

Report Number: **BTC 20790F**

A FIRE RESISTANCE TEST ON A 5m HIGH SHAFTWALL SYSTEM INCORPORATING A 60mm GYPFRAME METAL STUD FRAMEWORK CLAD WITH A DOUBLE LAYER OF 12.5mm GYPROC FIRELINE WITH 25mm ISOVER ACOUSTIC PARTITION ROLL IN CAVITY. EXPOSED TO THE FIRE FROM THE SHAFT SIDE. CONDUCTED IN ACCORDANCE WITH BS EN 1364-1: 2015.

Test Date: 23rd January 2019

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FOREWORD

This test report details a fire resistance test conducted on a 5 m British Gypsum ShaftWall, with one layer of CoreBoard on the exposed face and two layers of Gyproc FireLine board on the unexposed face, tested from the shaft side.

The test sponsor was British Gypsum.

The test specimen was installed by PVR Joinery. The construction of the specimen took place between the 21st and 22nd January 2019. The Building Test Centre played no role in the design or selection of materials comprising the test specimen.

The test was conducted on the 23rd January 2019.

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: 2012, section 12.1)

REPORT AUTHORISATION

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TEST REPORT AMENDMENTS

Page	Amendments	Date

Report Amendments Author

Name
Role

Amendments Authorised by

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 5000mm (high) x 3000mm (wide).

Gypframe 62DC50 Deep Flange Floor and Ceiling Channel was fixed to the base of the test aperture using 60mm fire resistant fixings at 600mm centres.

A continuous strip of Gyproc FireStrip was placed along the centreline of a Gypframe 62JC70 'J' Channel and attached to the head of the frame using 60mm fire resistant fixings at 300mm centres (short flange "Corridor side" to the unexposed face). A bead of Gyproc Sealant was applied between the head of the test frame and the Gypframe 62JC70 'J' Channel on the unexposed face of specimen.

Gypframe 60SC55 Starter Channels were butt-jointed in order to leave a 15mm gap between the top of the starter channel and the head channel. The starter channels were positioned between the head and base channels at the left-hand side of the aperture as viewed from the unexposed face and fixed at 600mm centres using 60mm fire resistant fixings.

Extended Gypframe 60I70 'I' Studs were shortened in order to leave a 15mm gap between the top of the stud and the head channel and were positioned between the head and base channels at 600mm centres.

Gypframe 60I70 'I' Studs were extended by trimming the 'I' stud flanges leaving a 200mm web extension which was then overlapped with an adjoining 'I' stud and fixed through the stud webs with four British Gypsum Wafer Head Screws. The join was positioned 3600mm from the base of the studs.

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 framing lining was filled with a 25mm thick rock mineral fibre gasket.

One layer of 19mm Gyproc CoreBoard, reduced in length to leave a 15mm gap at the head of the aperture, was inserted between the studs with a horizontal joint at 1500mm and 4500mm height.

Two 122mm wide x 19mm Gyproc CoreBoard fire stops were positioned fully into the web of the head channel and behind the vertical flanges of the studs. These were fixed in position through the head channel using 2 x 35mm British Gypsum Drywall Screws.

Gypframe GA3 Steel Angle was placed in the horizontal board joints. Two beads of Gyproc Sealant (one top and one bottom) were applied to the back of a 122mm wide x 19mm Gyproc

CoreBoard fire stops and were fixed to the Gypframe GA3 Steel Angle using 3 x 35mm British Gypsum Jack-Point screws.

Gypframe G102 Retaining Channels (cut to accommodate the fire stops) were positioned between the 19mm Gyproc CoreBoard and the Gypframe 60I70 'I' Studs / Gypframe 60SC55 Starter Channels.

25mm Isover Acoustic Partition Roll 1200 insulation was placed within the stud cavity.

The corridor framework was clad with a double layer of 12.5mm Gyproc FireLine. All the boards were reduced to leave a 15mm gap at the head of the specimen.

The inner layer of boards was screw fixed at 300mm centres to all framing members, except the head channel, using 35mm British Gypsum Jack-Point Screws. Horizontal joints were positioned at 600mm and 3000mm from the base of the specimen.

The outer layer of boards was screw fixed at 300mm centres to all framing members, except the head channel, using 41mm British Gypsum Jack-Point Screws. Horizontal joints were positioned at 2400mm and 4800mm from the base of the specimen.

All joints were staggered between layers.

Gypframe GFS1 Fixing Straps were used to back the horizontal outer layer board joints on the unexposed face.

All external 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.

Test Construction Drawings

Horizontal Cross Section

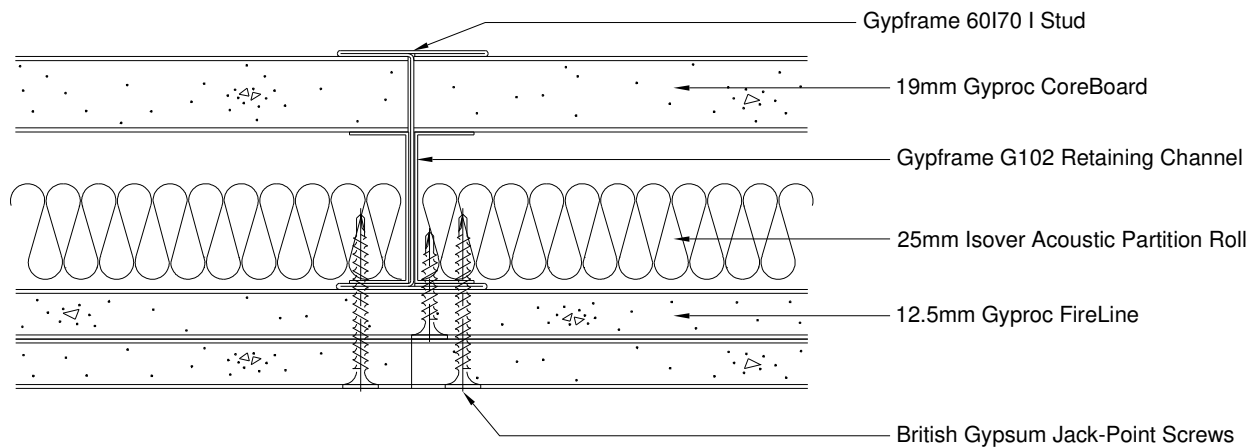


Figure 1 – Horizontal cross section.

