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Title:

The Fire Resistance Performance of an Asymmetrical, Non-Load Bearing, Partition Wall Assembly, Tested in Accordance with BS EN 1364-1: 2015

Date of Test:

12 June 2024

Issue 1

13 December 2024

WF Report No.

544490/R

Prepared for:

Lancaster insulation/MC Resources

34 Port Royal Avenue
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Lancaster
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0249

Test Specimen

Summary of Tested Specimen

The specimen had overall nominal dimensions of 3050 mm high by 2975 mm wide by nominally 60 mm thick and was formed from a fire curtain referenced 'Fire Barrier'. The fire curtain was formed by a nominally 60 mm thick barrier comprising a mineral rock fibre insulation core with a 40 µm mm thick layer of spun woven polypropylene tissue 1199 SWT facing tissue to both faces, with a 0.5 mm gauge steel chicken wire to the unexposed face only. The barrier was secured using a 3 mm thick mild steel angle. The barrier incorporated three vertical joints and one horizontal joint, which were secured with 1.6 mm thick galvanised steel wire. The barrier was installed with one vertical edge unrestrained.

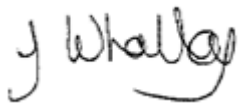
Detailed drawings of the test specimen(s) and a comprehensive description of the test construction based on a detailed survey of the specimen(s) and information supplied by the sponsor of the test are included in the Test Specimen and Schedule of Components sections of this report.

Performance Criteria and Test Results

Integrity	It is required that the specimen retains its separating function, without: ▪ causing ignition of a cotton pad when applied ▪ permitting the penetration of a gap gauge as specified in BS EN 1363-1: 2020 ▪ sustained flaming on the unexposed surface **These requirements were satisfied for the periods shown below:**				
Sustained flaming	132 minutes*				
Gap gauge	132 minutes	No failure*			
Cotton pad	132 minutes*				
Insulation	It is required that the mean temperature rise of the unexposed surface shall not be greater than 140°C and that the maximum temperature rise shall not be greater than 180°C. Insulation failure also occurs simultaneously with integrity failure. **These requirements were satisfied for the period shown below:**				
Specimen	7 minutes	Exceeded maximum temperature criteria	TC11		
Radiation	BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m2 is reported.				
Radiation Performance	**5 kW/m^2**	**10 kW/m^2**	**15 kW/m^2**	**20 kW/m^2**	**25 kW/m^2**
	132 minutes*	132 minutes*	132 minutes*	132 minutes*	132 minutes*
	*Test was discontinued after a period of 132 minutes.				

Date of Test 12 June 2024

Signatories



Responsible Officer
***J.Whalley**
Senior Technical Officer

Approved
*** S.Gilfedder**
Technical Officer

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

Report Issued: 13 December 2024

Revision History

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Revised By:	Approved By:
Reason for Revision:	

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Test Conditions

Standard

BS EN 1364-1:2015 Fire resistance tests for non-loadbearing elements - Part 1: Walls.

Sampling

Warringtonfire was not involved in the sampling or selection of the tested specimen or any of the components.

The results obtained during the test only apply to the test samples as received and tested by **Warringtonfire.**

Installation

The specimen was installed into a refractory concrete lined steel restraint frame, with one vertical edge unrestrained, by representative of the test sponsor between the 10th and 11th of May 2024.

Conditioning

The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 3 days. Throughout this period of time both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 16°C to 27°C and 28.5% to 55% respectively.

Instruction to Test

The test was conducted on the 12 June 2024 at the request of Lancaster insulation/MC Resources, the test sponsor.

Mr. B. Whittaker, Mr. R. Butcher, and Mr. Paruzel representatives of the test sponsor witnessed the test.

Ambient Temperature

The ambient air temperature in the vicinity of the test construction was 22ºC at the start of the test with a maximum variation of -2ºC and +1ºC during the test.

Furnace

The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2020 Clause 5.1 using nine plate thermometers, distributed over a plane 100 mm from the surface of the test construction.

Thermocouples

Thermocouples were provided to monitor the unexposed surface of the specimen. The output of all instrumentation was recorded at no less than one minute intervals. The locations and reference numbers of the various unexposed surface thermocouples are shown in Figure 2.

Radiation

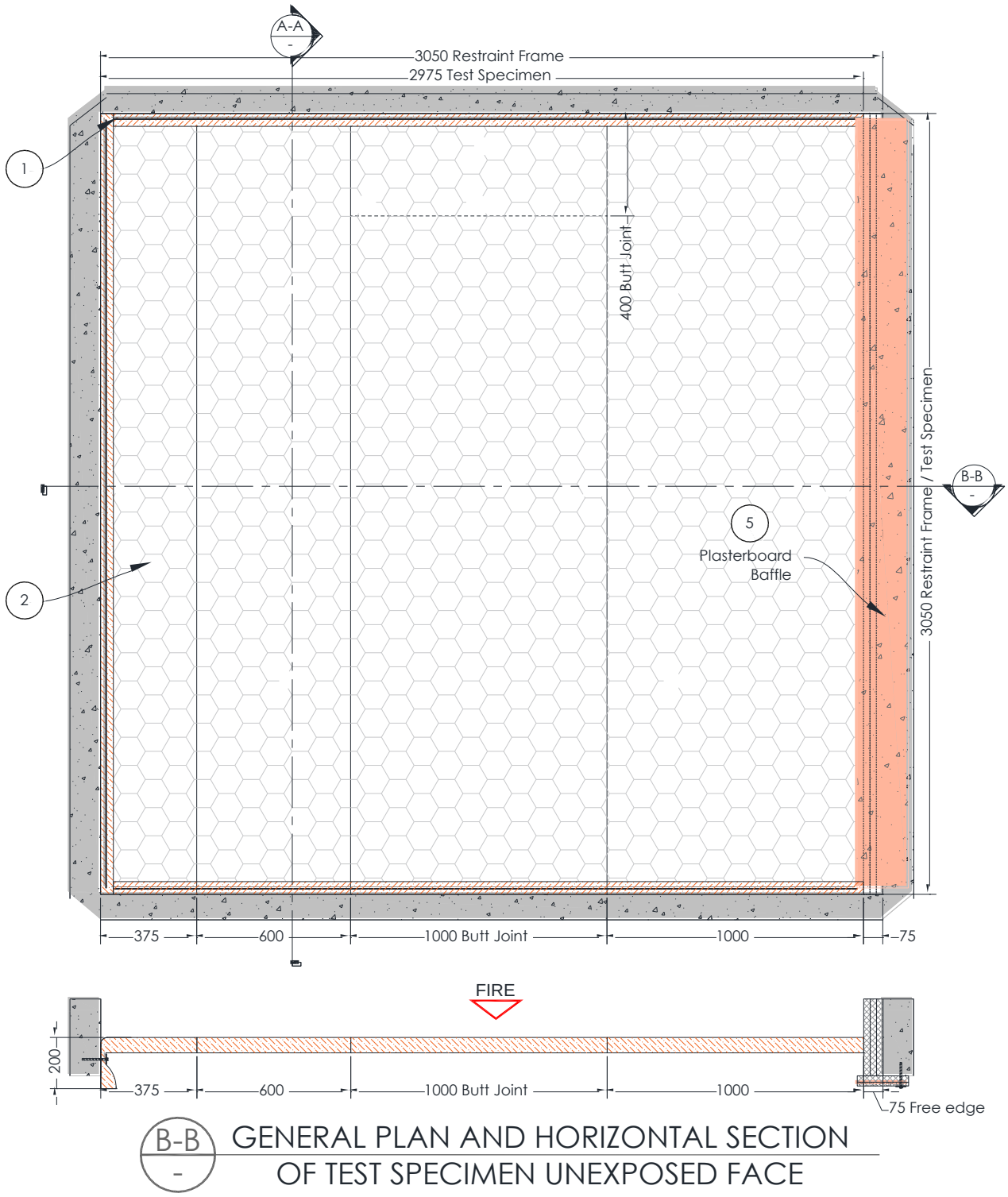
A water-cooled foil heat-flux meter was used to record the heat radiation from the specimen. The heat flux meter was positioned at a distance of 1 metre from the centre of the specimen.

