specimen, approximately 1000 mm from viewing platform – no failure. Cotton pad attempt on second board joint from control room side of specimen, approximately 1000 mm from viewing platform – no failure.
1	20	<i>Unexposed face</i> <b>INTEGRITY FAILURE.</b> The cotton pad ignited (glowed) when placed at the approximate centre of the specimen, mid span.  <b>FURTHER INTEGRITY FAILURE.</b> The gap at the approximate centre of the specimen exceeded 25 mm diameter (visual)
1	21	<b>TEST TERMINATED</b> at the request of the sponsor.

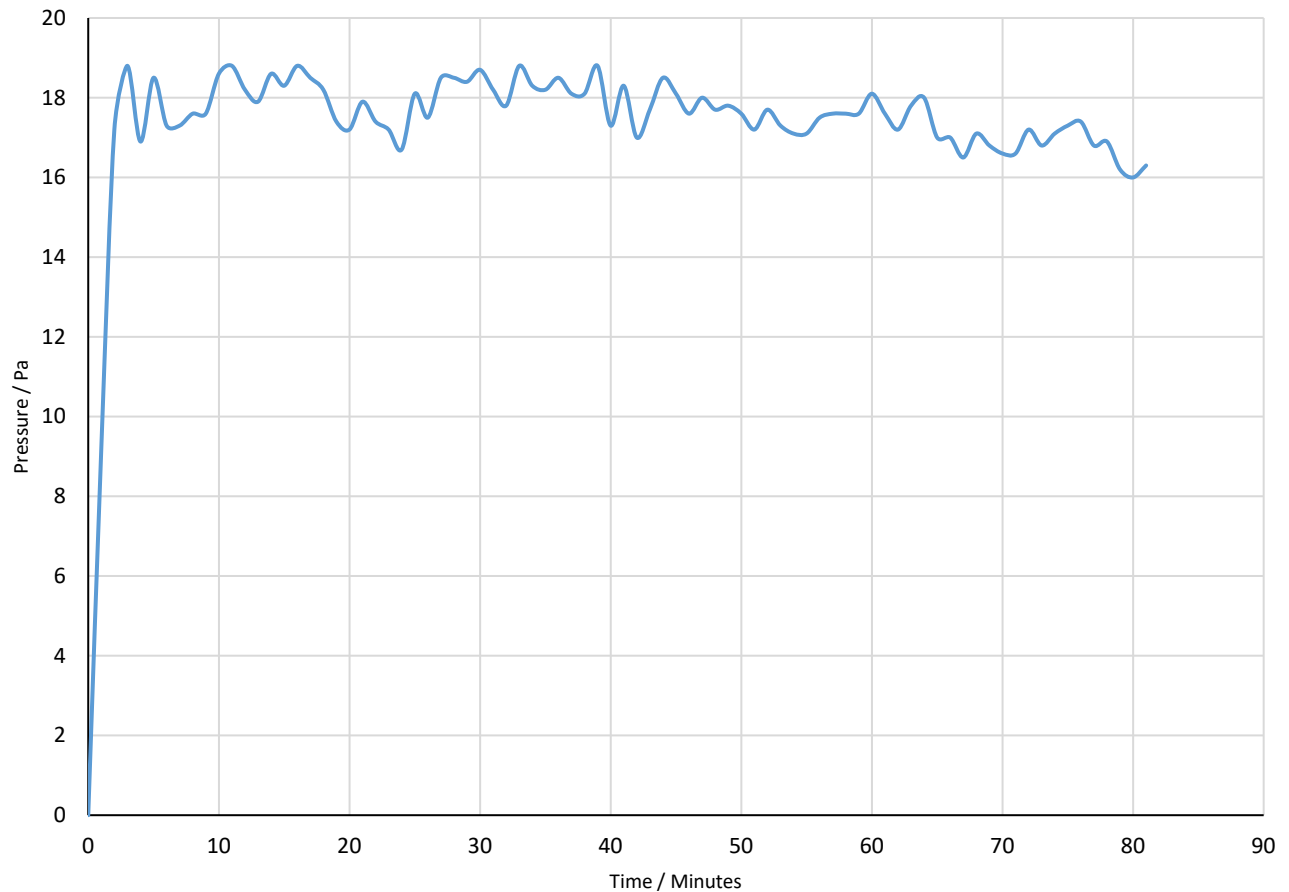
## Furnace Temperature Graph



**Figure 3** – Furnace temperature graph.

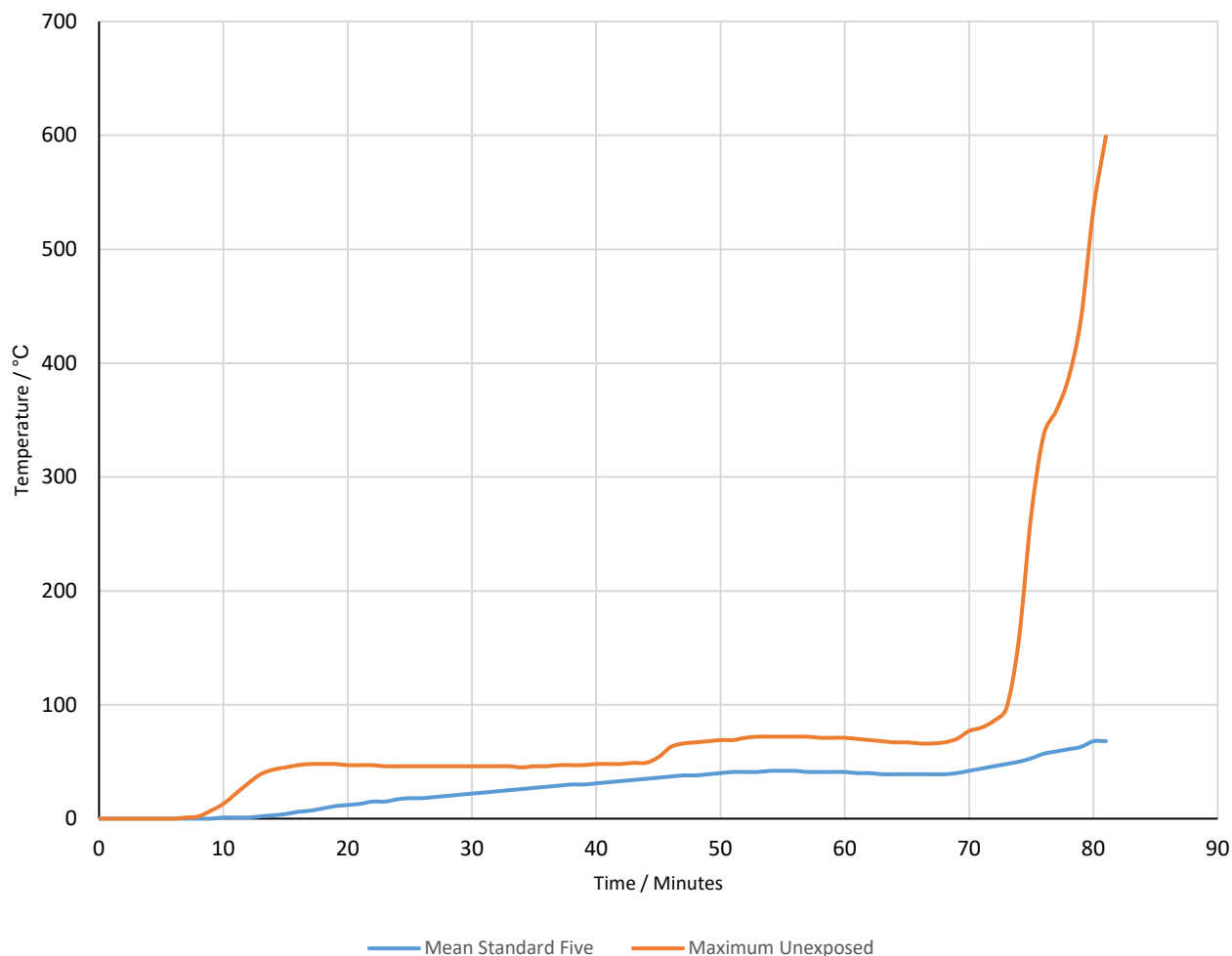


## Furnace Pressure Graph



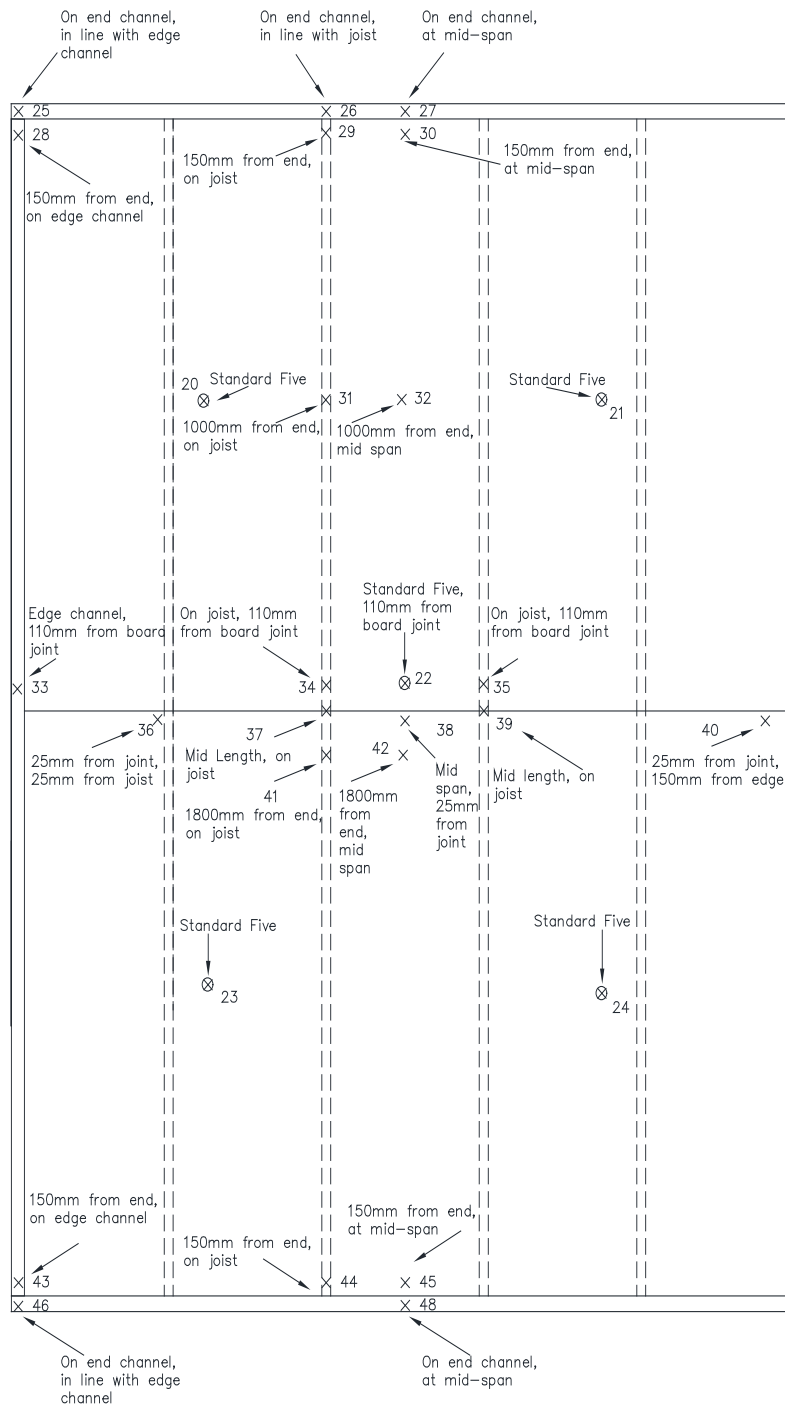
**Figure 4** – Furnace pressure graph.

## Unexposed Face Temperature Graph



**Figure 5** – Unexposed face temperature graph.

### Unexposed Face Thermocouple Layout



#### KEY:

- ⊗ Standard Five Thermocouple positions
- X Additional Thermocouple positions
- Unexposed Face Board Joint
- = = Joist positions

Figure 6 – Unexposed face thermocouple layout.