Exposed Face Elevation

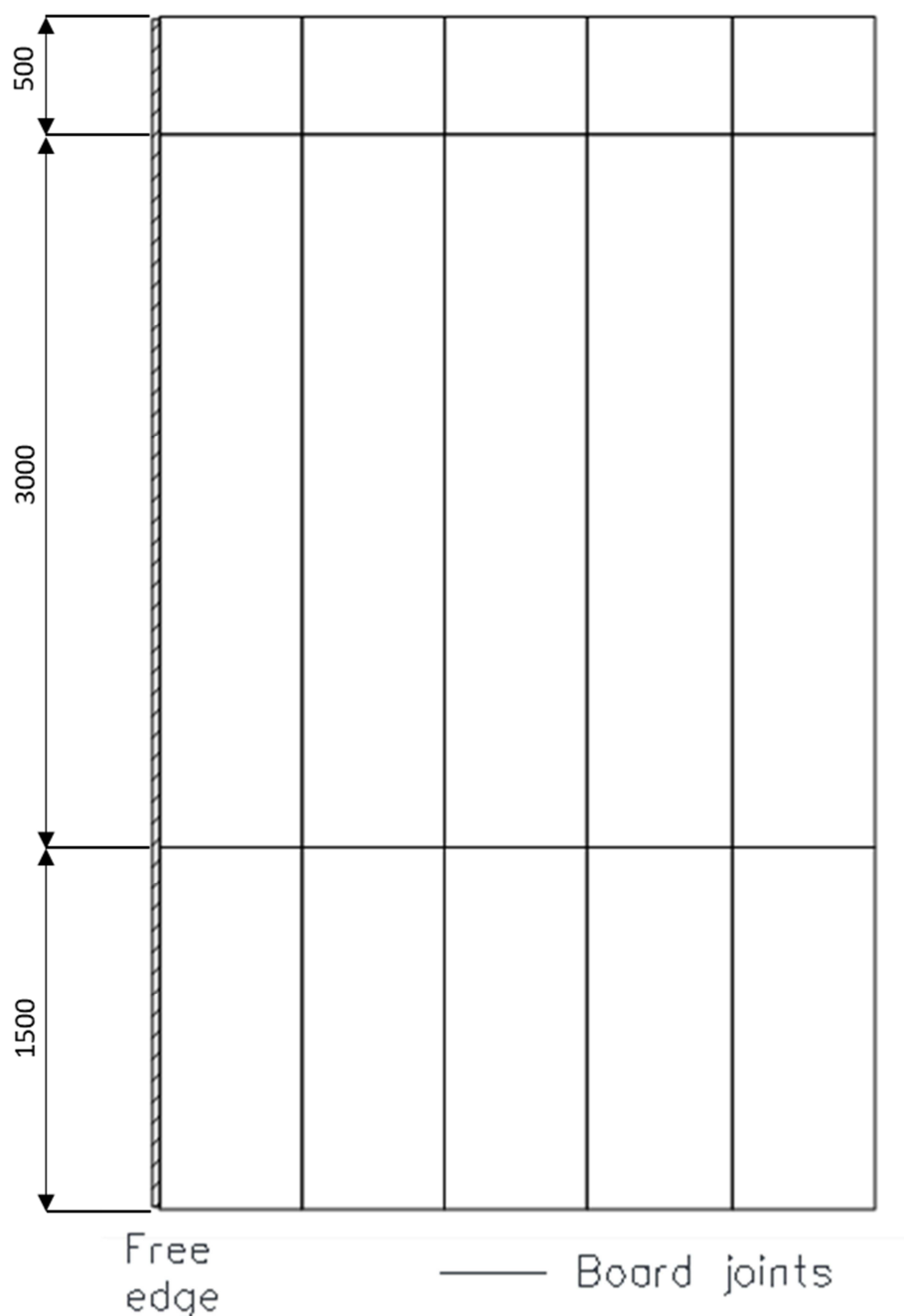
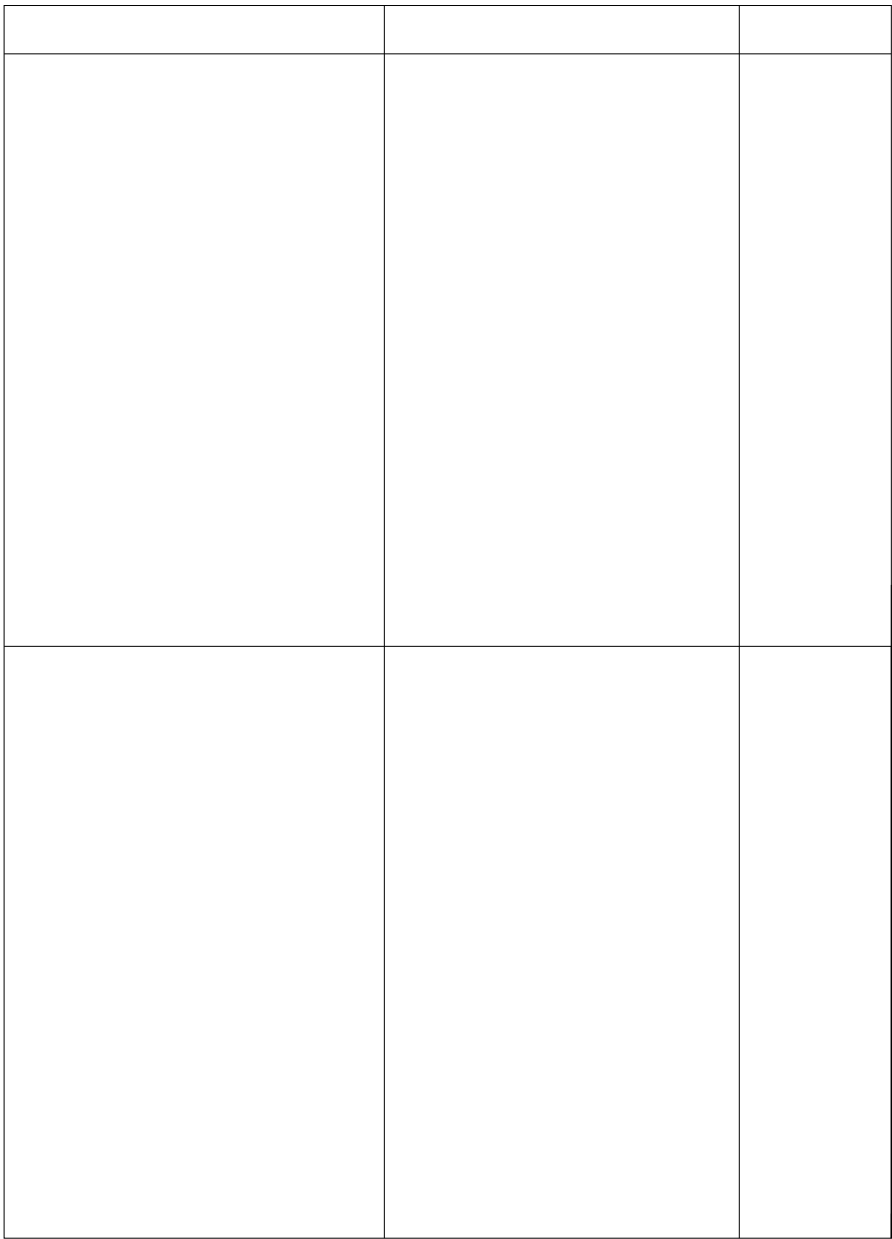


Figure 2 – Exposed face elevation.

Unexposed Face Elevation



Free Edge

Figure 3 – Unexposed face elevation.

TEST MATERIALS

Plasterboard

- i) Nominally, 2400 mm (long) x 1200 mm (wide) x 12.5 mm (thick), Gyproc FireLine (TE), manufactured and supplied by British Gypsum, ex Sherburn.

Measured mass per unit area:	10.1 kg/m ²
Measured thickness:	13.0 mm
Board identification numbers:	31 316 18 05:21 31 316 18 05:22 31 316 18 05:22
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:	16.1 kg/m ²
Measured thickness:	18.9 mm
Board identification numbers:	18 206 18 07:30 18 206 18 07:31 18 206 18 07:31
Measured moisture content:	0.35%

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 62JC70 'J' Channel.
- iv) Gypframe 62DC50 Deep Flange Floor & Ceiling Channel.
- v) Gypframe 60SC55 Starter Channel.
- vi) Gypframe 60I70 'I' Stud.
- vii) Gypframe G102 Retaining Channel.
- viii) Gypframe GA3 Steel Angle.
- ix) Gypframe GFS1 Fixing Strap.

All metal components were supplied by British Gypsum.

Fasteners

- x) 35mm British Gypsum Jack-Point Screws, supplied by British Gypsum.
- xi) 41mm British Gypsum Jack-Point Screws, supplied by British Gypsum.
- xii) 35mm British Gypsum Drywall Screws, supplied by British Gypsum.
- xiii) 60mm fire resistant fixings, supplied by The Building Test Centre.

Miscellaneous Components

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

Insulation

- xviii) Nominally 25mm (thick) Isover Acoustic Partition Roll 1200 manufactured and supplied by Saint-Gobain Isover.

Measured surface density: 0.429 kg/m²

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 1364-1: 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 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 3.

