Warringtonfire
Holmesfield Road
Warrington
Cheshire
WA1 2DS
United Kingdom
T: +44 (0)1925 655116
W: www.warringtonfire.com

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:

29 September 2022

Issue 3

12 February 2024

WF Report No.

521289/R

Prepared for:

Lancaster insulation/ MC Resources

34 Port Royal Avenue
Lune Ind. Est.
Lancaster
LA1 5QP
United Kingdom

0249

This report supersedes report referenced 521289/R Issue 2, Issued 31 January 2024.

Test Specimen

Summary of Tested Specimen

The specimen had overall nominal dimensions of 3050 mm high by 3050 mm wide by 175 mm thick and was formed from a fire barrier referenced 'Total comfort smoke & fire barrier'. The barrier comprised a single layer of 50 mm thick mineral rock fibre fire barrier with a stated density of 100 kg/m^3, with a galvanised mild steel mesh to the unexposed face. Two layers of the 1000 mm wide sections were installed with a nominal 75 mm air cavity between them, joints were stitched together using stainless steel lacing wire, and were typically offset by 200 mm. The perimeter of the test specimen was secured using 1.5 mm thick galvanised mild steel angle, the specimen was secured on all four edges.

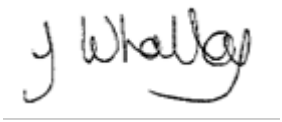
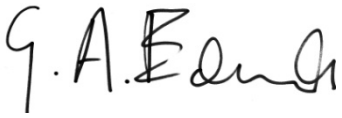
Detailed drawings of the test specimen(s) and a comprehensive description of the test construction based on a detailed survey of the specimen(s) and information supplied by the sponsor of the test are included in the Test Specimen and Schedule of Components sections of this report.

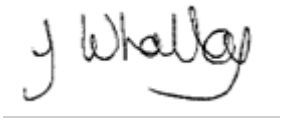
Performance Criteria and Test Results

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	30 minutes	Exceeded maximum temperature criteria	TC9		
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 29 September 2022

Quality management

Issue No: 1	Issue Date: 22 May 2023
Responsible Officer: J. Whalley	Approved By: G. Edmonds
	

Issue No: 2	Re-issue Date: 31 January 2024
Responsible Officer: J. Whalley	Approved By: G. Edmonds
	

Reason for Revision:

Page 1

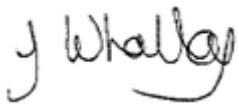
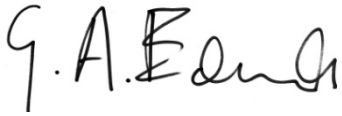
- Title changed; test is no longer generally in accordance.
- UKAS logo added.

Pages 4 and 5

- Signatories and revision history sections replaced with quality management section.

Page 6

- Restraint comment in standard section replaced with statement confirming that the specimen tested was maximum size as in practice.

Issue No: 3	Re-issue Date: 12 February 2024
Responsible Officer: J. Whalley	Approved By: G. Edmonds
	
Reason for Revision: • Deflections of the test specimen during the test added.	

