The Building Test Centre
Fire Acoustics Structures

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Report Number: **BTC 21855F**

A FIRE RESISTANCE TEST ON A SFS EXTERNAL WALL SYSTEM WITH A 100 MM COLD-ROLLED STRUCTURAL STEEL STUD FRAMEWORK CLAD ON THE EXPOSED SIDE WITH A TRIPLE LAYER OF 15 MM GYPROC FIRELINE WITH 100 MM ISOVER STEEL FRAME INFILL BATT IN THE CAVITY AND A 20 MM DEFLECTION HEAD, CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 2015.

Test Date: 7th July 2021

Report Issue Date: 8th July 2021

www.btconline.co.uk

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

UKAS TESTING
0296

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FOREWORD

This test report details a fire resistance test conducted on a metal stud partition clad on the exposed side with a triple layer of Gyproc FireLine and clad on the unexposed side with a single layer of Glasroc X Sheathing Board incorporating a 20 mm deflection head and 100 mm Isover Steel Frame Infill Batt in the cavity.

The test sponsor was British Gypsum.

The test specimen was installed by PVR Joinery. The construction of the specimen took place between the 1st and 5th July 2021. The Building Test Centre played no role in the design or selection of materials comprising the test specimen. This information is provided by the customer.

The test was conducted on the 7th July 2021.

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 1364-1 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.” (BS EN 1363-1: 2020, section 12.1)

REPORT AUTHORISATION

Report Author

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TEST REPORT AMENDMENTS

Page	Amendments	Date

Report Amendments Author	Amendments Authorised by
Name *Role*	**Name** *Role*

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TEST CONSTRUCTION

Description of Construction

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

A 104 mm x 40 mm x 1.2 mm gauge cold rolled structural steel channel was fixed to the base of the test aperture at 600 mm centres using 60 mm fire resistant fixings.

A 104 mm x 70 mm x 2.0 mm gauge cold rolled structural steel 'Slotted head' channel was fixed to the head of the test aperture at 600 mm centres using 60 mm fire resistant fixings.

100 mm x 50 mm x 1.2 mm gauge cold rolled structural steel studs were positioned at 600 mm centres between the channels. Each stud was cut 25 mm short and engaged into the slotted head channel and fixed through the slots with a 13 mm British Gypsum Wafer Head Jack-point Screw each side of the stud positions (25 mm below the top of the slot).

The right hand stud viewed from the unexposed face was not fixed to the perimeter of the test frame, and the gap between the stud and the frame lining was filled with a 25 mm thick rock mineral fibre gasket (stud was cut 25 mm short).

At the left-hand edge a 100 mm x 50 mm x 1.2 mm gauge cold rolled structural steel stud was used to fix the partition to the test frame, using 60 mm fire resistance fixings at 600 mm centres (stud was cut 25 mm short).

Thermocouples were added to the studs at mid height on the web, hot and cold flanges of the central two studs.

100 mm Isover Steel Frame Infill Batt was placed within the stud cavity.

A Gypframe GFS1 Fixing Strap was positioned 25 mm below the bottom edge of the head channel on the corridor (plasterboard) side of the partition and fixed to each stud with two 13 mm British Gypsum Wafer Head Jack-point Screws.

The exposed face of the specimen was clad with a triple layer of 15 mm Gyproc FireLine. All the boards were reduced to leave a 25 mm gap at the head of the specimen.

The inner layer boards were fixed with 25 mm British Gypsum Jack-Point Screws at 300 mm centres around the perimeter of the boards only, except to the head channel.

The middle layer boards were fixed with 41 mm British Gypsum Jack-Point Screws at 300 mm centres around the perimeter of the boards only, except to the head channel.

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The outer layer boards were fixed with 60 mm British Gypsum Jack-Point Screws at 300 mm centres around the perimeter and within the field of the boards to all framing members except the head channel. The uppermost board fixings were positioned 130 mm below the test frame concrete soffit.

All vertical joints were staggered between layers, with a full board at the right-hand side of the exposed face (as viewed from the unexposed side). A horizontal joint was positioned at 2400 mm from the base on the inner and outer layer exposed face boards and at 600 mm from the base on the middle layer exposed face boards. A Gypframe GFS1 Fixing Strap was used behind the horizontal outer layer board joint on the exposed face only.

The unexposed face of the specimen was clad with a single layer of 12.5 mm Glasroc X Sheathing Board. The boards were not cut short at the head. The boards were fixed with 25 mm Glasroc X Screws at 300 mm centres around the perimeter and within the field of the boards, except to the head channel. A horizontal joint was positioned at 2400 mm from the base on the unexposed face boards. The uppermost board fixings were positioned 130 mm below the test frame concrete soffit.

A continuous 6 mm bead of Glasroc X Sealant was applied along the vertical and horizontal edges of the board which had boards abutting against them. The Glasroc X Sheathing Boards were pushed up to the previous board so that the sealant ‘mushroomed’ out fully sealing the joint.

On the exposed face the 25 mm gap above the Gyproc FireLine boards was filled with a strip of Rockwool Flexi stone mineral wool insulation. A continuous bead of Gyproc Sealant was applied to the 25 mm legs of Gypframe GA4 Steel Angles and fixed to the head of the of the test aperture at 600 mm centres using 60 mm fire resistant fixings. The 50 mm legs extended down to cover the deflection head gap. A butt joint was added in the Gypframe GA4 Steel Angles 1000 mm from the fixed end.

All exposed face outer layer Gyproc FireLine board joints were taped and filled using Gyproc Paper Joint Tape and Gyproc Joint Filler as appropriate. All screw heads were spotted using Gyproc Joint Filler.

Note. The deflection head is constructed to 25 mm to accommodate a 20 mm downward deflection. This is due to the Rockwool Flexi in the head not being able to completely compress.

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Test Construction Drawings

Horizontal Cross Section (Head)