The ambient temperature at the commencement of the test was 12°C.

The furnace pressure was set to control at 18 ± 2 Pa positive with respect to atmosphere, at the top of the specimen. (Pressure was set to control at 1 ± 2 Pa positive with respect to atmosphere at the measuring point.) Furnace pressure data is shown in **Figure 5**.

The test conditions did not meet the full requirements of BS EN 1363-1: 2012 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: 2012.

TEST RESULTS

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

Integrity	Sustained Flaming	131 minutes, no failure.
	6mm Gap Gauge	131 minutes, no failure.
	25mm Gap Gauge	131 minutes, no failure.
	Cotton Pad	130 minutes.
Insulation		98 minutes.
Test Terminated		131 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: 1999, section 13.

TEST DATA

Observations

All observations refer to the exposed face unless stated.

Observers: Unexposed face: Lynda Cooper
Exposed face: Denis Bradshaw

Time Hours	Minutes	Observations
0	00	Test started.
0	10	Jointing material was flaking away. Face papers had charred.
0	20	Lower horizontal joint had opened up to approximately 10-12mm.
0	30	Lower horizontal joint had opened up to approximately 25-30mm. All lower boards were cracked at the horizontal joint. I studs had discoloured.
0	40	Lower horizontal joint had opened up to approximately 30-35mm.
0	50	Lower horizontal joint had opened up to approximately 35mm on left-hand and right-hand boards. Lower horizontal joint of centre board had closed to approximately 1mm. All boards were crazed.
1	00	Lower left-hand horizontal joint had closed to approximately 1mm. Lower left-hand centre board horizontal joint had opened up to approximately 5mm. Lower right-hand horizontal joint had opened up to approximately 2mm. <i>Unexposed face</i> No visible change.
1	10	No visible change.
1	20	Lower right-hand horizontal joint had opened up to approximately 2-4mm.

Time		Observations
Hours	Minutes	
1	30	Upper centre board had fallen into the furnace. 1 studs warped where visible. <i>Unexposed face</i> Horizontal joint had started to open up.
1	38	<i>Unexposed face</i> INSULATION FAILURE. The temperature rise of thermocouple no.27 positioned at the head of the specimen on the centre of the centre board exceeded 180°C.
1	40	Left-hand board had fallen into the furnace. Second layer boards were crazed.
1	45	<i>Unexposed face</i> Discolouration down centre of centre boards from approximately 3000mm to 3900mm height. Filler darkened over screw heads adjacent to vertical joints and horizontal joints.
1	50	Second layer lower horizontal joint had opened up to approximately 20-25mm. All second layer boards were severely crazed.
1	54	<i>Unexposed face</i> Discolouration adjacent to left-hand and right-hand vertical joints and down centre of left-hand boards.
1	56	<i>Unexposed face</i> The mean temperature rise of the standard five thermocouples exceeded 140°C.
2	00	No visible change. <i>Unexposed face</i> Paper liner charred on lower centre board from approximately 600mm to 900mm height. Increased discolouration over 600mm to 3000mm height on centre boards and right-hand side of left-hand boards.
2	03	<i>Unexposed face</i> Glow visible on right-hand vertical joint at approximately 1000mm height.

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Time		Observations
Hours	Minutes	
2	10	No visible change. <i>Unexposed face</i> INTEGRITY FAILURE. The cotton pad ignited (flamed) when placed on a point approximately 1000mm from the free edge at the head of the specimen.
2	11	TEST TERMINATED at the request of the sponsor.

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Furnace Temperature Graph

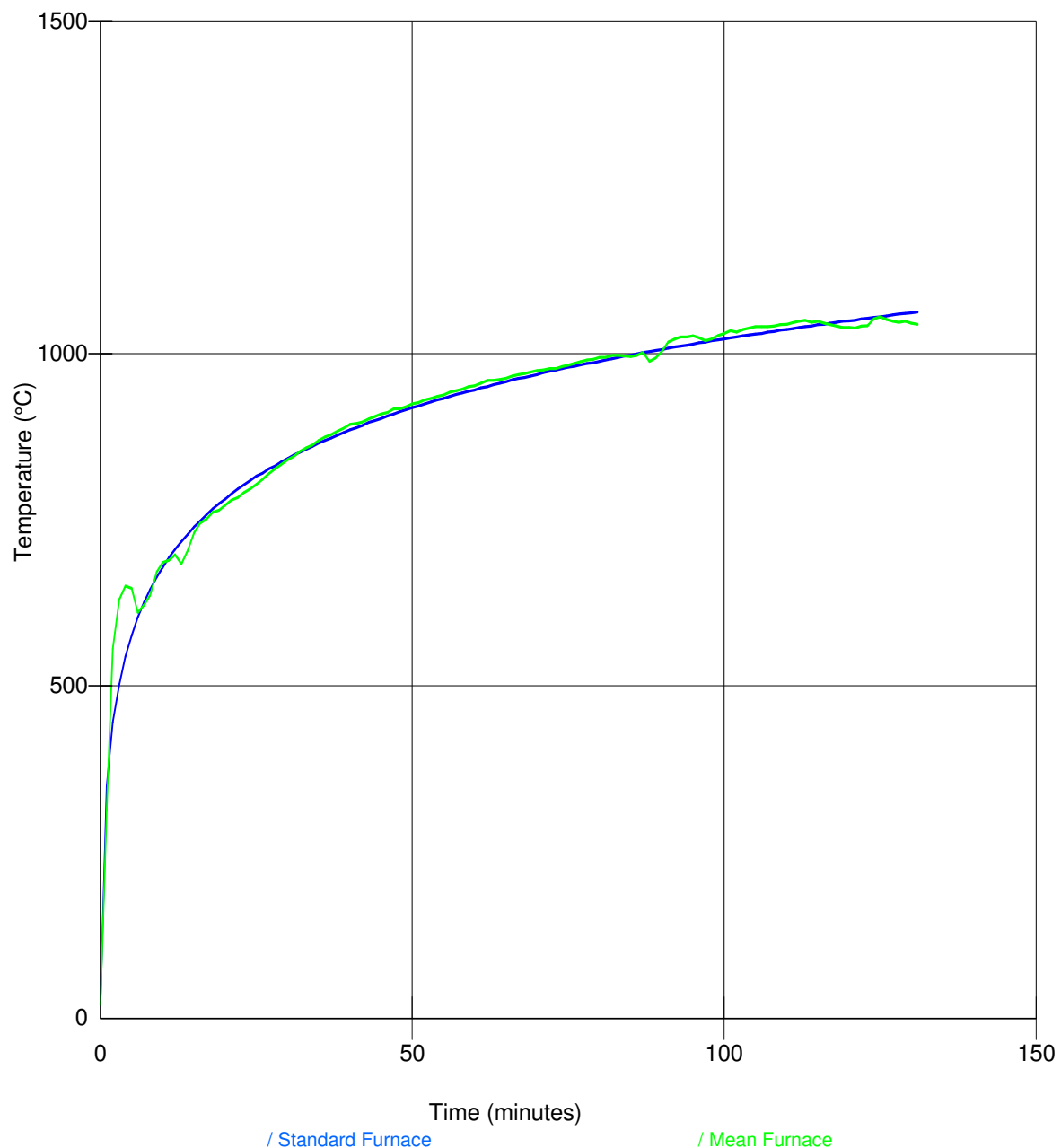


Figure 4 – Furnace temperature graph.