Furnace Pressure

After the first five minutes of testing and for the remainder of the test, the furnace atmospheric pressure was controlled so that it complied with the requirements of BS EN 1363-1: 2020, clause 5.2.1 The calculated pressure differential relative to the laboratory atmosphere at the top of the specimen was 20 (± 5) Pa between 5 and 10 minutes and 20 (± 3) Pa thereafter.

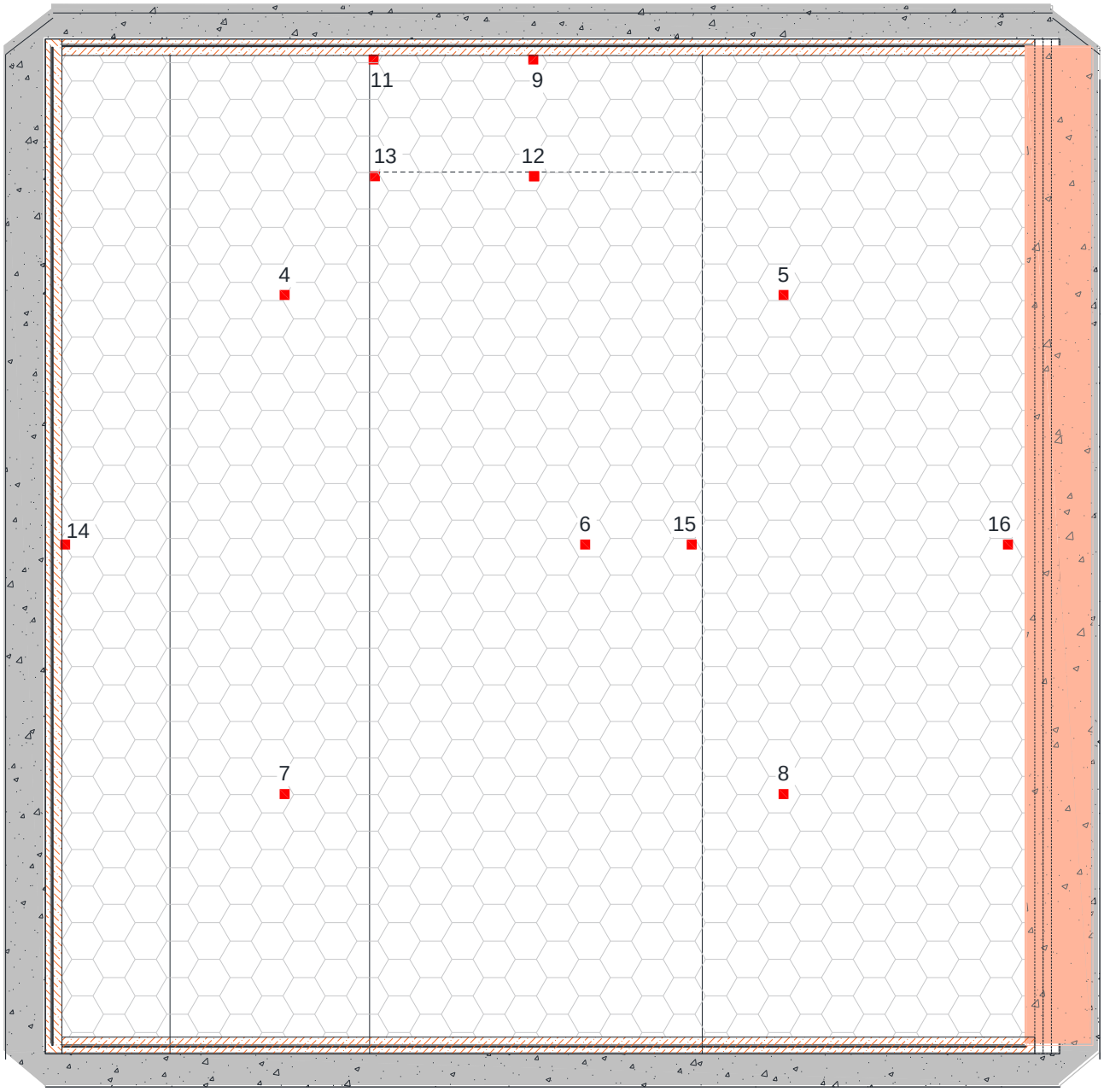
Test Specimen Drawings

Figure 1 – General plan and horizontal section of test specimen unexposed face



Do not scale. All dimensions are in mm

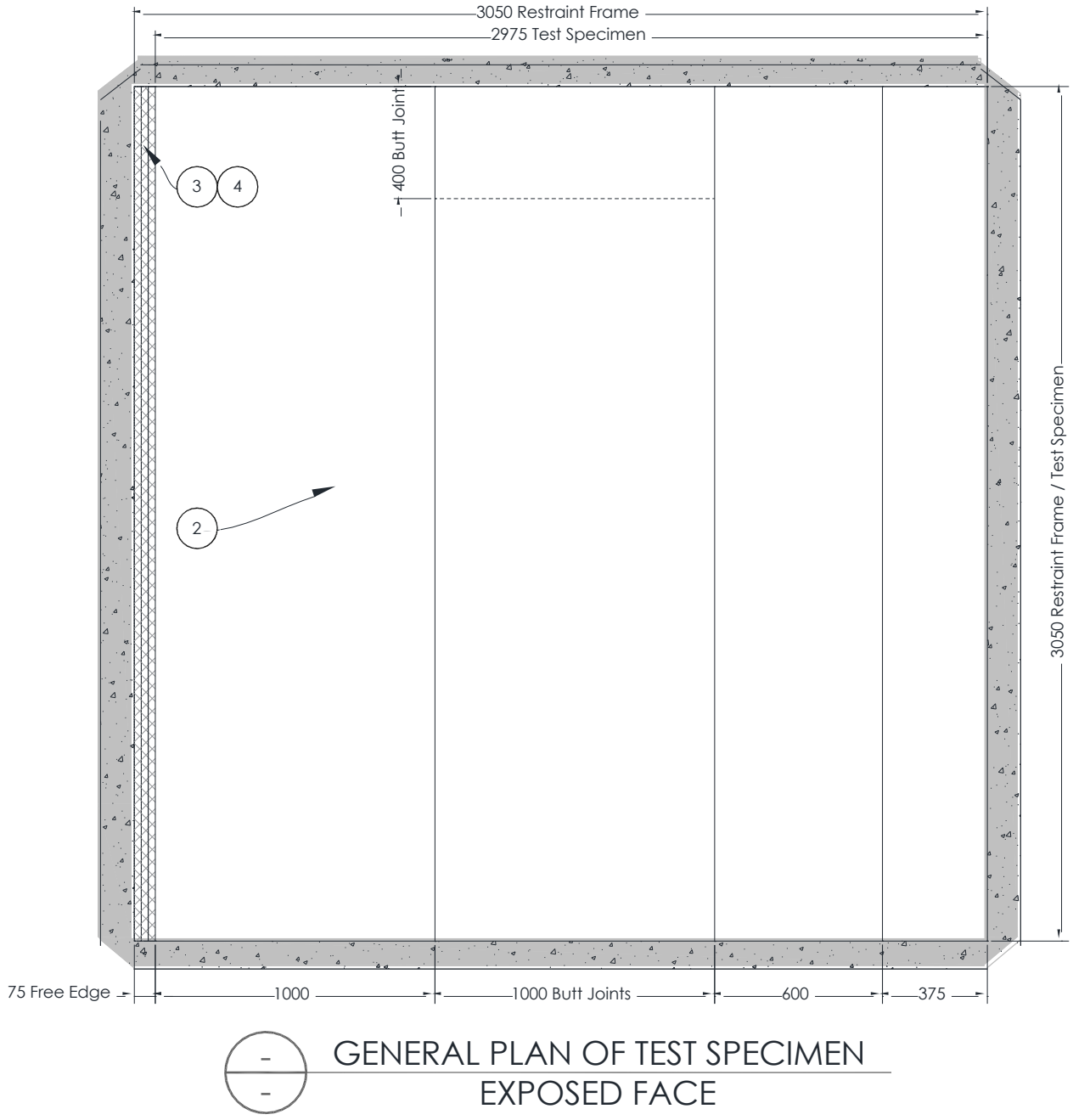
Figure 2 – General plan of test specimen unexposed face - Thermocouples