### Unexposed Face Standard Five Temperature Data

Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	1	1	1	0	0	1
11	1	1	1	1	1	1
12	2	1	2	1	1	1
13	3	2	3	2	1	2
14	5	3	4	2	2	3
15	6	4	6	3	3	4
16	8	5	8	5	3	6
17	10	7	10	6	4	7
18	12	8	12	7	5	9
19	14	10	15	9	6	11
20	15	11	17	10	7	12
21	17	13	18	11	8	13
22	18	14	20	12	9	15
23	19	15	21	13	9	15
24	20	17	22	14	10	17
25	21	18	23	15	11	18
26	22	19	24	15	12	18
27	23	20	25	16	12	19
28	24	21	26	17	13	20
29	25	22	27	18	14	21
30	26	23	28	19	15	22
31	26	25	30	19	16	23
32	27	26	31	20	16	24
33	28	27	32	21	17	25
34	29	28	33	22	18	26
35	30	30	34	23	19	27
36	30	31	35	23	20	28
37	31	32	36	24	21	29

# The Building Test Centre

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The Building Test Centre

British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: btc.testing@saint-gobain.com

Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
38	32	33	37	25	21	30
39	33	34	37	25	22	30
40	34	35	38	26	23	31
41	34	36	39	27	25	32
42	35	37	41	27	26	33
43	36	38	41	28	27	34
44	37	38	42	29	29	35
45	37	39	43	30	30	36
46	38	40	44	30	32	37
47	39	41	44	31	33	38
48	39	42	44	32	35	38
49	40	43	44	33	36	39
50	41	43	44	34	37	40
51	42	43	44	36	39	41
52	42	43	44	37	40	41
53	42	42	44	38	41	41
54	43	42	43	39	42	42
55	43	42	43	40	42	42
56	42	41	43	40	42	42
57	42	41	43	40	41	41
58	42	40	42	41	41	41
59	42	40	42	41	41	41
60	41	39	42	41	40	41
61	41	39	41	40	40	40
62	41	38	41	40	40	40
63	40	38	40	39	39	39
64	39	38	40	39	39	39
65	39	38	40	38	39	39
66	39	39	40	38	38	39
67	39	40	41	38	38	39
68	39	41	42	37	37	39
69	39	44	45	37	36	40
70	40	49	49	37	36	42
71	41	54	53	37	36	44
72	42	59	55	38	36	46
73	43	63	59	38	36	48
74	46	66	63	39	36	50
75	51	69	68	40	37	53
76	59	71	73	42	38	57
77	66	72	74	44	39	59

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Time (minutes)	Temperature Rise (°C)					Mean Standard Five
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	
78	70	73	75	46	41	61
79	73	74	76	50	43	63
80	75	76	90	53	46	68
81	76	76	86	55	49	68

See **Figure 6** for the location of the thermocouples.

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Loughborough  
Leicestershire, LE12 6NP  
Tel: (0115) 945 1564  
Fax: (0115) 945 1562  
Email: btc.testing@saint-gobain.com

### Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29	Thermocouple No. 30
0	0	0	0	0	0	0
1	0	0	0	0	0	0
2	0	0	0	0	0	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	0	0	0	0
6	0	0	0	0	0	0
7	0	0	0	0	0	0
8	0	0	0	0	0	0
9	0	0	0	0	0	0
10	1	0	0	0	1	0
11	1	1	1	0	2	0
12	1	1	1	1	3	1
13	2	1	1	1	4	1
14	4	1	2	2	6	1
15	6	2	3	3	8	2
16	8	2	4	4	10	3
17	9	3	4	5	12	3
18	10	3	5	6	13	4
19	12	5	5	7	15	5
20	13	4	6	8	16	6
21	13	5	6	9	17	7
22	14	5	6	10	18	8
23	15	5	7	11	19	9
24	16	6	7	12	20	10
25	18	6	8	13	22	10
26	19	6	9	14	23	11
27	21	6	10	15	24	12
28	22	7	11	16	25	13
29	24	7	12	17	27	14
30	26	7	13	18	28	15
31	27	8	14	19	29	16
32	29	8	15	20	30	17
33	30	8	16	21	32	18
34	32	10	15	22	33	19
35	33	10	15	23	34	21
36	34	12	15	24	35	22
37	36	12	16	25	37	23