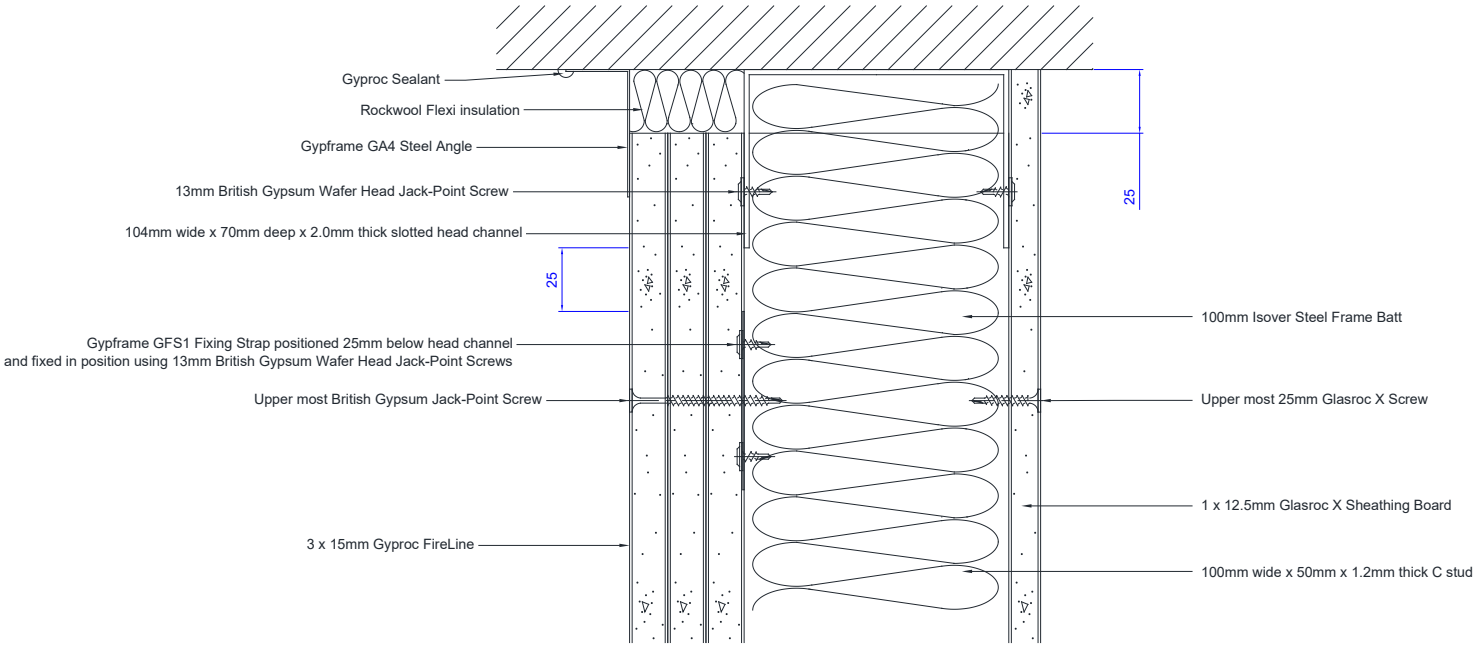

Figure 1 – Horizontal cross section (head).

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Exposed Face Elevation

Figure 2 – Exposed face elevation.

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Unexposed Face Elevation

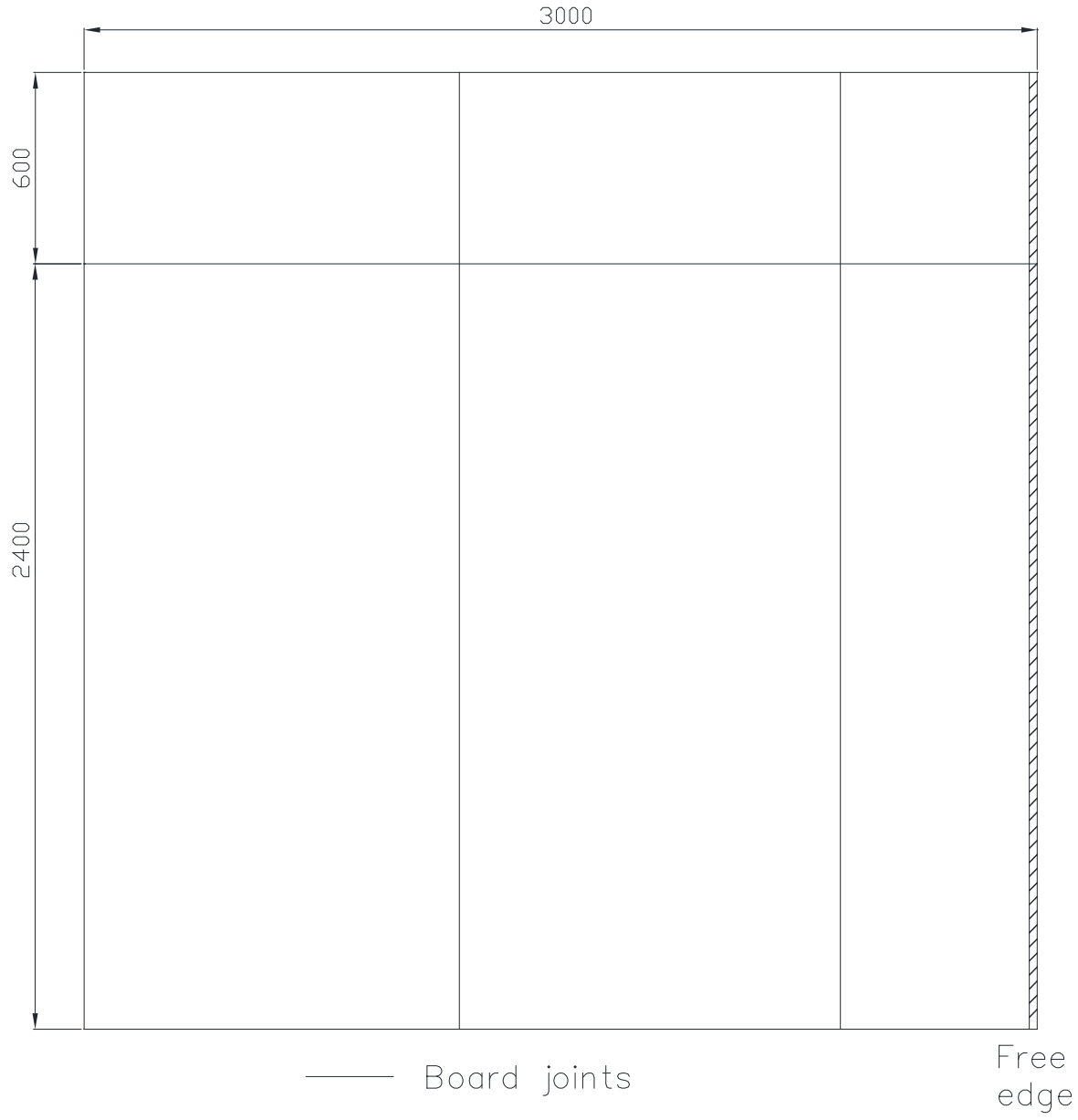

Figure 3 – Unexposed face elevation.

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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:	13.0 kg/m²
Measured thickness:	15.4 mm
Board identification numbers:	31 170 21 17:01
	31 170 21 17:01
	31 170 21 17:02
Measured moisture content:	0.47 %

ii) Nominally, 2400 mm (long) x 1200 mm (wide) x 12.5 mm (thick), Glasroc X (SE), manufactured and supplied by British Gypsum, ex Melnik.

Measured mass per unit area:	11.0 kg/m²
Measured thickness:	12.5 mm
Board identification numbers:	20 05 21 07:23
	20 05 21 07:24
	20 05 21 07:24
Measured moisture content:	0.21 %

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 GFS1 Fixing Strap, supplied by The Building Test Centre.
iv) Gypframe GA4 Steel Angle, supplied by British Gypsum.
v) 104 mm x 40 mm x 1.2 mm gauge cold rolled structural steel channel manufactured by Hadley Steel Framing and supplied by British Gypsum.

Measured web dimension	105 mm
Measured flange dimension	40 mm
Measured thickness	1.211 mm
Measured weight per metre	1.68 kg/m

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vi) 104 mm x 70 mm x 2.0 mm gauge cold rolled structural steel 'slotted head' channel. Incorporating slots on both sides 40 mm long at 25 mm centres. manufactured by Hadley Steel Framing and supplied by British Gypsum.