GENERAL PLAN OF TEST SPECIMEN
UNEXPOSED FACE - THERMOCOUPLES

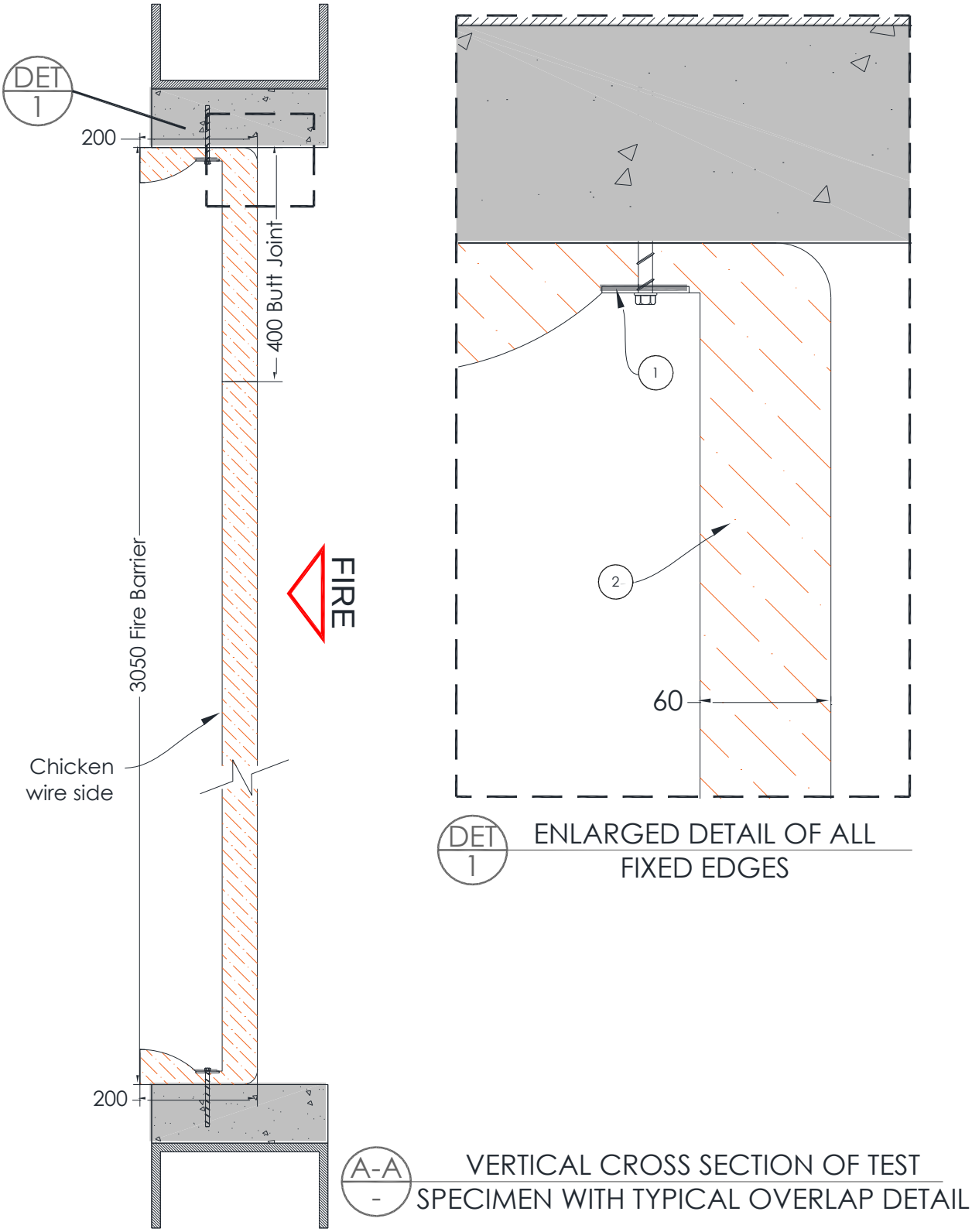
Do not scale. All dimensions are in mm

Figure 3 – General plan of test specimen - Exposed face



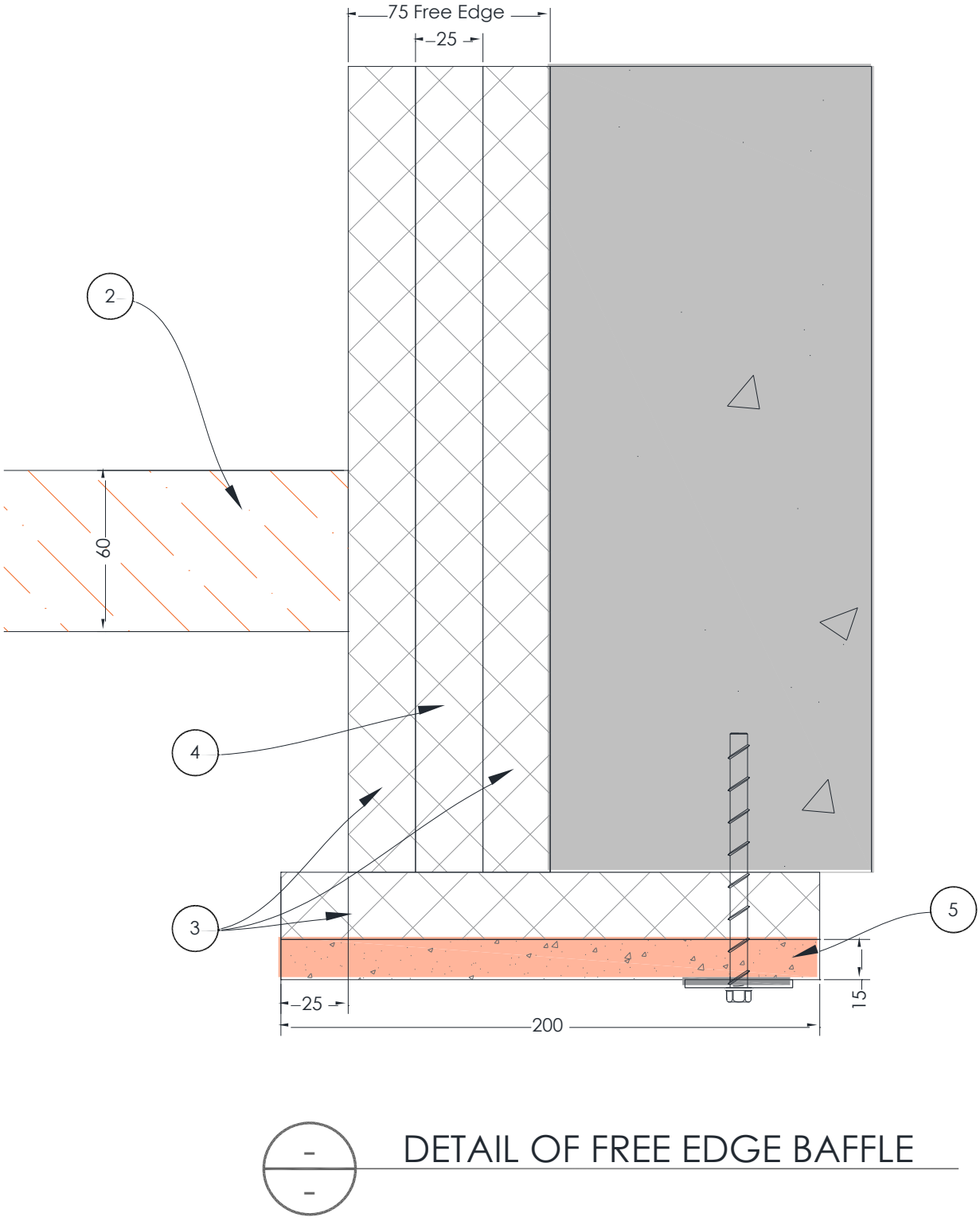
Do not scale. All dimensions are in mm

Figure 4 – Vertical cross section of test specimen



Do not scale. All dimensions are in mm

Figure 5 – Details of free edge



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 to 5)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Item		Description
1. Fire Barrier Flat Bar		
Manufacturer	:	Lancaster Insulation
Reference	:	Flat Bar
Material	:	Mild Steel
Thickness	:	3mm
Overall size	:	2450mm long x 40mm wide
Fixing method	:	Through fixed through the fire barrier to the restraint frame.
Fixings		
i. Manufacturer	:	JCP Construction Products
ii. Reference	:	Ankerbolt M6/M8 x 100
iii. Type		Zinc plated Hex Flange Head Bolt
iv. Size	:	100mm long x 8/8mm diameter
iv. Centres	:	200mm
2. Fire barrier curtain		
Manufacturer	:	Lancaster Insulation
Reference	:	Fire Barrier
Material	:	Mineral rock fibre insulation core compressed in a spun woven polypropylene tissue 1199 SWT, wrapped in 0.5mm gauge steel chicken wire to 1 side of the unexposed face of the barrier only
Density	:	110kg/m³ (measured compressed) including steel wire and tissue 100kg/m^3 (stated)
Thickness		
i. Stonewool	:	60mm
ii. Tissue	:	2µm
Overall size	:	1000mm wide roll x 3700mm long rolls
Fixing method	:	Fire Barrier is trapped with the flat bar fixed to the restraint frame to the head, fixed edge and base. The fire barrier overlapped the head / sides and base. Vertical and horizontal butt joints are secured with galvanised steel wire.
Fixings		
i. manufacturer	:	Marksmen Garden and Outdoor
ii. reference	:	Galvanised Garden Wire
iii. Thickness	:	20M long x 1.6mm thick
iv. centres	:	180mm - 250mm
3. Alkaline Earth Silicate Fibre Based Insulation (Free edge - 1st and 3rd layer off the restraint frame)		
Manufacturer	:	Morgan Advanced Materials
Reference	:	Superwool Plus
Material	:	High temperature insulation wool
Thickness	:	25 mm, uncompressed
Density	:	96 kg/m3 (stated)

Item		Description
4. Alkaline Earth Silicate Fibre Based Insulation (Free edge - 2nd layer off the restraint frame)		
Manufacturer	:	UNIFRAX
Reference	:	Insulfrax® LTX
Material	:	High temperature insulation wool
Thickness	:	25 mm, uncompressed
Density	:	96 kg/m3 (stated)
5. Plasterboard Baffle		
Manufacturer	:	British Gypsum
Type	:	Gyproc Fireline
Board size	:	200 mm x 3000 mm
Thickness	:	15 mm
Stated density	:	843 kg/m³
Fixing method	:	Through fixed to the restraint frame with item 1 flat bar and fixings, additionally a layer of item 3 was glued to the back of the plasterboard.

Test Observations

All observations are from the unexposed face unless noted otherwise.

Time		
mins	secs	
00	00	**The test commences.**
00	05	Test specimen does not touch the baffle.
00	40	Slight steam/smoke release through test specimen.
01	00	Steam/smoke release ceased to occur.
05	00	Moisture deposits on non-woven layer of fabric, causing it to appear darker.