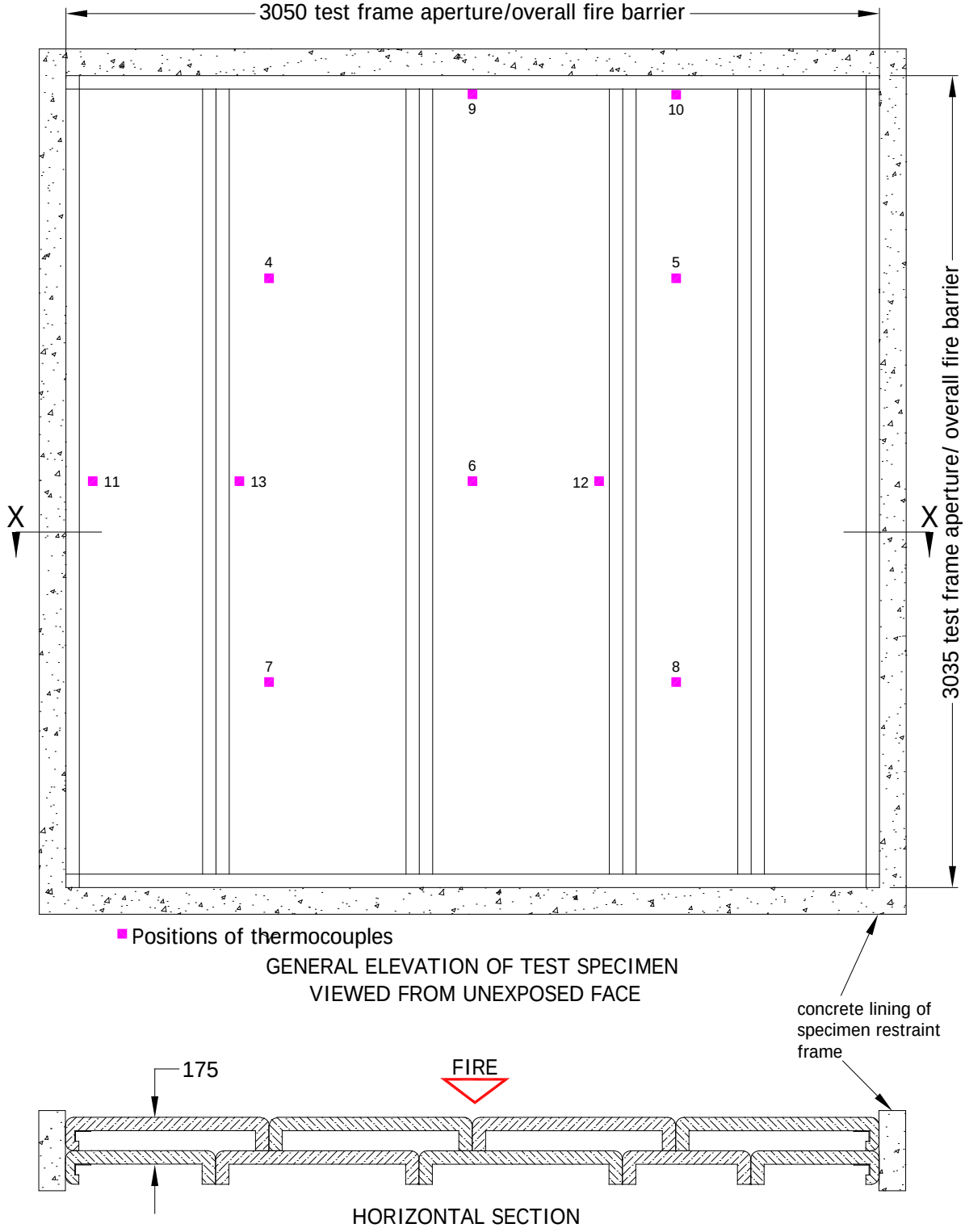
CONTENTS **PAGE NO.**

Test Conditions

Standard	BS EN 1364-1:2015 Fire resistance tests for non-loadbearing elements - Part 1: Walls. At the test sponsor's request, the specimen has been tested at 3035 mm long by 3050 mm wide, this was deemed to be full size as in practice.''
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, restrained on all four sides, by representative of the test sponsor between the 26 and 28 September 2022.
Conditioning	The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of 4 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 14.5^{o}C to 22^{o}C and 53.5% to 74.5% respectively.
Instruction to Test	The test was conducted on the 29 September 2022 at the request of Lancaster insulation/ MC Resources, the test sponsor. Mr. A. Clokey, Mr. S. Wilkinson, and Mr. R. Boettcher representatives of the test sponsor witnessed the test.
Ambient Temperature	The ambient air temperature in the vicinity of the test construction was 14ºC at the start of the test with a maximum variation of +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 1.
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.