Measured web dimension	104 mm
Measured flange dimension	70 mm
Measured thickness	1.975 mm
Measured weight per metre	3.34 kg/m

vii) 100 mm x 50 mm x 1.2 mm gauge (with 12 mm returns) cold rolled structural steel studs manufactured by Hadley Steel Framing and supplied by British Gypsum.

Measured web dimension	100 mm
Measured flange dimension	50 mm
Measured thickness	1.280 mm
Measured weight per metre	2.13 kg/m

Fasteners

viii) 13 mm British Gypsum Wafer Head Jack-point Screws, supplied by The Building Test Centre.
ix) 25 mm British Gypsum Jack-point Screws, supplied by The Building Test Centre.
x) 41 mm British Gypsum Jack-point Screws, supplied by The Building Test Centre.
xi) 60 mm British Gypsum Jack-point Screws, supplied by The Building Test Centre.
xii) 60 mm fire resistant fixings, supplied by The Building Test Centre.
xiii) 25 mm Glasroc X Screws, supplied by British Gypsum.

Miscellaneous Components

xiv) Gyproc Paper Joint Tape, supplied by The Building Test Centre.
xv) Gyproc Joint Filler, supplied by The Building Test Centre.
xvi) Rock mineral fibre gasket, supplied by The Building Test Centre.
xvii) Glasroc X Sealant, supplied by British Gypsum.

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Insulation

xviii) Nominally 100 mm (thick) Isover Steel Frame Infill Batt, manufactured by Saint-Gobain Isover and supplied by British Gypsum.

Measured surface density: 1.837 kg/m²

xix) Nominally 50 mm (thick) Rockwool Flexi manufactured by Rockwool and supplied by British Gypsum.

Measured surface density: 1.707 kg/m²

Where measurements could not be taken and were provided by the customer or the manufacturer e.g. from material labelling, or where mass and dimension measurements were provided by the customer or the manufacturer e.g. customer has completed material dimension forms the results only apply to the sample as received.

All data and materials supplied by the customer or manufacturer are clearly identified.

Material information was sampled and recorded according to procedure AP070 vs. 1.1.

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TEST PROCEDURE

The test was conducted fully in accordance with BS EN 1364-1: 2015. The specimen was subjected to fire from one side, as specified in BS EN 1364-1: 2015.

The test specimen was not symmetrical and should therefore be tested in both orientations. No performance can be claimed for the system if installed with Glasroc X Sheathing Board exposed to the furnace without a separate test being undertaken to substantiate this orientation.

The test procedure used was EN 1364-1 Issue 3.

The ambient temperature at the commencement of the test was 22 °C.

The furnace pressure was set to control at 18 ± 2 Pa positive with respect to atmosphere, at the top of the specimen. Furnace pressure data is shown in **Figure 5**.

The test conditions did not meet the full requirements of BS EN 1363-1: 2020 as the test frame stiffness did not fully comply.

The specimen and associated construction were not conditioned in accordance with clause 8 of BS EN 1363-1: 2020.

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TEST RESULTS

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

Integrity	**Sustained Flaming**	**150 minutes, no failure.**
	6 mm Gap Gauge	**150 minutes, no failure.**
	25 mm Gap Gauge	**150 minutes, no failure.**
	Cotton Pad	**150 minutes, no failure.**
Insulation		**150 minutes, no failure.**
Test Terminated		**150 minutes, at the request of the sponsor.**

LIMITATIONS

The scope of the Field of Direct Application of the results and construction details in this test report is explained in BS EN 1364-1: 2015, section 13.

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TEST DATA

Observations

All observations refer to the exposed face unless stated.

Observers: Unexposed face: Lindsey Watson
Exposed face: Beth Kelliher and Eric Chee

Time Hours	Time Minutes	Observations
0	00	Test started.
0	10	Face paper charred. Jointing material was flaking away.
0	20	Left-hand vertical joint had opened up to approximately 2 mm. Right-hand vertical joint had opened up to approximately 2 mm. Horizontal joint had opened up to approximately 2-3 mm.
0	30	Left-hand vertical joint had opened up to approximately 11-12 mm. Right-hand vertical joint had opened up to approximately 6 mm. Horizontal joint had opened up to approximately 7-8 mm. Boards had begun to crack around screw heads adjacent to all board joints. *Unexposed face* No visible change.
0	40	No visible change.
0	50	Left-hand vertical joint had opened up to approximately 13 mm. Right-hand vertical joint had opened up to approximately 7 mm. Horizontal joint had opened up to approximately 8-9 mm.
1	00	Left-hand vertical joint had opened up to approximately 14 mm. Right-hand vertical joint had opened up to approximately 8 mm. Horizontal joint had opened up to approximately 10 mm. *Unexposed face* No visible change.
1	10	Left-hand vertical joint had opened up to approximately 15 mm.

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Time Hours	Time Minutes	Observations
1	20	Left-hand vertical joint had opened up to approximately 16-17 mm.
1	30	No visible change. *Unexposed face* No visible change.
1	40	Left-hand vertical joint had opened up to approximately 22-24 mm. Horizontal joint had opened up to approximately 11-12 mm.
1	50	Lower centre board had fallen into the furnace.
2	00	Lower left-hand board had fallen into the furnace. Second layer right-hand vertical joint had opened up to approximately 6-7 mm. Second layer left-hand vertical joint had opened up to approximately 5-6 mm. *Unexposed face* No visible change.
2	10	Second layer boards were heavily crazed. Second layer right-hand vertical joint had opened up to approximately 12-13. Second layer left-hand vertical joint had opened up to approximately 7 mm.
2	20	Second layer lower centre and lower right-hand board had fallen into the furnace. Third layer left-hand vertical joint had opened up to approximately 8 mm.
2	28	*Unexposed face* Left-hand vertical joint had discoloured from approximately 1300-1500 mm height.
2	30	Third layer lower centre board had fallen into the furnace. **TEST TERMINATED** at the request of the sponsor.