17	30	When viewed from the exposed face, barrier glows arrange in colour. No significant visible change to joints and stitching.
20	00	Signs of moisture depositing across the top half of the specimen.
54	30	Some glowing between free edge packing and barrier.
60	00	When viewed from the exposed face, no significant visible change.
65	30	Glowing at seam at mid height, second seam in from the fixed edge.
71	50	Cotton pad applied to the area of glow. Pod does not discolour or ignite.
80	00	Very small areas of glow form at the stitch locations at the head of the specimen.
78	42	Cotton pad applied to the area of glowing. Pod does not discolour or ignite.
90	00	Small specs of glow form at stitch location in the top half of the specimen. No significant visible change to free edge. No glowing at horizontal joint or the head of the test specimen.
118	12	Cotton pad applied to the area of glowing. Pad discolours very slightly but does not ignite. Barrier ≈ 20mm from baffle at closest point.
120	00	Glowing visible at both central vertical joints.
132	00	**Test discontinued at the request of the test sponsor.**

Test Photographs

The exposed face of the specimen prior to testing

The unexposed face of the specimen prior to testing

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

The unexposed face of the specimen after a test duration of 90 minutes

The unexposed face of the specimen after a test duration of 120 minutes

The exposed face of the specimen immediately after the test

Temperature, Pressure and Deflection Data

Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard BS EN 1363-1: 2020

Time Minutes	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	26
4	544	534
8	646	648
12	706	711
16	748	750
20	781	783
24	809	809
28	832	832
32	852	851
36	869	867
40	885	883
44	899	897
48	912	914
52	924	926
56	935	937
60	945	946
64	955	956
68	964	965
72	973	973
76	981	980
80	988	987
84	996	996
88	1003	1002
92	1009	1009
96	1016	1015
100	1022	1022
104	1028	1027
108	1033	1031
112	1039	1038
116	1044	1044
120	1049	1049
124	1054	1054
128	1059	1061
132	1063	1064

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

Time Minutes	T/C Number 4 Deg. C	T/C Number 5 Deg. C	T/C Number 6 Deg. C	T/C Number 7 Deg. C	T/C Number 8 Deg. C	Mean Temp Deg. C
0	28	27	26	20	28	26
4	52	54	46	*	29	45
8	68	122	58	25	41	63
12	130	206	114	39	54	109
13	145	220	123	44	59	118
14	160	232	138	48	67	129
15	176	242	152	46	78	139
16	188	249	166	*	90	173
20	218	265	207	*	128	205
24	232	273	225	*	163	223
28	238	279	232	*	186	234
32	241	284	235	*	195	239
36	244	289	238	*	201	243
40	249	292	242	*	207	248
44	252	296	244	*	211	251
48	256	301	249	*	214	255
52	261	306	255	*	219	260
56	264	312	259	*	224	265
60	268	314	261	*	227	268
64	271	317	264	*	230	271
68	275	321	270	*	233	275
72	280	324	274	*	237	279
76	282	326	276	*	238	281
80	282	326	276	*	237	280
84	284	327	277	*	238	282
88	286	329	279	*	240	284
92	286	332	279	*	244	285
96	289	336	282	*	247	289
100	293	340	287	*	251	293
104	296	340	288	*	252	294
108	298	342	291	*	254	296
112	300	345	294	*	257	299
116	302	348	296	*	259	301
120	304	349	298	*	260	303
124	305	352	300	*	262	305
128	306	353	301	*	262	306
132	308	354	303	*	264	307