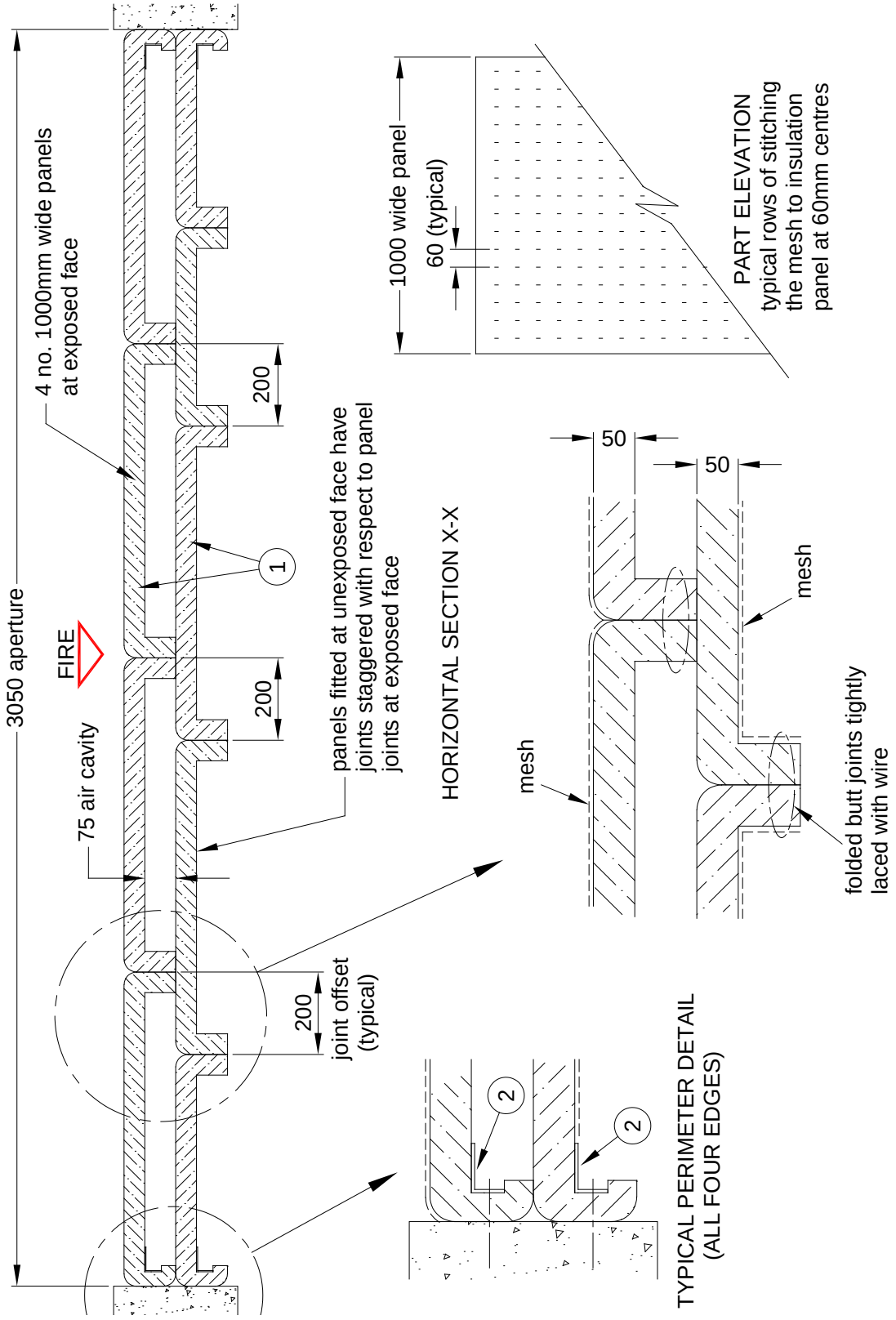
Test Specimen Drawings

Figure 1 – General elevation of test specimen showing thermocouples at unexposed face



Do not scale. All dimensions are in mm

Figure 2 – Typical details of test specimen



Do not scale. All dimensions are in mm

Schedule of Components

(Refer to Figures 1 & 2)
(All values are nominal unless stated otherwise)
(All other details are as stated by the sponsor)