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Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29	Thermocouple No. 30
38	37	12	17	26	38	25
39	37	13	18	27	39	26
40	36	14	19	28	40	27
41	38	15	21	29	42	29
42	42	14	22	30	43	30
43	45	15	22	31	45	32
44	46	15	24	33	46	33
45	54	16	24	35	48	34
46	63	16	25	38	49	35
47	66	17	26	43	51	36
48	67	16	27	50	53	37
49	68	18	28	57	55	38
50	69	18	29	62	57	39
51	69	16	30	65	59	40
52	69	17	31	67	61	41
53	68	18	32	67	63	42
54	67	18	32	68	64	42
55	67	18	33	68	64	43
56	67	18	33	68	64	43
57	67	18	34	68	63	43
58	66	17	33	67	63	43
59	65	19	33	67	62	43
60	64	18	33	66	60	43
61	63	18	32	65	59	42
62	61	19	32	64	58	42
63	60	19	33	62	58	41
64	59	20	34	61	58	44
65	58	20	33	60	59	38
66	56	22	32	58	60	34
67	56	24	32	58	62	37
68	56	28	34	58	63	39
69	55	31	39	57	63	50
70	55	32	42	57	64	56
71	56	37	37	56	65	61
72	55	36	37	57	69	63
73	57	43	41	58	73	67
74	58	81	44	58	77	68
75	58	83	42	59	84	68
76	58	63	43	60	92	70
77	59	101	46	60	101	72

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Loughborough  
Leicestershire, LE12 6NP  
Tel: (0115) 945 1564  
Fax: (0115) 945 1562  
Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29	Thermocouple No. 30
78	56	59	49	61	107	75
79	60	42	49	63	114	77
80	60	43	51	65	123	80
81	58	43	56	64	137	90

See **Figure 6** for the location of the thermocouples.

# The Building Test Centre

Fire Acoustics Structures

The Building Test Centre

British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: btc.testing@saint-gobain.com

## Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 41	Thermocouple No. 42
0	0	0	0	0
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	1	0
9	0	0	1	0
10	1	0	2	0
11	1	1	3	1
12	2	1	5	1
13	4	2	7	2
14	6	2	10	3
15	8	3	12	5
16	10	5	15	7
17	12	6	17	9
18	14	8	19	11
19	16	9	21	14
20	18	11	23	16
21	19	12	24	18
22	21	14	26	19
23	22	15	27	21
24	23	16	28	22
25	24	17	29	23
26	25	18	30	25
27	26	19	31	26
28	28	20	32	27
29	29	21	33	28
30	30	23	34	29
31	31	24	35	30
32	32	25	35	31
33	33	26	36	32
34	34	27	37	33
35	35	29	38	34
36	36	30	39	35
37	38	31	40	36

Customer: **British Gypsum**

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Loughborough

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Fax: (0115) 945 1562

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 41	Thermocouple No. 42
38	39	32	41	37
39	40	33	41	37
40	41	34	42	38
41	42	35	43	39
42	43	36	45	40
43	44	37	46	41
44	45	38	47	42
45	47	40	48	43
46	48	40	49	44
47	49	41	51	45
48	51	42	52	45
49	52	43	54	46
50	53	43	54	46
51	54	44	55	46
52	55	44	55	46
53	55	43	55	46
54	55	43	56	45
55	55	43	56	45
56	55	42	57	45
57	54	42	57	44
58	53	41	57	44
59	53	41	58	44
60	52	41	58	43
61	52	40	58	43
62	51	40	59	42
63	51	40	59	42
64	51	40	59	41
65	53	41	59	41
66	57	42	59	41
67	57	44	61	41
68	60	50	62	41
69	66	56	64	42
70	75	60	65	42
71	80	64	67	42
72	84	67	70	43
73	93	73	75	45
74	157	77	80	49
75	267	77	89	54
76	337	77	101	61
77	358	77	116	66

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 41	Thermocouple No. 42
78	387	77	144	71
79	439	77	220	77
80	535	82	336	79
81	599	88	443	79

Figures highlighted in red indicated the minute in which the temperature rise exceeded 180 °C.

See **Figure 6** for the location of the thermocouples.

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Loughborough

Leicestershire, LE12 6NP

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## Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)		
	Thermocouple No. 33	Thermocouple No. 34	Thermocouple No. 35
0	0	0	0
1	0	0	0
2	0	0	0
3	0	0	0
4	0	0	0
5	0	0	0
6	0	0	0
7	0	0	0
8	1	1	0
9	1	1	0
10	2	2	1
11	3	4	1
12	4	6	2
13	6	8	3
14	8	10	4
15	11	12	6
16	13	14	8
17	15	17	10
18	17	19	12
19	18	20	14
20	19	22	15
21	20	24	17
22	20	25	18
23	21	26	19
24	22	27	21
25	22	28	22
26	23	29	23
27	24	30	24
28	24	31	26
29	25	32	27
30	26	33	28
31	27	34	30
32	27	35	31
33	28	35	32
34	29	36	34
35	30	37	35
36	31	38	36
37	32	39	37