*Thermocouple malfunction

Individual Temperatures Recorded On The Unexposed Surface Of The Specimen

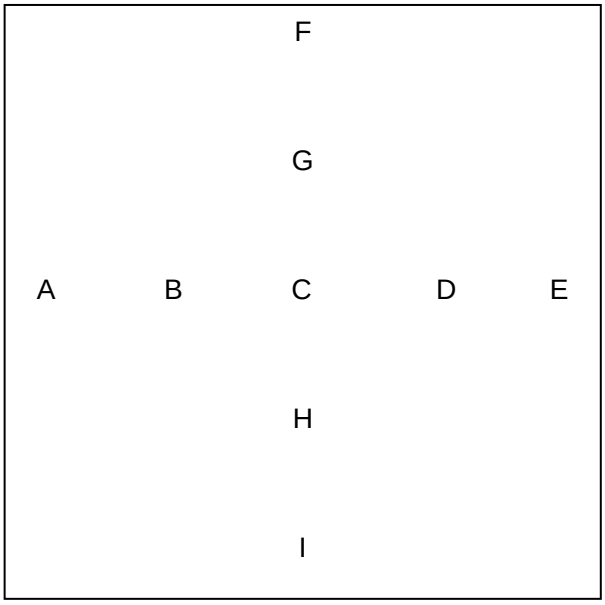
Time Minutes	T/C Number 9 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C	T/C Number 14 Deg. C	T/C Number 15 Deg. C	T/C Number 16 Deg. C
0	31	32	32	33	29	28	27
4	82	99	56	59	48	53	52
7	173	189	72	77	60	78	90
8	208	219	90	96	66	99	111
12	296	291	159	183	111	177	205
16	338	331	195	239	147	209	247
20	379	369	207	262	186	223	263
24	379	374	212	273	208	229	269
28	384	375	215	279	221	236	274
32	389	379	216	284	228	238	277
36	400	391	219	289	235	240	281
40	401	396	220	294	240	240	284
44	407	404	221	300	245	242	287
48	416	412	223	307	251	248	292
52	420	417	226	316	259	250	298
56	430	429	230	324	265	257	303
60	433	431	230	332	271	258	303
64	437	439	232	338	275	263	306
68	441	445	235	346	282	267	310
72	445	448	237	353	292	*	315
76	450	453	238	359	297	*	319
80	451	456	237	359	298	*	317
84	454	457	238	362	299	*	319
88	458	464	239	366	302	*	322
92	462	470	240	370	308	*	325
96	467	477	241	374	313	*	329
100	466	481	244	381	320	*	335
104	469	480	244	383	322	*	334
108	471	484	246	388	325	*	337
112	474	487	247	393	329	*	341
116	481	491	249	397	332	*	345
120	486	496	250	401	334	*	346
124	489	498	251	404	337	*	349
128	492	501	252	407	339	*	351
132	491	504	252	412	342	*	353

*Thermocouple malfunction

Recorded Heat Radiation Intensity From The Specimen

Time Minutes	Radiation Intensity kW/m^2
0	0
4	0.097
8	0.749
12	1.173
16	1.401
20	1.89
24	1.923
28	2.118
32	2.02
36	2.183
40	2.118
44	2.314
48	2.314
52	2.477
56	2.477
60	2.542
64	2.542
68	2.672
72	2.803
76	2.705
80	2.737
84	2.737
88	2.77
92	2.835
96	2.933
100	2.998
104	2.966
108	3.031
112	3.096
116	3.128
120	3.291
124	3.259
128	3.324
132	3.291

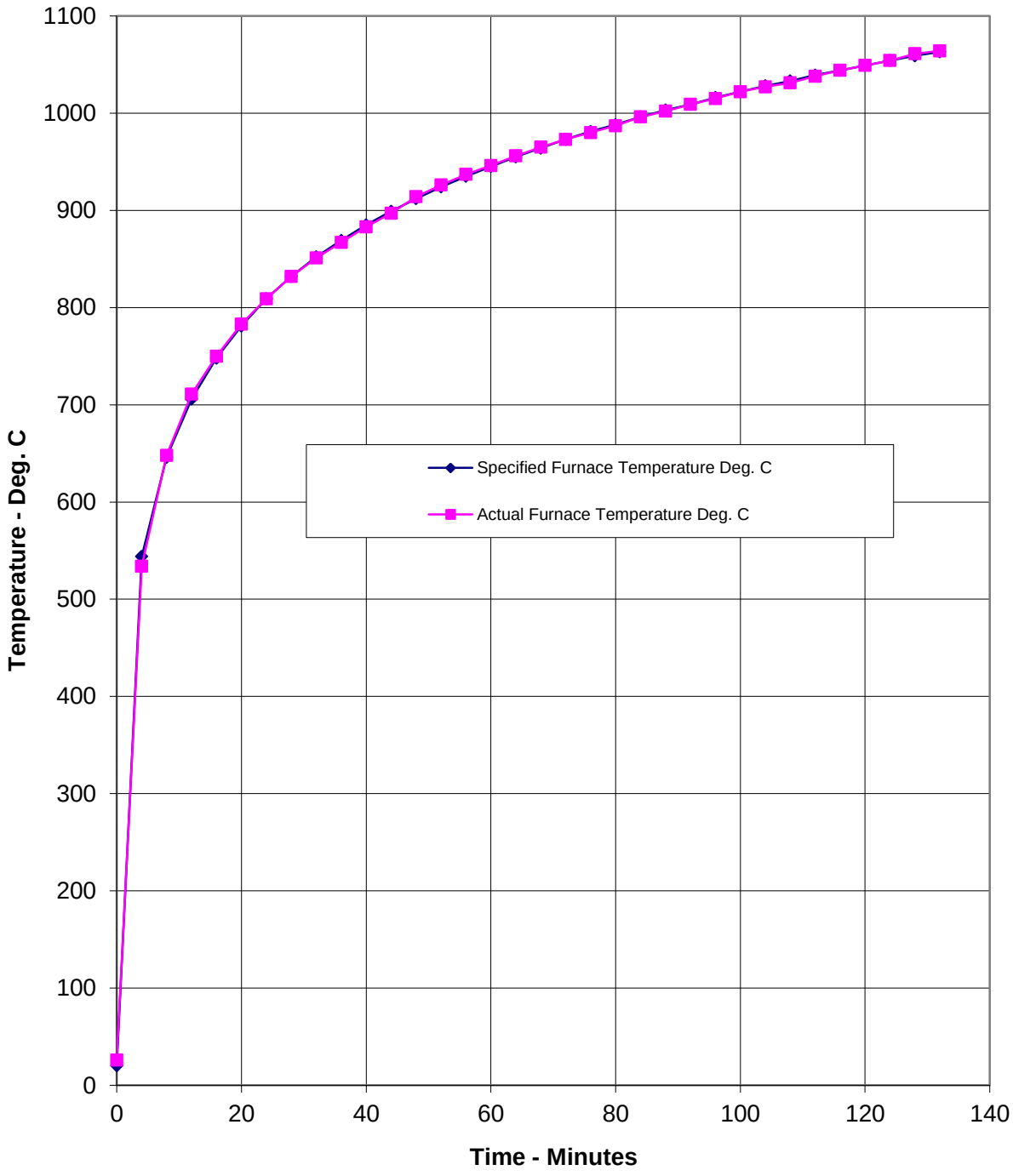
Deflection Of The Specimen During The Test