Furnace Pressure Graph

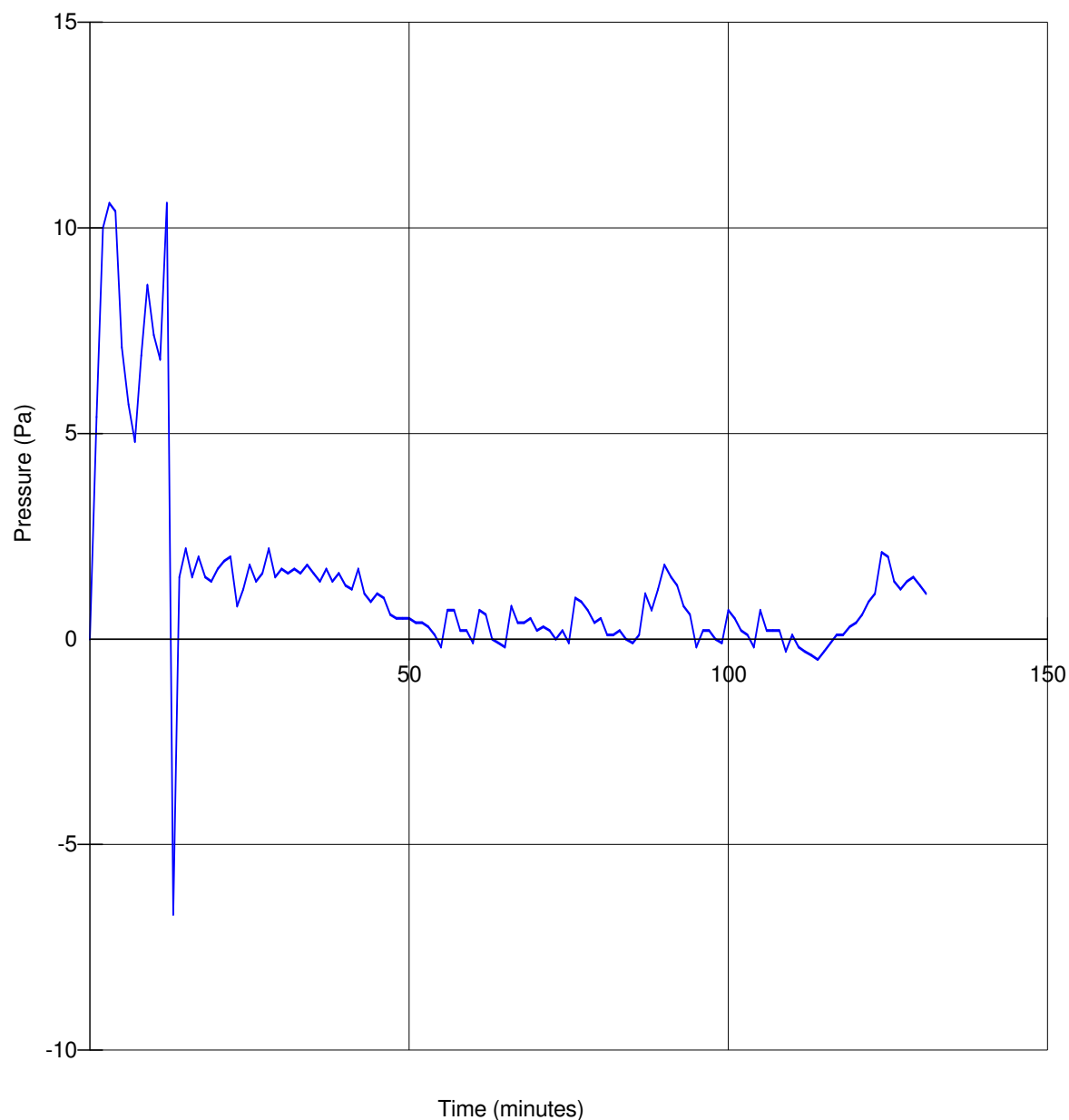


Figure 5 – Furnace pressure graph.

Unexposed Face Temperature Graph

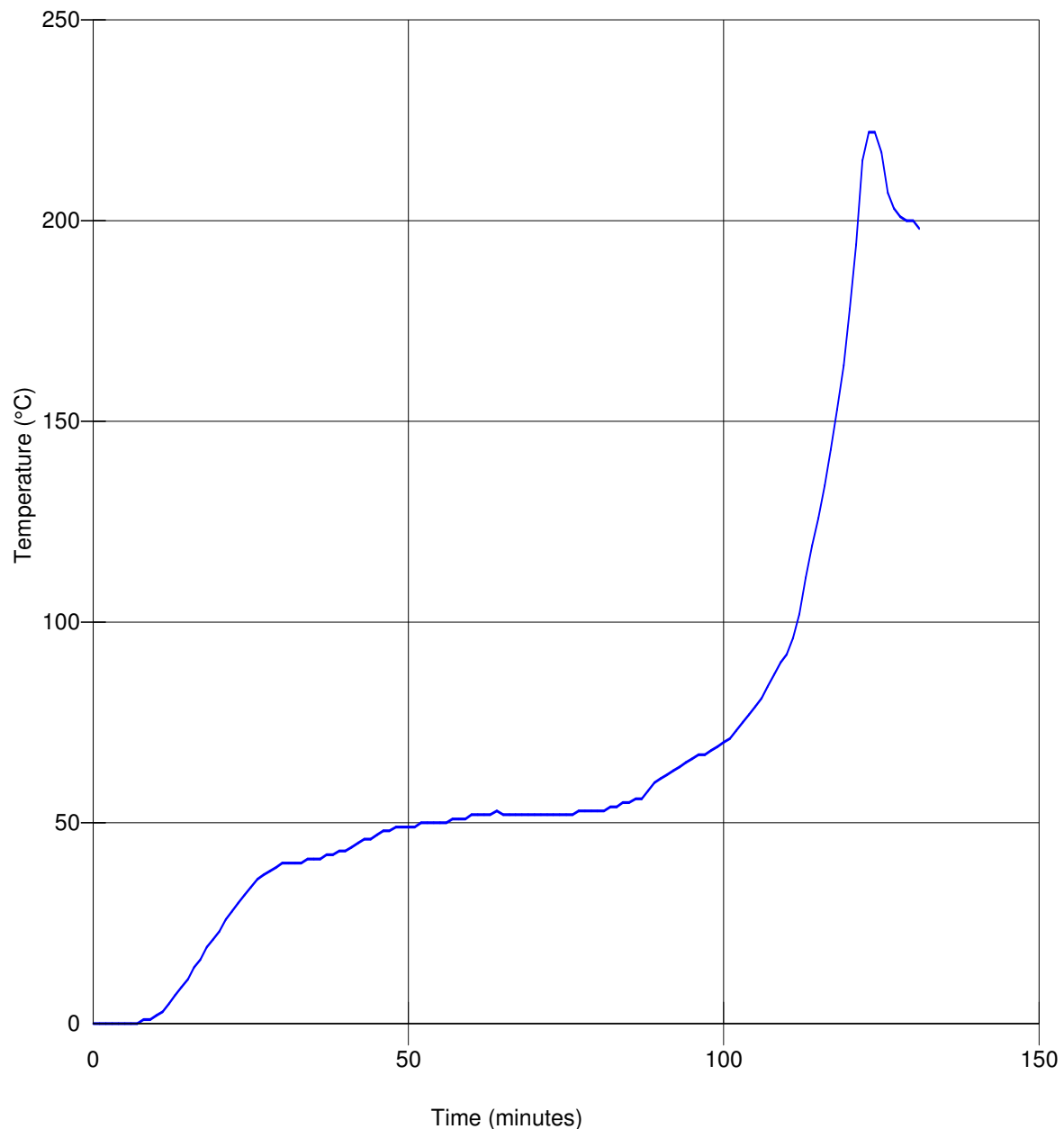


Figure 6 – Unexposed face temperature graph.