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Furnace Temperature Graph

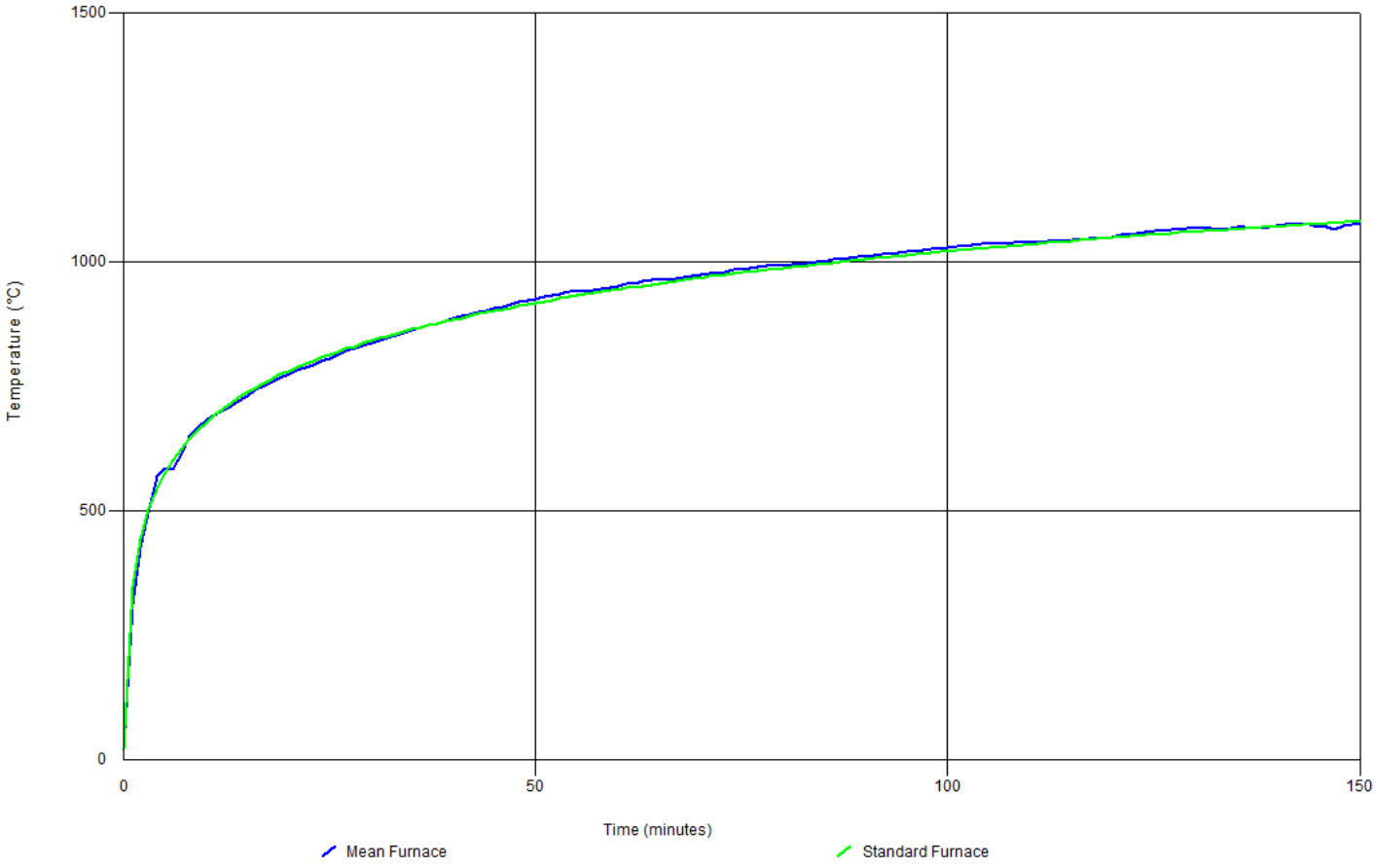

Figure 4 – Furnace temperature graph.

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Furnace Pressure Graph

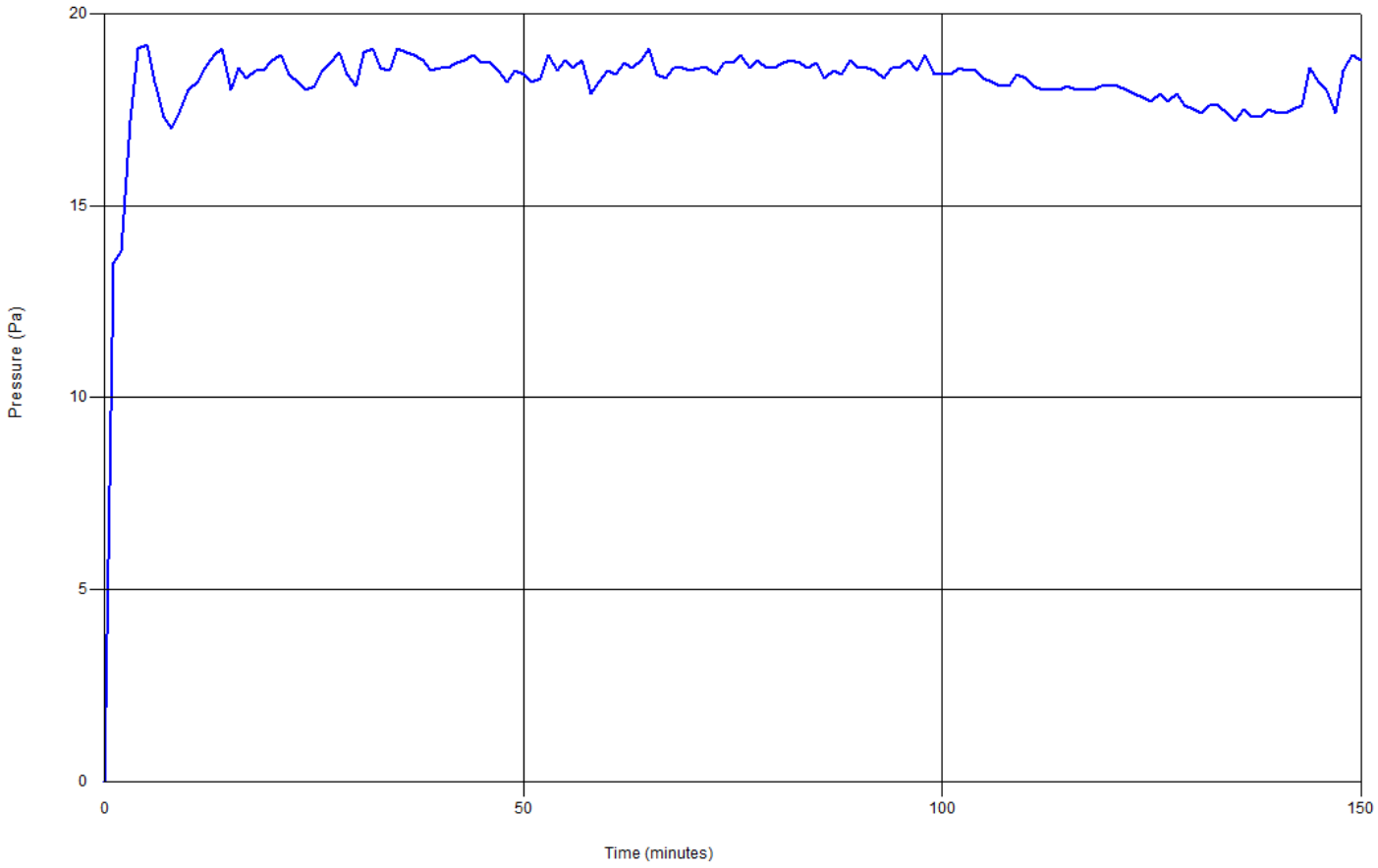

Figure 5 – Furnace pressure graph.