Item		Description
1. Fire barrier		
Material	:	Mineral rock fibre insulation panels reinforced on one side (outer face) using wire mesh.
Reference	:	Total comfort smoke & fire barrier
Panel supplied size	:	1000 mm wide x 4000 mm long x 50 mm thick
Overall barrier size	:	3050 mm wide x 3035 mm high
Overall barrier thickness	:	175 mm (1st layer 50mm panels + 75mm air cavity + 2nd layer 50mm panels).
Density	:	100 kg/m^3 mineral fibre insulation (stated)
Fixing method		The 1000 mm wide insulation panels were butt joined along folded vertical edges and stitched together using stainless steel lacing wire. The fire barrier insulation panels were fixed directly to the masonry surround along the perimeter head, base and vertical edges using screw fixed clamping angle (item 2).
Details of reinforcement mesh		
Material	:	Galvanised mild steel
Thickness	:	0.6 mm
Mesh size	:	30 mm wide hexagonal pattern
Fixing method	:	Mesh supplied pre-fixed to one face of the insulation panels using thin gauge galvanised steel wire to stitch the mesh in vertical rows at 60 mm centres.
Details of butt joint lacing wire		
Material	:	Stainless steel (304L)
Size	:	0.3 mm diameter
Fixing method	:	Lacing wire tightly stitched the folded butt joints together at 100 mm nominal centres along full height of insulation panels.
2. Perimeter clamping angle		
Material	:	Galvanised mild steel angle
Thickness	:	1.5 mm
Overall section size	:	60 mm x 40 mm
Fixing method	:	Clamping angle screw fixed through to the concrete lining of the specimen restraint frame using 100 mm long x 7.5 mm diameter concrete screws at 300 mm centres along perimeter head, base and both vertical edges.

Test Observations

All observations are from the unexposed face unless noted otherwise.

Time		
mins	secs	
00	00	**The test commences.**
05	50	Slight smoke/steam at the head of the test specimen.
10	00	When viewed from the exposed face, specimen glows orange in colour.
16	06	Slight steam/smoke release from the top third of specimen through barrier. Stone wool darkens due to moisture at steam/smoke release locations.
26	20	Darkened areas increase in size adjacent to first two seams from the left side.
52	57	When viewed from the exposed face, no significant visible change barrier. Joints open slightly at the head.
60	00	Darkening continues in the top half of the specimen. Steam/smoke release has ceased to occur.
80	00	No significant visible change.
120	00	No significant visible change.
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 30 minutes

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

The unexposed face of the specimen after a test duration of 132 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 Mins	Specified Furnace Temperature Deg. C	Actual Furnace Temperature Deg. C
0	20	30
4	544	530
8	646	642
12	706	699
16	748	727
20	781	783
24	809	793
28	832	834
32	852	852
36	869	871
40	885	889
44	899	899
48	912	912
52	924	922
56	935	937
60	945	945
64	955	955
68	964	963
72	973	971
76	981	978
80	988	992
84	996	1002
88	1003	1005
92	1009	1011
96	1016	1018
100	1022	1024
104	1028	1029
108	1033	1034
112	1039	1037
116	1044	1043
120	1049	1045
124	1054	1049
128	1059	1055
132	1063	1061

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

Time Mins	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	17	17	16	16	15	16
4	19	19	17	17	15	17
8	35	41	23	17	16	26
12	45	48	28	16	15	30
16	43	47	29	16	16	30
20	42	46	27	*	16	33
24	44	54	26	17	16	31
28	66	86	29	16	16	43
32	103	144	44	16	16	65
36	133	172	70	17	*	98
40	153	188	96	18	17	94
44	167	201	116	20	16	104
48	180	215	133	23	14	113
52	190	224	151	29	11	121
56	196	229	161	40	24	130
60	200	232	165	52	31	136
64	203	234	167	62	39	141
68	205	237	169	70	47	146
72	207	240	171	78	55	150
76	209	242	174	83	63	154
77	209	243	175	84	64	155
78	210	244	176	85	66	156
80	211	244	176	88	70	158
84	212	247	178	92	76	161
88	213	249	181	96	81	164
92	215	251	183	99	86	167
96	218	254	186	103	91	170
100	219	256	189	107	96	173
104	221	259	192	112	101	177
108	223	261	194	115	105	180
112	224	263	196	118	109	182
116	226	265	198	122	112	185
120	227	267	199	124	115	186
124	227	268	200	127	118	188
128	228	270	201	128	120	189
132	229	271	202	129	122	191