Unexposed Face Thermocouple Layout

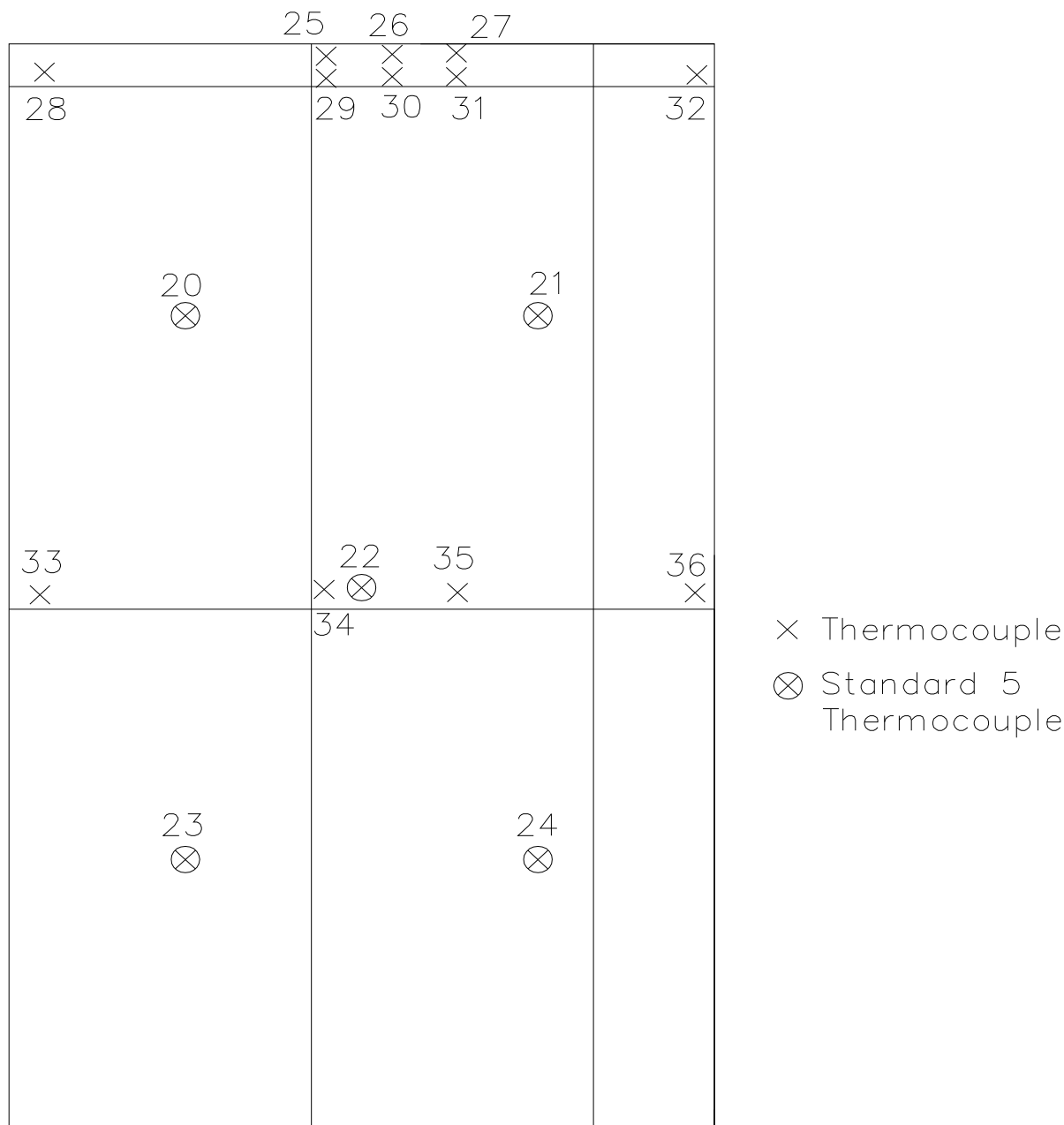


Figure 7 – Unexposed face thermocouple layout.

Unexposed Face Standard Five Temperature Data

Time (minutes)	Temperature Rise (°C)					Mean Standard Five
	Thermocouple No. 20	Thermocouple No. 21	Thermocouple No. 22	Thermocouple No. 23	Thermocouple No. 24	
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	1	0	1	1	1
9	0	1	1	1	2	1
10	1	2	2	3	3	2
11	1	3	3	4	5	3
12	3	4	5	6	8	5
13	4	5	7	8	10	7
14	6	7	9	11	13	9
15	8	9	11	13	16	11
16	10	11	14	16	19	14
17	12	13	16	18	21	16
18	15	15	19	21	24	19
19	17	17	21	23	27	21
20	19	19	24	26	29	23
21	22	22	26	28	32	26
22	24	24	28	31	34	28
23	26	26	30	33	37	30
24	28	28	32	35	38	32
25	30	30	34	37	40	34
26	32	32	36	38	41	36
27	34	33	37	40	42	37
28	35	35	38	40	43	38
29	36	37	38	41	43	39
30	38	38	39	41	42	40
31	39	39	39	41	42	40
32	40	39	38	41	42	40
33	40	40	39	41	42	40
34	41	40	38	42	42	41
35	41	40	39	43	42	41
36	41	40	39	44	43	41
37	41	39	40	45	44	42

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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	
38	40	39	41	46	45	42
39	40	39	41	48	46	43
40	40	39	42	49	47	43
41	40	39	43	50	48	44
42	41	40	44	51	49	45
43	42	40	45	52	49	46
44	43	41	45	52	50	46
45	44	42	46	53	51	47
46	45	43	47	53	51	48
47	46	44	47	53	51	48
48	47	45	47	53	51	49
49	47	45	47	54	51	49
50	48	45	47	54	50	49
51	48	46	47	54	51	49
52	49	45	48	55	51	50
53	49	46	48	55	51	50
54	49	46	48	55	52	50
55	48	47	49	55	52	50
56	48	47	49	56	52	50
57	48	48	49	56	52	51
58	49	48	50	56	53	51
59	49	49	50	56	53	51
60	49	50	51	56	53	52
61	49	50	51	56	53	52
62	49	51	51	56	53	52
63	49	51	51	56	53	52
64	49	52	52	56	54	53
65	49	52	52	54	54	52
66	49	52	53	52	54	52
67	49	53	53	51	54	52
68	49	53	53	50	54	52
69	49	53	54	49	54	52
70	49	53	54	48	54	52
71	50	53	54	47	54	52
72	50	53	54	47	54	52
73	50	53	55	47	54	52
74	50	53	55	47	55	52
75	51	53	55	47	54	52
76	51	53	55	47	54	52
77	51	53	56	48	55	53

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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	52	53	56	48	55	53
79	52	53	55	49	55	53
80	52	53	55	50	55	53
81	52	53	55	51	55	53
82	52	53	56	52	55	54
83	53	53	56	54	56	54
84	53	53	56	55	56	55
85	53	53	55	56	57	55
86	53	53	57	57	58	56
87	53	53	60	57	59	56
88	53	54	65	58	62	58
89	53	54	70	58	63	60
90	53	56	71	60	65	61
91	53	57	72	62	66	62
92	54	59	72	64	66	63
93	54	63	71	66	67	64
94	53	66	71	68	68	65
95	53	68	71	70	69	66
96	54	69	72	71	69	67
97	54	70	72	71	70	67
98	55	70	73	71	71	68
99	55	71	73	73	71	69
100	57	71	76	76	72	70
101	58	72	77	78	72	71
102	61	72	79	81	74	73
103	62	73	82	85	75	75
104	63	73	84	90	77	77
105	63	74	86	94	79	79
106	64	75	88	97	82	81
107	64	77	91	100	89	84
108	64	79	93	103	94	87
109	65	83	96	107	98	90
110	65	86	99	111	101	92
111	66	90	102	118	104	96
112	66	93	105	138	107	102
113	67	96	108	173	110	111
114	67	100	112	201	114	119
115	68	103	117	220	120	126
116	68	107	122	232	139	134
117	69	111	127	235	173	143

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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	
118	70	118	132	230	214	153
119	71	135	136	222	255	164
120	72	164	140	212	304	178
121	73	189	143	203	364	194
122	74	209	146	193	455	215
123	76	225	151	185	472	222
124	79	238	154	178	463	222
125	82	251	157	171	424	217
126	85	261	160	166	365	207
127	88	272	162	161	334	203
128	92	289	164	156	305	201
129	96	305	165	151	284	200
130	100	316	167	148	271	200
131	103	315	169	143	261	198

Figures highlighted in red indicated the minute in which the mean temperature rise exceeded 140°C.