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Unexposed Face Temperature Graph

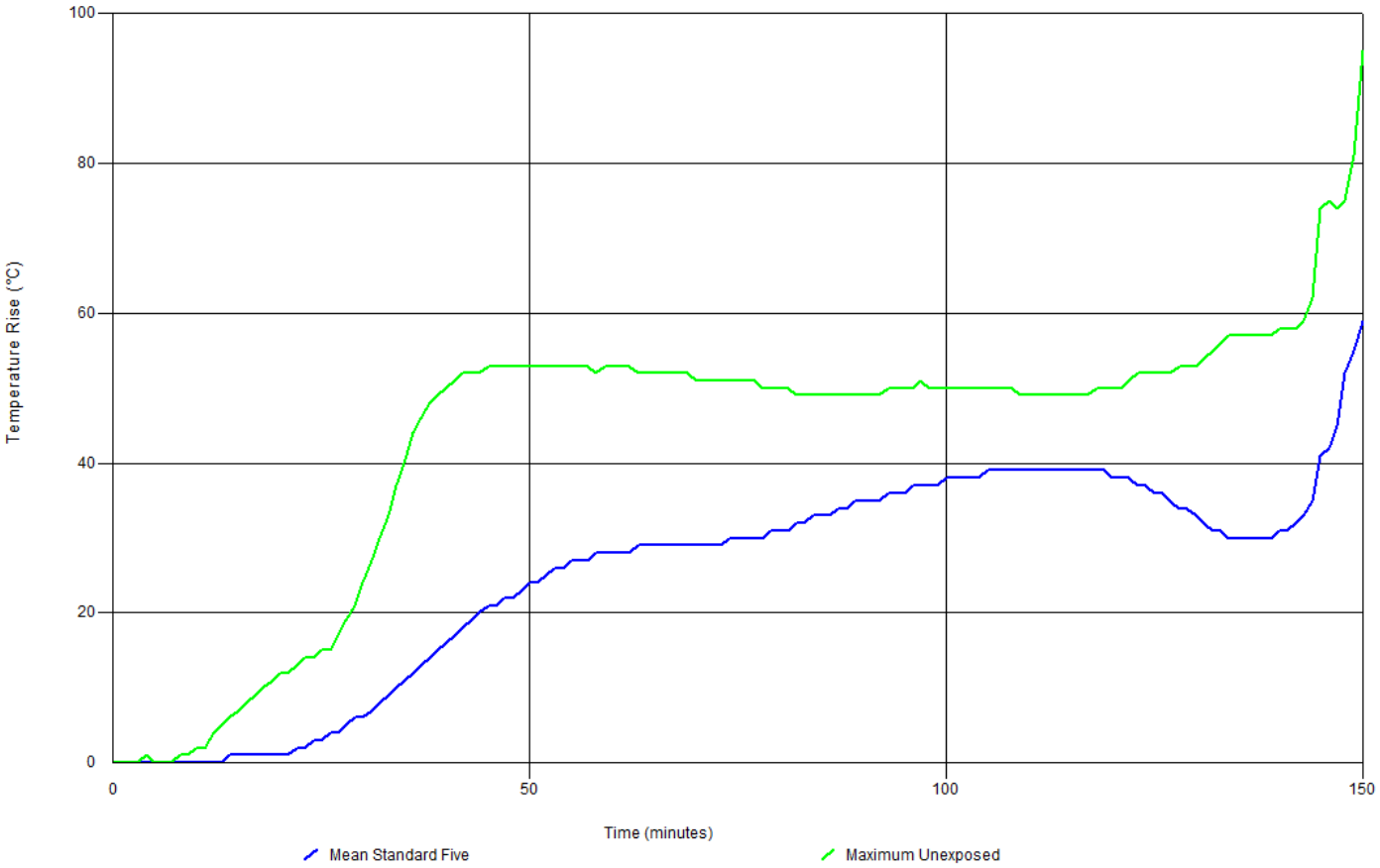

Figure 6 – Unexposed face temperature graph.

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Unexposed Face Thermocouple Layout

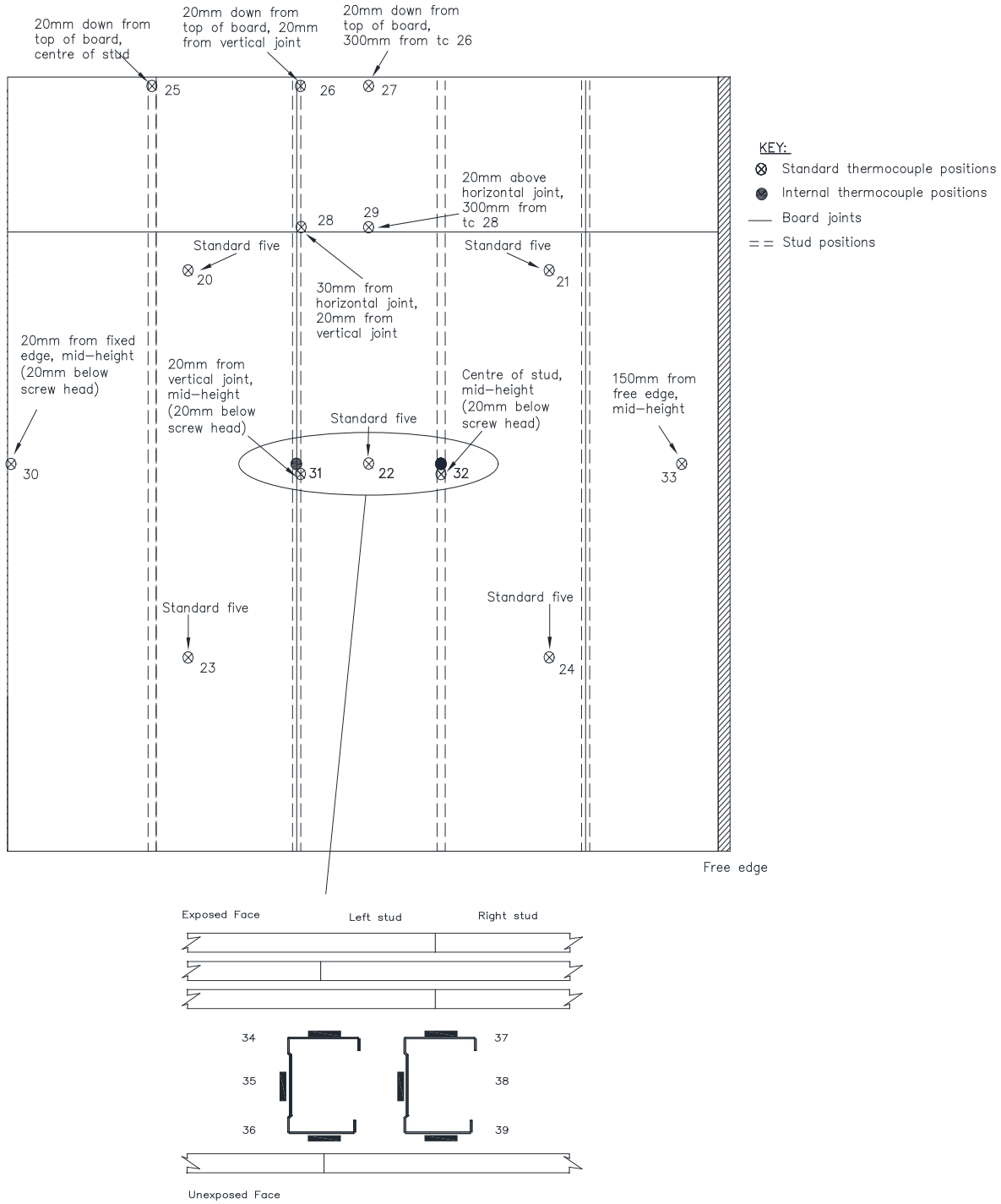

Figure 7 – Unexposed face thermocouple layout.