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)		
	Thermocouple No. 33	Thermocouple No. 34	Thermocouple No. 35
38	33	40	39
39	34	41	40
40	35	42	41
41	36	42	43
42	37	43	44
43	39	44	46
44	41	45	47
45	43	46	48
46	46	47	49
47	50	48	50
48	54	49	52
49	58	51	53
50	61	51	54
51	63	52	54
52	64	52	55
53	65	53	55
54	66	53	55
55	66	53	55
56	66	54	54
57	66	55	54
58	66	55	54
59	65	56	54
60	65	57	53
61	63	57	53
62	62	57	52
63	60	57	51
64	59	58	51
65	59	59	52
66	58	62	54
67	58	64	56
68	58	67	61
69	60	70	69
70	62	73	77
71	63	79	78
72	63	86	80
73	64	97	82
74	64	119	86
75	65	147	108
76	66	182	145
77	68	218	178

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)		
	Thermocouple No. 33	Thermocouple No. 34	Thermocouple No. 35
78	70	257	219
79	70	307	313
80	74	383	487
81	88	492	543

See **Figure 6** for the location of the thermocouples.

### Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 36	Thermocouple No. 37	Thermocouple No. 38	Thermocouple No. 39	Thermocouple No. 40
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	1	0	0	0
9	0	1	0	0	0
10	0	2	0	1	0
11	0	3	0	1	0
12	0	5	0	2	0
13	0	7	0	3	0
14	1	9	1	5	0
15	1	11	1	7	0
16	1	13	1	9	0
17	2	15	2	11	0
18	2	17	2	13	0
19	3	18	3	14	-
20	4	20	4	16	-
21	5	21	5	17	-
22	6	22	6	18	-
23	7	23	7	19	-
24	8	24	8	20	-
25	9	25	9	21	-
26	10	26	10	23	-
27	11	27	11	24	-
28	12	28	12	25	-
29	13	29	12	26	-
30	14	30	13	27	-
31	15	31	14	28	-
32	17	32	15	30	-
33	18	33	16	31	-
34	19	34	17	32	-
35	21	35	18	34	-
36	22	37	19	35	-
37	23	38	19	37	-



# The Building Test Centre

## Fire Acoustics Structures

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British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: btc.testing@saint-gobain.com

Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 36	Thermocouple No. 37	Thermocouple No. 38	Thermocouple No. 39	Thermocouple No. 40
38	25	39	20	38	-
39	26	40	21	40	16
40	28	42	22	42	17
41	29	43	23	43	17
42	31	45	24	45	18
43	32	46	25	47	19
44	34	48	26	49	20
45	35	50	27	51	21
46	37	52	28	53	22
47	39	54	29	55	23
48	41	56	30	56	24
49	43	57	31	57	25
50	44	57	31	58	26
51	45	57	32	58	28
52	46	58	33	58	29
53	46	58	33	58	30
54	46	58	33	58	31
55	46	58	34	57	32
56	46	58	34	57	33
57	46	60	34	57	33
58	46	60	34	56	34
59	45	60	34	56	35
60	45	61	34	55	35
61	45	61	34	54	36
62	44	61	34	54	36
63	44	61	34	53	36
64	43	60	34	52	36
65	43	61	33	53	37
66	42	62	33	55	37
67	42	64	33	56	36
68	41	66	33	58	36
69	42	66	33	60	36
70	41	67	33	68	36
71	42	69	34	71	36
72	42	73	34	71	35
73	43	80	35	76	35
74	44	94	36	83	35
75	46	119	38	97	35
76	48	161	40	117	35
77	52	213	44	146	35

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 36	Thermocouple No. 37	Thermocouple No. 38	Thermocouple No. 39	Thermocouple No. 40
78	58	271	48	200	35
79	64	326	52	290	36
80	66	378	77	415	36
81	67	428	100	516	37

- Thermocouple broken due to equipment failure

See **Figure 6** for the location of the thermocouples.