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	1	0
2	0	0	0	6	0
3	0	0	1	13	0
4	0	0	2	19	0
5	2	1	4	23	1
6	4	2	6	25	1
7	6	3	10	29	3
8	9	4	14	32	4
9	12	6	18	36	6
10	14	7	22	39	9
11	17	9	26	43	12
12	20	11	30	46	15
13	22	13	33	44	18
14	25	14	34	46	21
15	27	16	36	48	24
16	29	18	38	50	26
17	31	20	40	51	29
18	32	22	42	52	31
19	34	23	43	53	33
20	36	25	44	54	35
21	38	27	45	55	37
22	39	28	45	56	38
23	41	30	46	56	39
24	43	32	46	56	40
25	44	33	46	56	42
26	45	34	47	56	42
27	46	35	48	56	43
28	47	37	48	56	44
29	48	38	49	56	44
30	49	39	49	56	45
31	49	40	50	56	45
32	49	41	51	56	46
33	49	42	51	56	46
34	49	43	52	56	46
35	49	43	52	57	46
36	49	44	53	57	46
37	49	44	53	57	47

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
38	49	44	53	56	46
39	49	45	53	56	46
40	49	46	54	56	46
41	49	46	54	57	46
42	49	46	55	57	46
43	49	47	56	59	46
44	49	46	56	59	47
45	49	47	56	60	47
46	50	47	57	61	48
47	50	47	58	62	49
48	50	47	58	62	49
49	50	47	59	63	50
50	51	47	60	64	50
51	51	47	60	65	51
52	51	47	61	66	51
53	51	48	61	67	52
54	52	48	62	67	53
55	52	48	63	68	53
56	52	48	64	69	54
57	53	48	65	70	54
58	53	48	66	71	54
59	53	48	66	72	54
60	53	47	67	72	55
61	54	47	68	73	55
62	54	47	69	74	55
63	54	46	70	75	55
64	55	46	70	76	55
65	55	46	71	76	55
66	55	46	72	78	55
67	56	47	72	78	56
68	56	46	74	79	56
69	57	46	74	80	56
70	57	46	75	81	56
71	57	46	76	82	56
72	57	46	77	83	56
73	57	47	78	83	56
74	58	47	78	84	56
75	58	48	79	85	56
76	59	48	80	86	56
77	59	49	81	88	56

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
78	59	49	82	89	56
79	59	50	83	90	56
80	60	51	84	91	56
81	60	51	85	92	57
82	61	51	86	93	57
83	62	52	88	94	57
84	62	53	89	96	57
85	63	55	90	97	57
86	64	57	92	98	58
87	65	59	93	99	59
88	66	61	94	100	60
89	66	61	97	101	61
90	67	61	100	103	62
91	68	60	104	104	63
92	69	60	108	104	65
93	70	60	113	105	66
94	71	61	118	106	67
95	72	62	125	107	68
96	73	64	134	109	69
97	74	66	152	110	69
98	75	68	169	112	70
99	77	69	185	114	70
100	78	71	205	116	71
101	80	73	224	119	71
102	82	77	243	122	72
103	83	80	262	125	72
104	84	83	279	131	72
105	86	90	297	139	73
106	87	91	313	146	73
107	88	92	327	153	74
108	89	96	332	158	75
109	90	100	337	162	76
110	91	106	342	166	78
111	93	115	350	170	82
112	95	123	356	172	86
113	98	131	359	178	90
114	100	138	360	186	94
115	102	156	357	197	97
116	105	180	351	209	100
117	109	192	342	224	103

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 25	Thermocouple No. 26	Thermocouple No. 27	Thermocouple No. 28	Thermocouple No. 29
118	116	199	343	231	106
119	125	204	344	240	109
120	134	215	348	251	115
121	153	228	353	265	126
122	178	242	362	284	143
123	202	257	370	304	161
124	224	276	384	318	184
125	245	297	398	327	203
126	263	320	406	341	221
127	287	337	417	376	239
128	312	355	421	409	255
129	333	388	439	424	272
130	352	413	439	435	293
131	368	416	426	454	316

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

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

Customer: **British Gypsum**

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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	Thermocouple No. 34
0	0	0	0	0	0
1	0	0	0	0	0
2	0	0	0	0	0
3	0	2	0	0	0
4	0	4	0	0	0
5	0	6	1	0	0
6	1	9	1	0	0
7	2	12	2	0	0
8	3	15	4	1	0
9	4	18	5	2	0
10	6	20	7	3	1
11	8	23	9	5	2
12	11	25	11	7	4
13	13	28	13	9	6
14	16	30	16	12	8
15	18	32	18	14	11
16	21	34	20	17	14
17	23	36	22	19	16
18	25	37	23	22	19
19	27	39	25	24	22
20	30	40	27	26	25
21	32	41	29	28	27
22	34	42	30	30	30
23	36	43	32	32	33
24	37	44	33	34	35
25	38	45	35	36	37
26	40	46	36	37	39
27	41	47	37	38	41
28	42	49	37	40	42
29	42	50	38	40	43
30	43	51	39	41	44
31	44	52	39	42	45
32	44	53	40	43	45
33	44	54	40	43	46
34	45	55	41	44	46
35	45	55	41	44	47
36	45	56	41	43	48
37	45	57	41	43	49

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33	Thermocouple No. 34
38	45	57	41	43	50
39	45	58	41	44	52
40	44	59	42	44	53
41	44	60	41	45	53
42	44	61	41	45	54
43	44	61	41	46	55
44	44	62	41	46	55
45	45	63	42	47	56
46	45	63	42	48	56
47	46	64	43	48	56
48	46	64	44	49	57
49	46	65	45	49	57
50	47	65	46	50	57
51	47	66	47	50	58
52	48	67	48	50	58
53	48	67	49	51	58
54	48	68	50	51	58
55	48	68	50	51	58
56	49	69	51	51	59
57	49	70	52	52	59
58	49	70	53	52	59
59	49	71	53	52	59
60	49	72	54	52	59
61	49	73	54	52	59
62	49	74	54	52	59
63	49	75	54	53	59
64	49	76	54	53	59
65	50	77	55	53	59
66	50	78	55	53	59
67	50	80	55	53	59
68	51	81	55	53	59
69	51	82	55	53	59
70	52	84	55	53	58
71	53	85	55	53	58
72	54	87	55	53	58
73	55	88	55	53	58
74	56	89	55	53	59
75	56	91	55	53	59
76	56	92	56	53	59
77	57	94	56	53	60

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33	Thermocouple No. 34
78	56	95	56	53	60
79	56	96	56	53	61
80	56	98	56	53	61
81	56	99	56	53	62
82	55	100	56	53	62
83	55	102	56	54	63
84	56	104	57	54	63
85	57	107	57	54	63
86	60	111	57	53	65
87	61	115	57	53	69
88	63	119	57	54	75
89	63	123	57	54	78
90	64	126	57	55	81
91	64	130	57	55	80
92	67	134	57	55	79
93	69	139	57	55	78
94	71	145	57	55	77
95	72	150	57	55	77
96	73	156	57	55	78
97	74	162	57	56	78
98	75	167	57	56	79
99	75	175	58	58	82
100	75	182	58	59	84
101	75	190	58	60	86
102	75	198	58	61	87
103	76	206	58	62	89
104	76	215	59	62	91
105	76	223	62	63	95
106	78	232	64	64	99
107	80	241	67	65	103
108	83	251	69	67	108
109	87	260	71	68	116
110	90	268	72	69	132
111	93	277	72	70	155
112	96	286	73	71	176
113	99	296	74	72	190
114	103	305	74	73	201
115	106	314	74	74	210
116	110	321	75	74	217
117	114	326	75	75	219