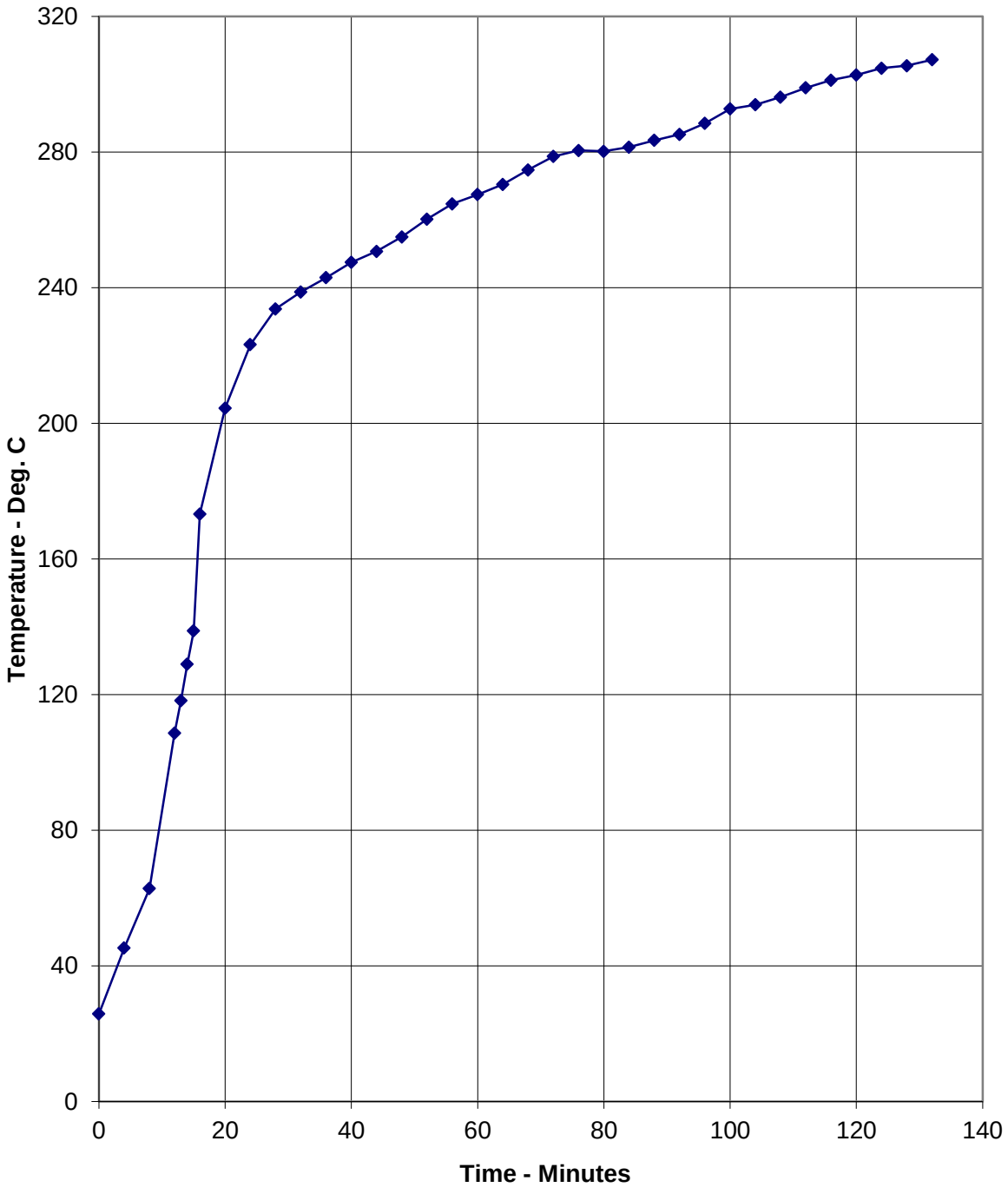
Time Mins	A	B	C	D	E	F	G	H	I
0	0	0	0	0	0	0	0	0	0
10	0	-25	-36	-47	28	0	-39	-30	0
20	6	-45	-63	-64	32	3	-49	-59	2
30	-3	-55	-75	-70	44	2	-53	-64	-1
40	2	-57	-73	-72	34	6	-56	-69	-2
50	2	-58	-72	-73	29	2	-57	-71	-8
60	4	-61	-77	-75	25	6	-55	-77	-4
70	-1	-65	-77	-77	25	2	-53	-79	-2
80	-3	-59	-80	-77	23	3	-59	-78	-13
90	7	-56	-81	-75	26	3	-55	-78	-1
100	2	-58	-84	-76	25	5	-53	-82	-3
110	1	-60	-81	-76	34	7	-55	-85	0
120	3	-57	-83	-78	37	9	-50	-85	-2
130	7	-59	-83	-76	35	4	-52	-85	0