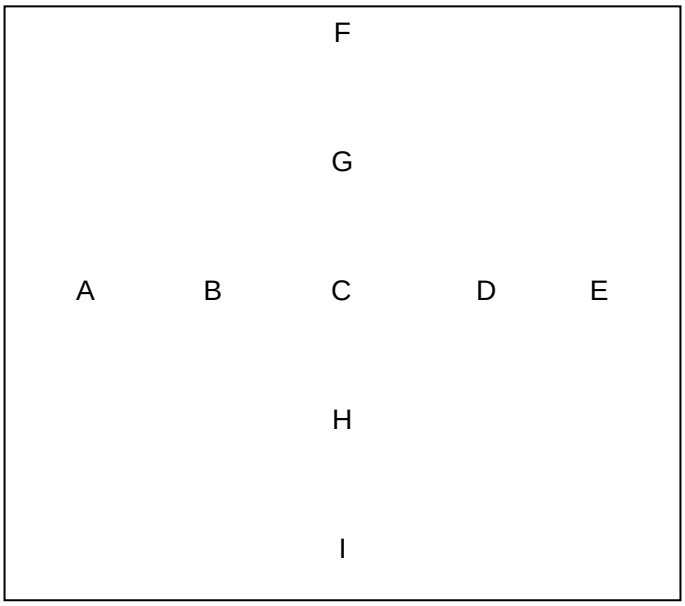
*Thermocouple malfunction

Individual Temperatures Recorded On The Unexposed Surface Of The Specimen

Time Mins	T/C Number 9 Deg. C	T/C Number 10 Deg. C	T/C Number 11 Deg. C	T/C Number 12 Deg. C	T/C Number 13 Deg. C
0	17	17	16	17	17
4	24	21	17	18	19
8	48	51	23	22	33
12	*	55	28	27	34
16	52	53	29	30	31
20	80	55	31	31	31
24	141	88	34	29	55
28	181	151	37	29	94
30	194	177	40	30	113
31	200	188	42	32	122
32	205	198	43	35	130
36	223	232	59	53	152
40	237	252	84	80	169
44	252	268	102	106	184
48	265	283	118	128	205
52	276	296	128	147	219
56	283	305	136	162	223
60	285	311	142	172	225
64	289	316	148	178	227
68	297	322	154	184	230
72	298	325	156	188	232
76	301	328	160	190	235
80	310	330	162	194	237
84	308	332	167	196	239
88	315	335	167	199	241
92	318	337	172	202	244
96	325	341	174	205	249
100	327	343	177	209	253
104	328	346	182	211	257
108	330	348	183	213	258
112	335	350	184	215	261
116	337	353	187	219	264
120	343	354	187	220	264
124	343	355	187	222	266
128	342	356	188	222	266
132	346	357	188	224	267