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)				
	Thermocouple No. 30	Thermocouple No. 31	Thermocouple No. 32	Thermocouple No. 33	Thermocouple No. 34
118	121	332	75	77	214
119	134	337	75	78	206
120	151	340	76	79	198
121	177	342	77	80	191
122	199	345	79	81	186
123	216	350	82	82	182
124	231	355	88	83	180
125	244	359	93	84	179
126	256	364	97	85	180
127	268	371	101	86	181
128	283	372	104	87	181
129	300	368	108	89	181
130	316	367	112	90	180
131	330	364	117	91	178

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

Additional Unexposed Face Temperature Data

Time (minutes)	Temperature Rise (°C)	
	Thermocouple No. 35	Thermocouple No. 36
0	0	0
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
6	0	0
7	0	0
8	1	0
9	2	0
10	4	1
11	6	1
12	9	2
13	12	4
14	15	5
15	18	7
16	21	9
17	24	11
18	27	13
19	30	15
20	33	17
21	36	19
22	38	21
23	41	23
24	43	25
25	45	27
26	47	29
27	49	30
28	51	32
29	52	33
30	54	34
31	55	35
32	56	36
33	55	37
34	55	37
35	54	37
36	53	37
37	52	37

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

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)	
	Thermocouple No. 35	Thermocouple No. 36
78	68	52
79	69	52
80	69	52
81	70	52
82	71	52
83	72	52
84	73	52
85	74	52
86	76	52
87	79	53
88	82	53
89	84	53
90	87	53
91	89	53
92	90	53
93	92	54
94	96	54
95	100	54
96	105	54
97	109	55
98	115	55
99	127	56
100	139	57
101	148	58
102	155	59
103	159	61
104	161	64
105	164	68
106	167	71
107	169	73
108	171	71
109	172	70
110	173	71
111	176	72
112	180	73
113	184	74
114	187	75
115	190	76
116	194	79
117	196	81

Customer: **British Gypsum**

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Time (minutes)	Temperature Rise (°C)	
	Thermocouple No. 35	Thermocouple No. 36
118	199	86
119	201	91
120	202	95
121	203	98
122	203	100
123	203	103
124	204	105
125	205	108
126	206	112
127	207	119
128	207	132
129	206	146
130	205	163
131	204	177

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

Internal Temperature Data at 1500 mm Height

Time (minutes)	Actual Temperature (°C)			
	Left stud		Right stud	
	Web Thermocouple No. 37	Cold Flange Thermocouple No. 38	Web Thermocouple No. 39	Cold Flange Thermocouple No. 40
0	16	15	16	15
1	16	16	16	16
2	19	18	19	20
3	28	25	38	34
4	47	34	75	59
5	71	48	82	71
6	90	64	89	79
7	97	78	93	86
8	102	88	98	92
9	106	91	101	98
10	109	93	106	106
11	116	100	111	114
12	122	105	116	123
13	130	109	127	132
14	141	120	140	140
15	153	128	155	147
16	167	137	169	155
17	180	145	180	163
18	193	152	191	170
19	204	159	202	177
20	215	166	211	183
21	227	172	220	190
22	239	179	230	197
23	252	185	240	204
24	265	192	251	210
25	279	200	263	217
26	293	208	277	224
27	308	216	293	232
28	324	224	311	241
29	341	234	329	249
30	357	244	347	259
31	373	255	364	270
32	390	266	383	283
33	406	277	404	295
34	422	288	426	307
35	437	299	443	317

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Time (minutes)	Actual Temperature (°C)			
	Left stud		Right stud	
	Web Thermocouple No. 37	Cold Flange Thermocouple No. 38	Web Thermocouple No. 39	Cold Flange Thermocouple No. 40
36	449	309	457	326
37	460	319	468	335
38	470	327	478	344
39	479	336	488	353
40	487	343	496	361
41	495	350	500	367
42	503	357	504	374
43	510	365	507	380
44	516	371	511	388
45	522	378	515	395
46	528	385	519	401
47	533	392	523	407
48	538	399	527	415
49	543	405	532	422
50	548	412	537	429
51	553	418	542	436
52	557	424	546	442
53	561	432	551	448
54	564	438	556	454
55	568	445	561	461
56	571	451	566	468
57	574	456	571	476
58	577	462	576	485
59	580	468	582	494
60	583	474	588	504
61	586	481	594	514
62	589	487	600	524
63	592	495	607	534
64	596	503	682	545
65	600	512	682	555
66	605	522	681	564
67	611	533	681	574
68	617	545	682	584
69	623	557	682	595
70	630	569	683	605
71	637	581	685	616
72	643	593	687	626
73	650	604	690	636

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Time (minutes)	Actual Temperature (°C)			
	Left stud		Right stud	
	Web Thermocouple No. 37	Cold Flange Thermocouple No. 38	Web Thermocouple No. 39	Cold Flange Thermocouple No. 40
74	656	615	692	646
75	663	625	693	655
76	671	634	692	662
77	678	637	691	668
78	684	641	692	674
79	690	641	694	681
80	695	643	697	687
81	700	651	700	694
82	705	660	703	701
83	708	669	706	705
84	752	732	710	710
85	800	824	720	728
86	806	-	738	742
87	835	-	744	750
88	852	-	742	746
89	875	-	732	741
90	878	-	886	880
91	895	-	-	-
92	899	-	-	-
93	-	-	-	-

- 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	27
2	51
3	64
4	72
5	78
6	80
7	84
8	88
9	92
10	94
11	96
12	98
13	100
14	101
15	102
16	103
17	104
18	105
19	106
20	108
21	109
22	110
23	112
24	113
25	115
26	117
27	119
28	122
29	124
30	127
31	131
32	134
33	138
34	142
35	146
36	149
37	153

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Time (minutes)	Deflection (mm)
	Centre
38	157
39	160
40	163
41	165
42	167
43	169
44	172
45	174
46	175
47	177
48	179
49	181
50	183
51	184
52	186
53	187
54	189
55	190
56	192
57	193
58	194
59	196
60	197
61	198
62	199
63	200
64	201
65	202
66	203
67	204
68	205
69	206
70	206
71	207
72	208
73	209
74	210
75	210
76	211
77	212

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Time (minutes)	Deflection (mm)
	Centre
78	213
79	-

The deflection was recorded at the approximate centre of the specimen and at mid-height at the free edge. Positive readings indicate deflection into the furnace.

The transducers were removed after 78 minutes to protect the equipment.