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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	0	0	0	0	0	0
11	0	0	0	0	0	0
12	0	0	0	0	0	0
13	0	1	1	0	0	0
14	1	1	1	1	0	1
15	1	1	1	1	1	1
16	1	1	1	1	1	1
17	1	1	1	1	1	1
18	1	1	1	1	1	1
19	1	1	1	1	1	1
20	1	1	2	1	1	1
21	2	1	2	1	1	1
22	2	2	2	2	2	2
23	2	2	3	2	2	2
24	3	3	3	3	3	3
25	4	3	4	3	3	3
26	4	3	4	4	4	4
27	5	4	5	4	4	4
28	6	5	6	5	5	5
29	6	5	6	5	6	6
30	7	6	7	6	6	6
31	8	7	8	7	7	7
32	9	8	9	8	8	8
33	10	9	10	9	9	9
34	11	10	11	10	10	10
35	12	11	12	11	11	11
36	13	13	13	11	12	12
37	14	14	13	12	13	13
38	15	15	15	13	14	14

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Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
39	16	16	15	14	15	15
40	17	18	16	15	16	16
41	18	19	17	16	17	17
42	18	20	18	17	18	18
43	19	21	19	17	18	19
44	20	22	20	18	19	20
45	21	23	21	19	20	21
46	22	24	21	19	20	21
47	22	25	22	20	21	22
48	23	25	23	20	21	22
49	24	26	24	21	22	23
50	25	27	25	21	22	24
51	25	27	26	21	23	24
52	26	28	27	22	23	25
53	26	29	28	22	23	26
54	27	29	28	23	24	26
55	27	30	29	23	24	27
56	27	30	30	23	24	27
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58	28	31	31	24	24	28
59	28	31	31	24	25	28
60	28	32	32	24	25	28
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63	29	32	32	25	25	29
64	29	32	32	25	25	29
65	29	32	32	25	25	29
66	30	32	32	25	25	29
67	30	32	32	25	25	29
68	30	32	32	25	25	29
69	30	32	32	25	25	29
70	30	32	32	26	25	29
71	30	32	32	26	25	29
72	30	32	32	26	25	29
73	30	32	32	27	26	29
74	31	32	32	27	26	30
75	31	32	32	27	26	30
76	31	32	32	28	27	30
77	32	32	32	28	27	30
78	32	32	32	28	27	30
79	33	32	32	29	28	31

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Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
80	33	33	33	29	28	31
81	33	33	33	29	29	31
82	34	33	33	30	29	32
83	34	34	33	30	30	32
84	35	34	34	31	30	33
85	35	34	34	31	31	33
86	35	35	34	31	31	33
87	36	35	34	32	32	34
88	36	35	35	32	32	34
89	37	36	35	33	33	35
90	37	36	35	33	33	35
91	37	36	35	33	34	35
92	37	36	36	33	34	35
93	38	37	36	34	35	36
94	38	37	36	34	35	36
95	38	37	36	34	36	36
96	39	37	36	35	36	37
97	39	37	36	35	36	37
98	39	38	37	35	37	37
99	39	38	37	36	37	37
100	40	38	37	36	37	38
101	40	38	37	36	37	38
102	40	38	38	36	38	38
103	40	38	38	37	38	38
104	40	38	38	37	38	38
105	40	39	38	37	39	39
106	40	39	38	37	39	39
107	40	39	38	37	39	39
108	40	39	38	38	39	39
109	40	39	39	38	40	39
110	40	39	39	38	40	39
111	40	39	39	38	40	39
112	40	39	39	38	40	39
113	40	39	39	39	40	39
114	40	39	38	39	40	39
115	40	39	38	39	40	39
116	39	39	38	39	40	39
117	39	39	38	39	40	39
118	39	39	37	39	40	39
119	39	39	37	38	40	39
120	39	38	37	38	40	38

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Time (minutes)	Temperature Rise (°C)					
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	Mean Standard Five
121	38	38	36	38	39	38
122	38	38	35	38	39	38
123	38	37	34	37	38	37
124	38	37	33	37	38	37
125	37	37	32	37	38	36
126	37	36	32	37	37	36
127	36	36	31	36	36	35
128	35	36	30	36	35	34
129	34	35	30	35	34	34
130	33	34	29	34	34	33
131	32	33	29	33	33	32
132	32	32	29	32	32	31
133	31	31	29	32	32	31
134	30	30	30	31	31	30
135	30	30	30	30	31	30
136	30	29	31	30	30	30
137	30	28	32	30	30	30
138	30	28	33	29	30	30
139	31	28	34	29	30	30
140	31	27	36	30	30	31
141	32	27	38	30	30	31
142	33	27	40	31	30	32
143	33	27	43	32	31	33
144	34	28	48	34	32	35
145	36	28	74	36	33	41
146	37	28	75	38	34	42
147	39	29	74	45	36	45
148	41	30	74	75	38	52
149	58	31	74	73	40	55
150	70	32	77	75	41	59

See **Figure 7** for the location of the thermocouples.

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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
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	1	1	0	0	0
10	1	2	0	1	0
11	1	2	1	1	0
12	1	4	1	1	0
13	1	5	1	1	0
14	2	6	2	2	1
15	3	7	2	2	1
16	3	8	3	3	1
17	4	9	4	3	1
18	5	10	5	4	1
19	6	11	5	5	1
20	7	12	6	6	1
21	8	12	7	7	1
22	9	13	8	8	1
23	10	14	8	9	2
24	12	14	9	10	2
25	13	15	10	12	2
26	15	15	11	13	3
27	17	16	11	15	3
28	19	17	12	17	4
29	21	17	13	18	4
30	24	18	14	20	5
31	27	18	15	22	6
32	30	19	16	23	7
33	33	19	17	25	8
34	37	20	18	26	9
35	40	22	19	27	10
36	44	23	21	27	11
37	46	25	23	27	12
38	48	28	25	28	14

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
39	49	30	26	28	15
40	50	32	28	29	16
41	51	34	29	30	18
42	52	35	31	31	19
43	52	37	32	32	20
44	52	38	33	33	22
45	53	39	34	34	23
46	53	39	35	35	24
47	53	40	36	37	25
48	53	40	37	38	26
49	53	40	37	38	27
50	53	40	38	39	28
51	53	41	38	39	28
52	53	41	39	40	29
53	53	41	39	40	30
54	53	40	39	40	30
55	53	40	39	40	30
56	53	40	40	40	31
57	53	39	40	41	31
58	52	39	41	41	32
59	53	40	41	41	32
60	53	40	41	41	32
61	53	41	42	41	32
62	53	41	41	40	32
63	52	42	42	41	33
64	52	43	42	41	33
65	52	43	42	42	33
66	52	43	42	42	33
67	52	43	43	42	32
68	52	44	43	43	32
69	52	44	43	43	32
70	51	43	43	43	32
71	51	43	43	43	32
72	51	43	43	43	32
73	51	42	43	44	32
74	51	41	43	44	32
75	51	41	43	44	32
76	51	40	43	45	32
77	51	40	44	45	32
78	50	39	44	45	32
79	50	39	44	46	32