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East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: btc.testing@saint-gobain.com

## Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 43	Thermocouple No. 44	Thermocouple No. 45	Thermocouple No. 46	Thermocouple No. 48
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	0	0	0	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	1
8	0	-1	0	0	2
9	1	-1	0	0	7
10	1	-2	0	1	13
11	1	-3	0	1	22
12	2	-4	1	1	31
13	2	-5	1	2	39
14	3	10	2	2	43
15	4	12	3	2	45
16	4	13	4	3	47
17	5	15	5	3	48
18	5	17	7	4	48
19	5	18	8	4	48
20	5	20	10	5	47
21	6	21	11	5	47
22	7	23	12	6	47
23	7	24	13	6	46
24	8	25	14	7	46
25	9	26	15	8	46
26	10	27	17	10	46
27	11	28	18	11	46
28	12	29	18	13	46
29	13	29	19	15	46
30	14	30	20	16	46
31	15	31	21	18	46
32	16	32	21	19	46
33	18	33	22	21	46
34	19	34	22	23	45
35	21	35	23	25	46
36	22	35	24	26	46
37	23	36	25	29	47

Customer: **British Gypsum**

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# The Building Test Centre

## Fire Acoustics Structures

The Building Test Centre

British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: btc.testing@saint-gobain.com

Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 43	Thermocouple No. 44	Thermocouple No. 45	Thermocouple No. 46	Thermocouple No. 48
38	25	37	25	31	47
39	27	38	26	33	47
40	28	39	27	35	48
41	30	40	27	37	48
42	33	41	28	40	48
43	35	42	29	42	49
44	38	43	30	45	49
45	42	44	31	48	49
46	46	46	31	51	50
47	51	47	32	54	50
48	56	48	33	57	51
49	60	49	33	61	51
50	64	50	33	65	51
51	68	51	34	69	52
52	69	53	35	71	52
53	71	54	35	72	53
54	71	55	35	72	54
55	71	55	36	72	55
56	71	56	36	72	56
57	71	57	36	72	56
58	71	57	36	71	57
59	71	57	36	71	57
60	70	58	36	71	57
61	70	58	36	70	57
62	69	58	36	69	57
63	68	58	36	68	57
64	67	58	36	67	57
65	67	59	35	66	57
66	66	60	35	66	57
67	66	60	35	65	57
68	65	60	35	64	57
69	65	61	35	64	58
70	65	61	35	64	58
71	66	62	35	64	59
72	66	62	35	64	60
73	66	63	36	64	60
74	66	63	36	65	61
75	66	64	37	65	61
76	67	67	48	66	63
77	67	67	47	66	67

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 43	Thermocouple No. 44	Thermocouple No. 45	Thermocouple No. 46	Thermocouple No. 48
78	68	69	58	66	82
79	68	72	61	67	114
80	69	79	65	68	155
81	69	88	66	68	198

See **Figure 6** for the location of the thermocouples.

# The Building Test Centre

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The Building Test Centre  
 British Gypsum  
 East Leake  
 Loughborough  
 Leicestershire, LE12 6NP  
 Tel: (0115) 945 1564  
 Fax: (0115) 945 1562  
 Email: btc.testing@saint-gobain.com

### Specimen Vertical Deflection

Time (minutes)	Centre Deflection (mm)	Rate of Deflection (mm/min)
0	0	0.0
1	4	3.6
2	3	-0.7
3	3	0.0
4	3	0.1
5	3	0.1
6	3	0.3
7	4	0.5
8	5	0.6
9	5	0.9
10	7	1.1
11	8	1.1
12	8	0.8
13	9	0.5
14	9	0.1
15	9	-0.1
16	9	-0.2
17	8	-0.3
18	8	-0.5
19	8	-0.3
20	7	-0.3
21	7	-0.3
22	7	-0.3
23	7	0.0
24	7	0.0
25	7	-0.2
26	6	-0.1
27	6	-0.2
28	6	0.0
29	6	-0.1
30	6	-0.2
31	6	0.0
32	6	-0.1
33	6	-0.2
34	6	0.0
35	5	-0.2
36	5	-0.1
37	5	-0.2