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PHOTOGRAPHS

Exposed face prior to test



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Unexposed face prior to test



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Unexposed face at 1 hour



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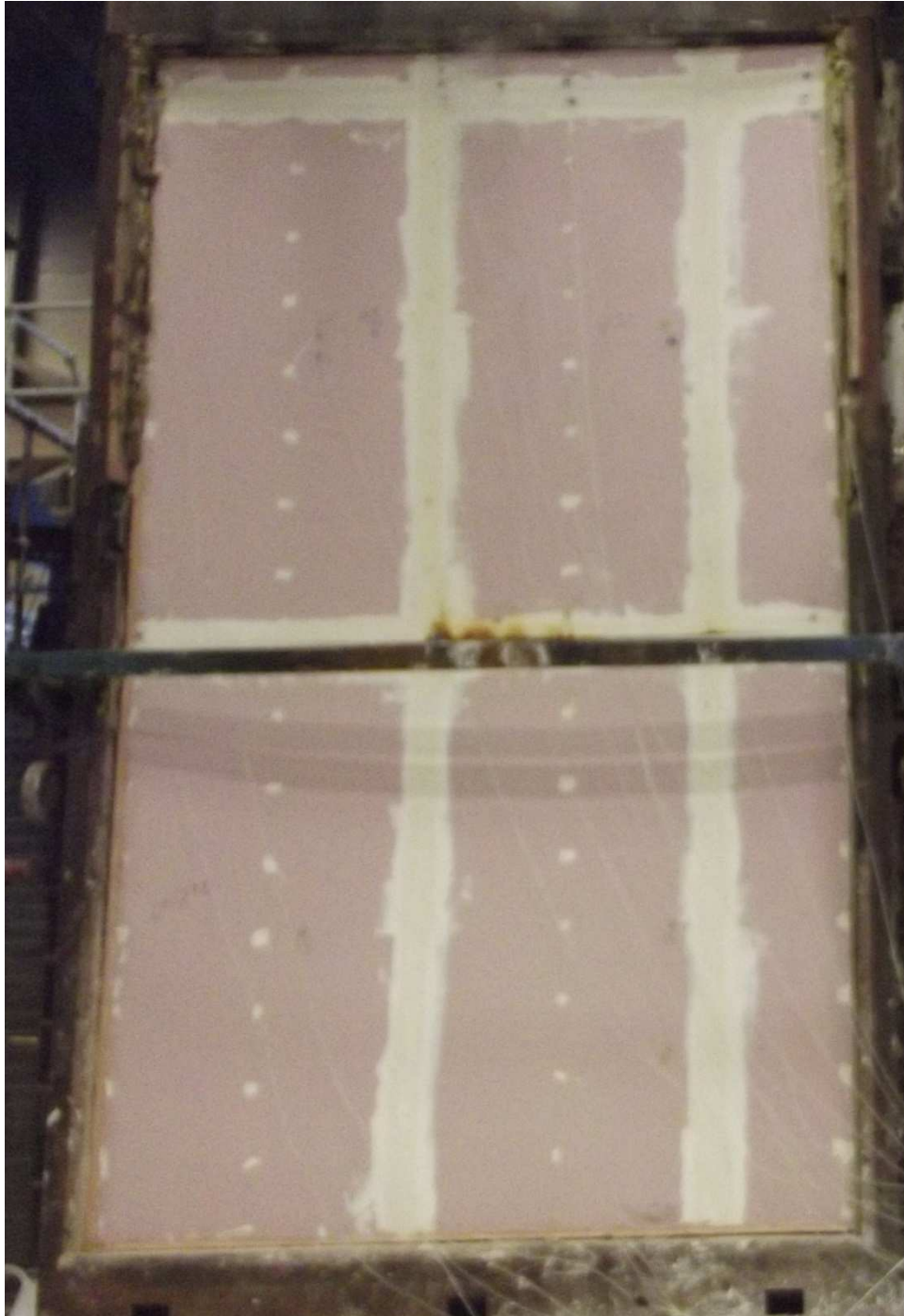
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Unexposed face at 1 hour, 30 minutes



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Unexposed face at 2 hours



Customer: **British Gypsum**

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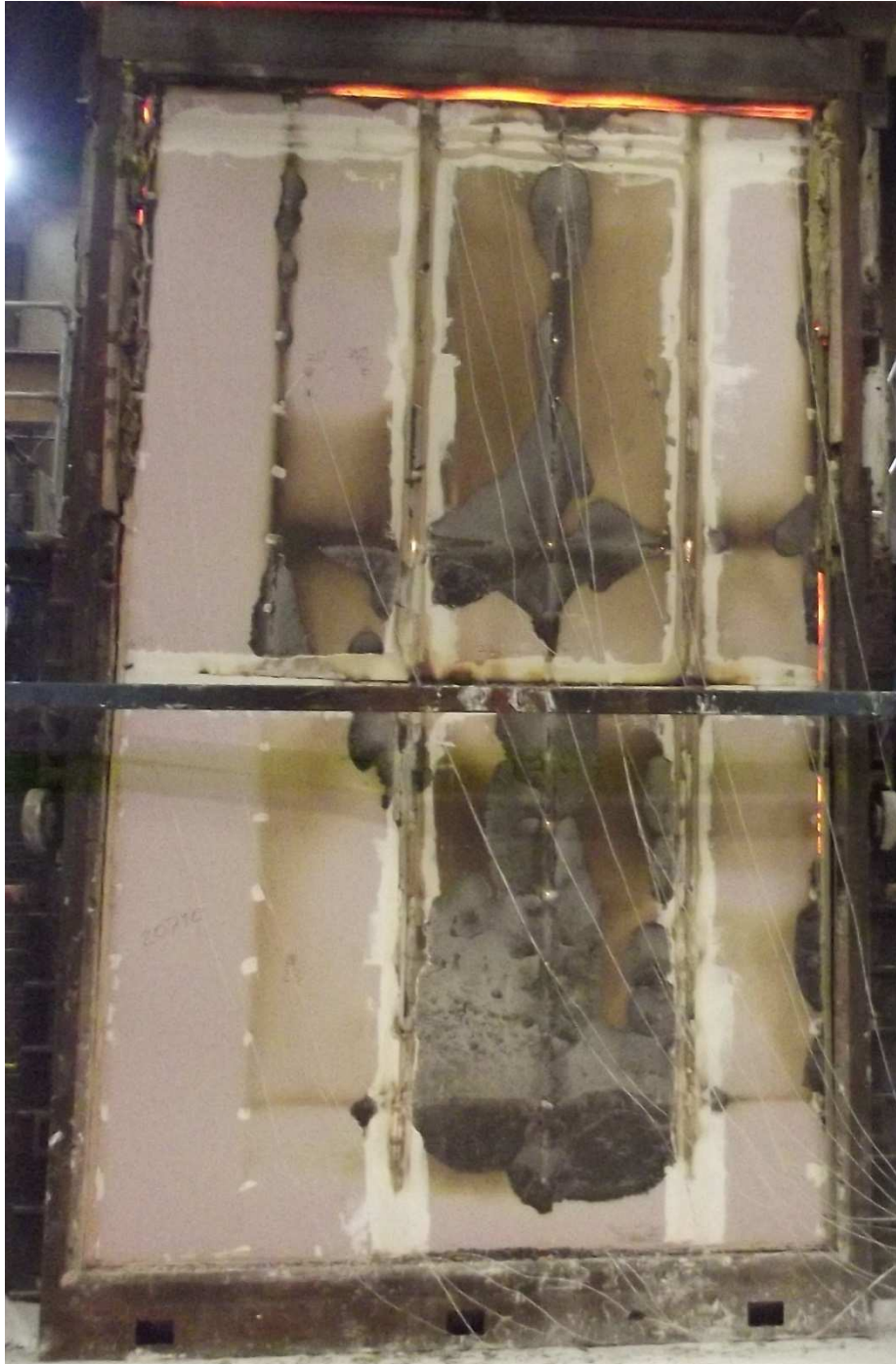
0296

The Building Test Centre

Fire Acoustics Structures

The Building Test Centre
British Gypsum
East Leake
Loughborough
Leicestershire, LE12 6NP
Tel: (0115) 945 1564
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Unexposed face at 2 hours, 11 minutes, at test termination



Customer: **British Gypsum**

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0296

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 5000 mm.
- ii) Increase in the thickness of the wall (minimum thickness 87 mm).
- iii) Increase thickness of component materials (minimum Gypframe stud depth 62 mm, minimum Gypframe stud gauge 0.50 mm).
- iv) Decrease in the linear dimensions of the boards but not thickness (≤ 2400 mm (long) x ≤ 1200 mm (wide) Gyproc FireLine and ≤ 3000 mm (long) x ≤ 598 mm (wide) Gyproc Core Board).
- 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 3000mm wide with one vertical edge without restraint.