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
80	50	38	44	46	32
81	50	38	44	47	32
82	49	38	44	47	32
83	49	38	44	47	32
84	49	38	44	47	33
85	49	38	45	48	33
86	49	38	45	48	33
87	49	39	45	48	33
88	49	39	45	49	33
89	49	39	45	49	34
90	49	39	45	49	34
91	49	39	45	49	34
92	49	40	45	49	34
93	49	40	46	50	35
94	49	40	46	50	35
95	49	40	46	50	35
96	49	40	46	50	36
97	50	40	46	51	36
98	49	41	46	50	36
99	49	41	46	50	36
100	49	41	47	50	36
101	49	41	47	50	37
102	49	41	47	50	37
103	49	41	47	50	37
104	49	42	47	50	37
105	49	42	47	50	37
106	48	42	48	50	37
107	48	42	48	50	37
108	48	42	48	50	37
109	48	42	48	49	36
110	48	42	48	49	36
111	48	42	49	49	36
112	48	42	49	48	36
113	48	42	49	47	36
114	48	42	49	47	36
115	48	42	49	47	35
116	48	42	49	46	35
117	48	42	49	46	35
118	47	43	50	46	35
119	47	43	50	47	35
120	47	43	50	47	35

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
121	47	44	50	47	35
122	47	45	51	46	35
123	47	45	52	45	34
124	47	45	52	44	34
125	47	45	52	43	34
126	48	45	52	42	33
127	48	45	52	41	32
128	48	45	53	40	31
129	50	45	53	40	31
130	53	45	53	39	30
131	54	45	53	39	30
132	55	46	52	39	29
133	56	46	52	39	29
134	57	46	52	39	28
135	57	46	52	40	28
136	57	46	52	40	28
137	57	47	52	41	28
138	57	47	52	42	29
139	57	48	53	42	29
140	58	48	53	43	29
141	58	48	53	44	29
142	58	49	53	45	30
143	58	50	53	46	30
144	58	50	52	47	31
145	58	51	52	48	33
146	58	51	52	49	35
147	58	52	52	50	36
148	58	52	52	52	37
149	58	53	52	53	38
150	58	53	52	55	40

See **Figure 7** for the location of the thermocouples.

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Additional Unexposed Face Temperature Data

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

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
39	13	19	22	12
40	14	20	26	13
41	15	21	29	14
42	16	21	33	15
43	17	22	36	16
44	18	23	39	16
45	20	24	41	17
46	21	25	43	18
47	22	25	44	18
48	24	26	45	19
49	25	26	45	19
50	26	27	46	20
51	27	27	46	20
52	28	28	46	21
53	29	28	47	21
54	30	29	47	22
55	30	29	47	22
56	31	29	46	22
57	31	30	47	23
58	32	30	47	23
59	32	30	47	23
60	32	31	46	24
61	32	31	47	24
62	33	30	47	24
63	33	31	46	24
64	33	31	46	24
65	33	31	45	25
66	34	31	44	25
67	34	31	44	25
68	34	32	43	25
69	34	32	43	25
70	34	33	42	26
71	34	33	42	26
72	34	33	42	26
73	34	34	42	26
74	34	34	42	26
75	35	34	42	26
76	35	35	41	27
77	35	35	41	27
78	35	35	41	27
79	35	36	41	27

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
80	35	36	41	28
81	35	36	41	28
82	35	37	41	28
83	36	37	40	29
84	36	38	40	29
85	36	38	40	30
86	36	38	40	30
87	36	39	40	30
88	36	40	39	31
89	37	40	39	31
90	37	40	39	31
91	37	40	39	32
92	37	41	38	32
93	37	41	38	32
94	37	41	38	33
95	38	41	38	33
96	38	41	38	33
97	38	41	38	33
98	38	41	38	34
99	38	41	38	34
100	39	42	38	34
101	39	42	37	35
102	39	42	37	35
103	39	42	37	35
104	39	42	37	35
105	39	43	37	36
106	39	43	36	36
107	40	43	36	36
108	40	43	36	36
109	40	43	36	36
110	40	43	36	36
111	40	43	36	37
112	40	43	36	37
113	40	42	36	37
114	41	42	37	37
115	41	42	37	37
116	41	41	37	38
117	41	41	38	38
118	41	40	38	38
119	41	40	39	38
120	41	39	39	38

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Time (minutes)	Temperature Rise (°C)			
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33
121	41	39	40	37
122	41	38	40	37
123	41	37	40	37
124	41	37	40	37
125	41	36	40	37
126	41	35	41	36
127	41	35	41	36
128	41	35	41	36
129	41	35	42	35
130	41	36	43	35
131	41	36	44	34
132	41	36	45	33
133	41	37	46	32
134	41	38	47	31
135	41	39	48	30
136	41	41	49	30
137	40	42	50	29
138	40	44	51	29
139	40	46	52	28
140	40	49	54	28
141	40	51	55	28
142	40	54	57	27
143	40	56	59	27
144	40	59	62	27
145	40	61	68	27
146	40	63	72	27
147	41	66	74	28
148	41	72	74	28
149	41	76	81	29
150	42	83	95	29

See **Figure 7** for the location of the thermocouples.

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Internal Temperature Data at 1500 mm Height

Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
0	33	30	27	34	31	28
1	34	30	28	34	31	28
2	35	30	28	34	31	29
3	36	31	28	35	31	28
4	36	31	29	35	31	29
5	37	31	28	36	31	29
6	40	31	28	37	31	29
7	41	31	28	38	32	29
8	43	32	28	39	32	29
9	45	32	28	40	32	29
10	47	33	28	42	33	29
11	49	34	28	44	33	29
12	51	35	29	46	34	29
13	54	36	29	48	35	30
14	56	37	29	51	36	30
15	59	38	30	53	37	31
16	62	40	30	56	39	31
17	64	42	31	58	40	32
18	67	44	32	60	42	33
19	70	46	33	62	43	34
20	72	47	34	66	45	35
21	75	49	35	67	47	36
22	77	53	36	69	48	37
23	79	53	37	71	50	38
24	81	56	39	74	53	40
25	83	57	40	77	55	42
26	85	59	42	79	58	44
27	87	62	43	82	61	46
28	89	63	45	84	63	49
29	91	65	47	87	66	52
30	93	67	49	90	69	56
31	94	69	51	92	71	60
32	95	71	53	95	73	63
33	97	72	55	97	76	67
34	97	74	56	97	79	72
35	98	75	58	98	82	77
36	99	76	60	99	85	82