Customer: **British Gypsum**

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British Gypsum

East Leake

Loughborough

Leicestershire, LE12 6NP

Tel: (0115) 945 1564

Fax: (0115) 945 1562

Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

Time (minutes)	Centre Deflection (mm)	Rate of Deflection (mm/min)
38	5	-0.1
39	5	-0.2
40	5	-0.2
41	5	-0.1
42	4	-0.2
43	4	-0.1
44	4	-0.3
45	4	-0.2
46	4	-0.1
47	4	0.0
48	4	0.4
49	5	0.8
50	6	1.1
51	7	1.1
52	8	1.3
53	10	1.4
54	11	1.3
55	13	1.5
56	14	1.7
57	16	2.0
58	18	2.2
59	21	2.5
60	24	3.3
61	28	3.9
62	33	4.5
63	37	4.6
64	44	6.4
65	52	8.2
66	61	8.8
67	69	8.6
68	77	7.9
69	83	6.3
70	88	4.8
71	92	3.9
72	96	3.6
73	103	7.4
74	109	5.9
75	120	11.4
76	129	8.8
77	140	10.4

Customer: **British Gypsum**

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East Leake  
Loughborough  
Leicestershire, LE12 6NP  
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Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

Time (minutes)	Centre Deflection (mm)	Rate of Deflection (mm/min)
78	155	15.2
79	171	16.2
80	191	19.9
81	236	45.0

The deflection was recorded at the approximate centre of the specimen. Positive readings indicate deflection into the furnace.



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Fax: (0115) 945 1562

Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

## PHOTOGRAPHS

### Exposed Face Prior to Test



Customer: **British Gypsum**

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British Gypsum  
East Leake  
Loughborough  
Leicestershire, LE12 6NP  
Tel: (0115) 945 1564  
Fax: (0115) 945 1562  
Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

### Unexposed Face Prior to Test



Customer: **British Gypsum**

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Loughborough  
Leicestershire, LE12 6NP  
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Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

### Unexposed Face at 30 Minutes



Customer: **British Gypsum**

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East Leake  
Loughborough  
Leicestershire, LE12 6NP  
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Fax: (0115) 945 1562  
Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

### Unexposed Face at 1 Hour



Customer: **British Gypsum**

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Leicestershire, LE12 6NP  
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Fax: (0115) 945 1562  
Email: [btc.testing@saint-gobain.com](mailto:btc.testing@saint-gobain.com)

### Unexposed Face at 1 Hour, 21 Minutes, at Test Termination



Customer: **British Gypsum**

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### **FIELD OF DIRECT APPLICATION**

Test results obtained for fire from above are not applicable for the situation with fire from below, and vice versa. The results of the fire test are directly applicable to constructions of the sample tested, where only one or more of the modifications listed below are made.

#### **a) Self-supporting ceilings exposed to fire from below or from above size**

- i) For ceilings where both length and width are less than 4 m × 3 m, and which were tested at full size, the results may be applied to ceilings of the same size or less than that tested.
- ii) For ceilings of full size span less than 4 m but of width equal to or greater than 3 m (tested at full size span and 3 m width) and in which the most onerous direction lies in the 4 m direction of the furnace, the results may be applied to ceilings of the same span or less than that tested. There shall be no restriction on application of the result in the width direction. The provisions with respect to most onerous configuration as given in 6.3.2 shall be followed in the direct application of results.
- iii) For ceilings of full size span greater than or equal to 4 m but of width less than 3 m (tested at 4 m span and full size width) and in which the most onerous direction lies in the 4 m direction of the furnace, the results may be applied to ceilings up to the tested span, increased by 10 %, provided an overrun time in the fire test result is available compared to the intended classification period. The required overrun time is shown in the table below. The width is restricted to equal or less than that tested. The provisions with respect to most onerous configuration as given in 6.3.2 shall be followed in the direct application of results.
- iv) For ceilings where both length and width are greater than or equal to 4 m × 3 m in practice, and which were tested at 4 m × 3 m size, and in which the most onerous direction lies in the 4 m direction of the furnace, the results may be applied to ceilings up to the tested span, increased by 10 %, provided an overrun time in the fire test result is available compared to the intended classification period. The required overrun time is shown in the table below. There shall be no restriction on application of the result in the width direction. The provisions with respect to most onerous configuration as given in 6.3.2 in the test standard shall be followed in the direct application of results.

Intended classification period (min)	Overrun time
15	≥ 3 min
30, 45 and 60	≥ 6 min
≥ 90	≥ 10 % of the intended classification period

#### **Fittings**

Fittings which may be installed are those which have been included in the test specimen. The distance between the fittings cannot be smaller than tested.

#### **Cavities above self-supporting ceilings**

The test results are valid for cavities of any height.