Positive deflections indicate movement towards the furnace chamber

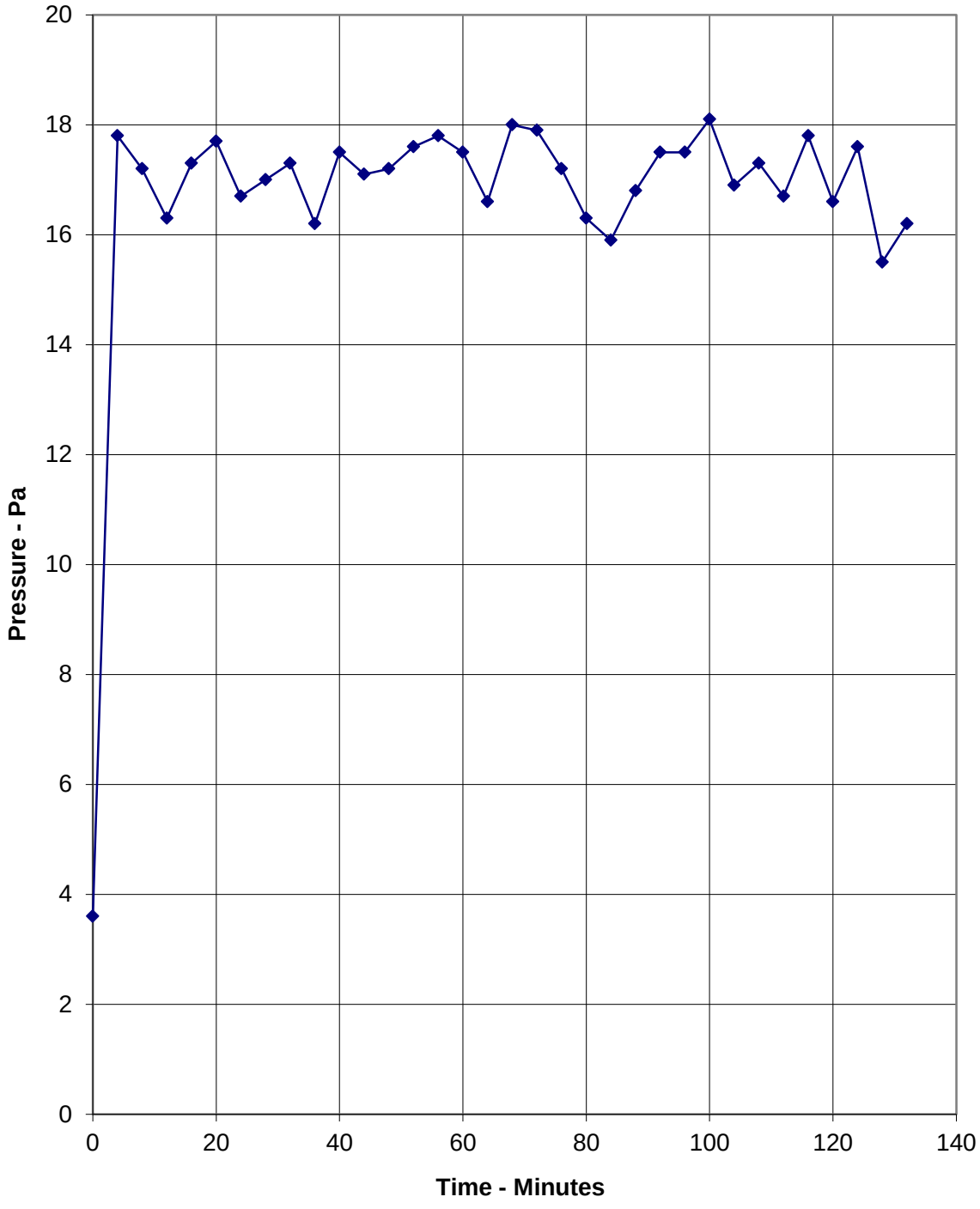
Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard BS EN 1363-1: 2020



Graph Showing Mean Temperature Recorded On The Unexposed Surface Of The Specimen



Graph Showing Recorded Furnace Pressure 300 mm Below The Head Of The Specimen



On-going Implications

Limitations

This report details the method of construction, the test conditions and the results obtained when the specific elements of construction described herein were tested following the procedure outlined in BS EN 1363-1: 2020, and where appropriate BS EN 1363-2: 1999. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report. Annex A of BS EN 1363-1: 2020, provides guidance information on the application of fire resistance tests and the interpretation of test data.

Because of the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

EGOLF

Certain aspects of some fire test specifications are open to different interpretations. EGOLF have identified a number of such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Groups. Where such Resolutions are applicable to this test they have been followed

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, except with respect to the construction types covered in Annex A (Glazed elements) and Annex B (Horizontally spanning elements) where specific direct field of application rules are given.

a) decrease in height;

b) increase in the thickness of the wall;

c) increase in the thickness of component materials;

d) decrease in linear dimensions of boards or panels but not thickness;

e) decrease in stud spacing;

f) decrease in distance of fixing centres;

g) 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;

h) increase in the number of vertical joints, of the type tested;

i) the use of installations such as electrical sockets, switches, etc. when tested as illustrated in Figures 9, 10 and 11 with the installations not more than 500 mm from the top edge;

j) horizontal and/or vertical joints, of the type tested.

For framing systems or systems with visible profiles on the unexposed side, intended to be used for EI classification, no increase in width and depth is allowed in case no temperature measurements on the unexposed side of the profiles were made during the test.

The field of direct application for glazed elements or non-loadbearing walls incorporating glazing is given in Annex A.

The field of direct application for non-loadbearing external and internal walls designed to span horizontally between two independently proven fire resisting vertical structural elements is given in Annex B.

Extension of width

For test specimens tested without a supporting construction, the width of an identical construction may be increased if the specimen was tested at a minimum of nominally 3 m wide with one vertical edge without restraint.

For test specimens tested with a supporting construction, the width of an identical construction may be increased if the specimen was tested at a minimum of nominally 2,8 m wide with one vertical edge without restraint.

In case of EW classification, an increase in width of an identical construction is only allowed when the average unexposed surface temperature of any discrete area of the test specimen remains below 300°C or the measured radiation remains below 6 kW/m2. In any other case, no increase in width is allowed.

Extension of height

The height of the construction may be increased by 1,0 m under the following conditions:

a) minimum tested height is 3 m when tested without a supporting construction or 2,8 m when tested with a supporting construction

b) the maximum deflection of the test specimen was not in excess of 100 mm (see 9.3)

c) the expansion allowances are increased pro-rata

In case of EW classification, an increase in height of an identical construction is only allowed when the average unexposed surface temperature of any discrete area of the test specimen remains below 300°C or the measured radiation remains below 6 kW/m2. In any other case, no increase in height is allowed.

Supporting Constructions

The following rules for the field of application apply.

Standard supporting constructions

a) For specimens tested in the test frame without any supporting construction, the result is applicable to high density rigid supporting constructions with at least the same fire resistance as the test specimen.

b) For specimens tested with any standard supporting construction as defined in EN 1363-1, the result is applicable to any other supporting construction of the same type (flexible or rigid) that has the same or a greater classified fire resistance (thicker, denser, more layers of boards, as appropriate) than the one used in the test and the same horizontal and/or vertical orientation, i.e.:

• only vertical if the specimen was tested with the standard supporting construction fixed along the vertical edge (see Figure 17, b1);

• only horizontal if the specimen was tested with the standard supporting construction fixed along the horizontal edge (see Figure 17, b2);

• both if the specimen was tested with the standard supporting fixed along both the horizontal and the vertical edge (see Figure 17, b3).

Non-standard supporting constructions

The result of a test on a non-loadbearing wall tested in a non-standard supporting construction is only applicable to that construction.