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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
37	99	77	62	99	89	86
38	100	78	64	99	91	89
39	100	79	65	100	93	91
40	101	80	66	101	95	93
41	101	80	67	101	95	93
42	102	81	68	102	96	94
43	102	81	69	103	96	95
44	102	82	70	103	96	95
45	103	82	70	104	96	95
46	103	82	71	104	95	94
47	103	83	71	105	96	94
48	104	83	72	106	96	95
49	104	83	73	107	96	95
50	105	83	73	108	96	95
51	105	84	73	109	96	95
52	106	84	74	110	96	95
53	107	85	75	111	96	95
54	109	85	76	112	96	95
55	109	85	76	113	96	95
56	110	85	77	113	96	95
57	113	85	77	115	96	95
58	114	85	78	116	97	95
59	115	85	78	117	97	95
60	115	86	78	119	97	95
61	117	86	78	121	97	95
62	119	86	78	122	97	95
63	120	86	78	124	97	94
64	121	87	78	126	97	94
65	121	87	79	128	96	94
66	122	87	79	131	96	93
67	123	88	79	133	96	93
68	124	88	79	134	96	93
69	125	89	80	136	96	92
70	127	89	80	137	96	92
71	128	89	80	138	96	92
72	129	90	81	140	97	92
73	131	90	81	141	97	92
74	132	91	81	142	97	92
75	134	91	82	143	97	92

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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
76	135	92	82	144	98	92
77	137	92	82	145	98	92
78	139	93	83	147	98	92
79	141	93	83	148	98	92
80	142	94	84	149	98	92
81	144	95	84	151	99	92
82	145	95	85	152	99	92
83	147	96	85	154	99	92
84	148	96	86	155	100	92
85	150	97	86	157	100	92
86	151	97	86	159	100	92
87	152	98	87	161	101	92
88	153	98	87	163	102	91
89	155	99	87	166	102	91
90	156	99	88	168	103	91
91	157	99	88	171	104	91
92	158	100	88	174	104	91
93	159	100	89	177	105	91
94	160	101	89	180	106	91
95	161	101	89	183	108	91
96	162	102	89	186	110	91
97	163	103	89	190	112	91
98	164	104	89	193	115	91
99	165	104	89	197	118	91
100	166	105	90	201	122	91
101	168	106	90	204	125	91
102	169	106	90	208	127	91
103	170	107	90	211	129	91
104	172	108	90	215	130	91
105	173	109	90	218	132	91
106	175	109	90	222	134	91
107	177	110	90	226	135	91
108	180	111	90	230	137	91
109	182	112	90	234	139	92
110	185	113	90	239	142	93
111	188	114	90	243	144	95
112	192	115	90	249	148	96
113	196	116	90	254	151	98
114	200	118	90	260	154	100

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Time (minutes)	Actual Temperature (°C)					
	Left stud			Right stud		
	Hot Flange Thermocouple No. 34	Web Thermocouple No. 35	Cold Flange Thermocouple No. 36	Hot Flange Thermocouple No. 37	Web Thermocouple No. 38	Cold Flange Thermocouple No. 39
115	206	119	90	266	158	104
116	212	121	89	273	165	106
117	219	124	89	280	170	109
118	226	127	89	288	175	111
119	234	129	89	297	180	113
120	242	133	89	307	185	116
121	251	137	89	316	192	120
122	265	139	89	327	199	124
123	281	145	89	337	206	127
124	296	151	90	348	213	132
125	311	158	91	361	221	136
126	326	165	93	373	229	141
127	343	174	96	385	237	146
128	359	183	100	397	246	152
129	376	193	104	409	256	157
130	392	203	108	420	265	163
131	408	214	112	429	274	168
132	423	225	117	442	283	174
133	438	237	122	452	293	180
134	455	248	128	464	303	185
135	472	259	134	479	313	191
136	492	273	141	498	323	198
137	516	288	147	525	335	204
138	544	309	154	565	349	212
139	569	331	162	605	367	222
140	590	349	171	645	389	235
141	602	367	184	680	415	249
142	638	394	202	713	445	266
143	871	422	226	642	481	304
144	-	443	270	670	625	403
145	-	583	571	692	763	588
146	-	767	771	886	876	825
147	-	696	929	926	918	964
148	-	951	845	1033	912	983
149	-	1049	848	-	876	991
150	-	-	950	-	884	1014

- Thermocouple broken due to equipment failure.

See **Figure 7** for the location of the thermocouples.

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Specimen Lateral Deflection

Time (minutes)	Deflection (mm)
	Centre
0	0
1	1
2	1
3	1
4	1
5	1
6	1
7	1
8	1
9	2
10	2
11	2
12	2
13	2
14	2
15	3
16	3
17	3
18	3
19	3
20	3
21	4
22	4
23	4
24	4
25	4
26	4
27	4
28	4
29	4
30	4
31	4
32	4
33	4
34	4
35	4
36	3
37	3
38	3

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Time (minutes)	Deflection (mm)
	Centre
39	3
40	3
41	2
42	2
43	2
44	2
45	2
46	2
47	2
48	2
49	2
50	2
51	2
52	2
53	2
54	2
55	2
56	2
57	2
58	2
59	2
60	2
61	2
62	2
63	2
64	2
65	2
66	2
67	2
68	2
69	3
70	3
71	3
72	3
73	3
74	3
75	3
76	3
77	3
78	3
79	3

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Time (minutes)	Deflection (mm)
	Centre
80	3
81	4
82	4
83	4
84	4
85	4
86	4
87	4
88	4
89	4
90	4
91	5
92	5
93	5
94	5
95	5
96	5
97	6
98	6
99	6
100	6
101	7
102	7
103	7
104	8
105	8
106	8
107	9
108	9
109	10
110	10
111	11
112	12
113	12
114	13
115	14
116	14
117	15
118	16
119	17
120	18

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Time (minutes)	Deflection (mm)
	Centre
121	19
122	20
123	22
124	24
125	25
126	27
127	29
128	30
129	31
130	33
131	34
132	36
133	38
134	39
135	41
136	43
137	45
138	48
139	51
140	54
141	57
142	60
143	63
144	65
145	65
146	65
147	68
148	71
149	68
150	65

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

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PHOTOGRAPHS

Exposed Face Prior to Test

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Unexposed Face Prior to Test

UKAS TESTING
0296

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Unexposed Face at 30 Minutes

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Unexposed Face at 1 Hour

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Unexposed Face at 1 Hour, 30 Minutes

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Unexposed Face at 2 Hours

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Unexposed Face at 2 Hours, 30 Minutes, at Test Termination

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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 3000 mm.

ii) Increase in the thickness of the wall (minimum thickness 161.5 mm).

iii) Increase thickness of component materials (minimum stud depth at 100 mm, minimum stud gauge 1.2 mm).

iv) Decrease in the linear dimensions of the boards but not thickness (≤ 2400 mm (long) x ≤ 1200 mm (wide) Gyproc FireLine & ≤ 2400 mm (long) x ≤ 1200 mm (wide) Glasroc X).

v) Decrease stud spacing from 600 mm.

vi) Decrease in fixing centres from 300 mm.

vii) Increase in the number of horizontal joints, of the type tested, when tested with one joint not more than (500±150) mm from the top edge.

Extension of Width

For test specimens tested without a supporting construction, the width of an identical construction may be increased as the specimen was tested at nominally 3000 mm wide with one vertical edge without restraint.

Extension of Height

The height of the construction may be increased by 1000 mm under the following conditions:

30 minutes	60 minutes	90 minutes	120 minutes	150 minutes
≤ 100 mm	≤ 100 mm	≤ 100 mm	≤ 100 mm	≤ 100 mm