*Thermocouple malfunction

Individual Temperatures Recorded On The Unexposed Surface Of The Specimen



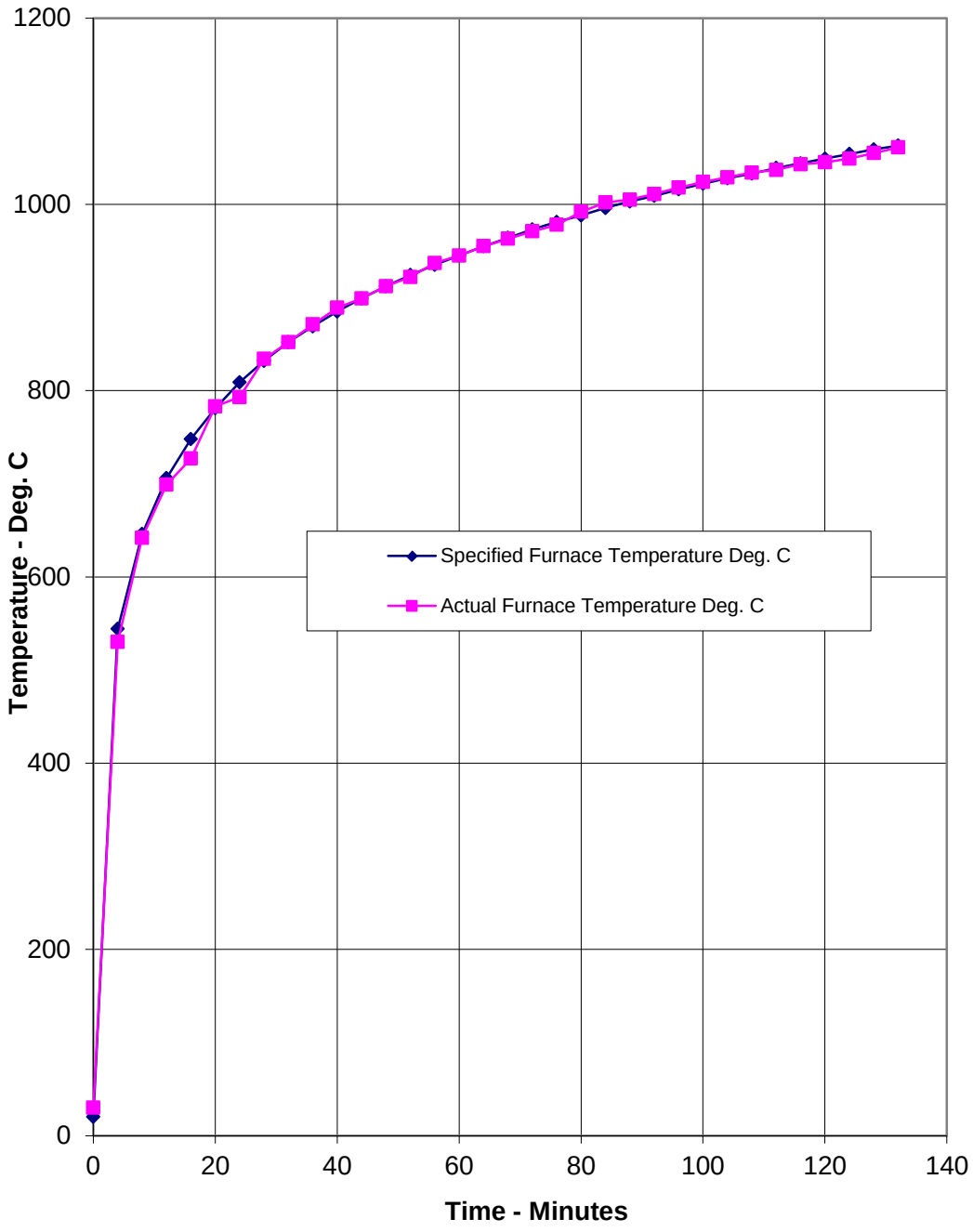
Deflections - mm									
TIME mins	A	B	C	D	E	F	G	H	I
0	0	0	0	0	0	0	0	0	0
10	-7	-27	-31	-7	-1	-6	-19	-18	-1
20	-8	-26	-17	-3	1	-4	-16	-14	-1
30	-6	-22	-21	-4	-0	1	-14	-15	0
40	-5	-24	-20	2	1	-4	-17	-15	-3
50	-7	-27	-23	-2	0	-3	-18	-15	-2
60	-10	-29	-26	0	0	-5	-18	-16	0
70	-5	-27	-23	-2	0	-3	-19	-10	-4
80	-2	-30	-23	-3	0	1	-16	-18	-4
90	-5	-25	-34	3	-1	0	-20	-18	-6
100	-5	-29	-34	-3	-1	-2	-16	-12	-1
110	-7	-29	-12	-1	-2	-6	-16	-19	-3
120	0	-25	-16	-5	1	-5	-15	-14	-3
130	-3	-29	-28	-5	-1	1	-23	-22	-4

Positive values indicate movement towards the furnace chamber.

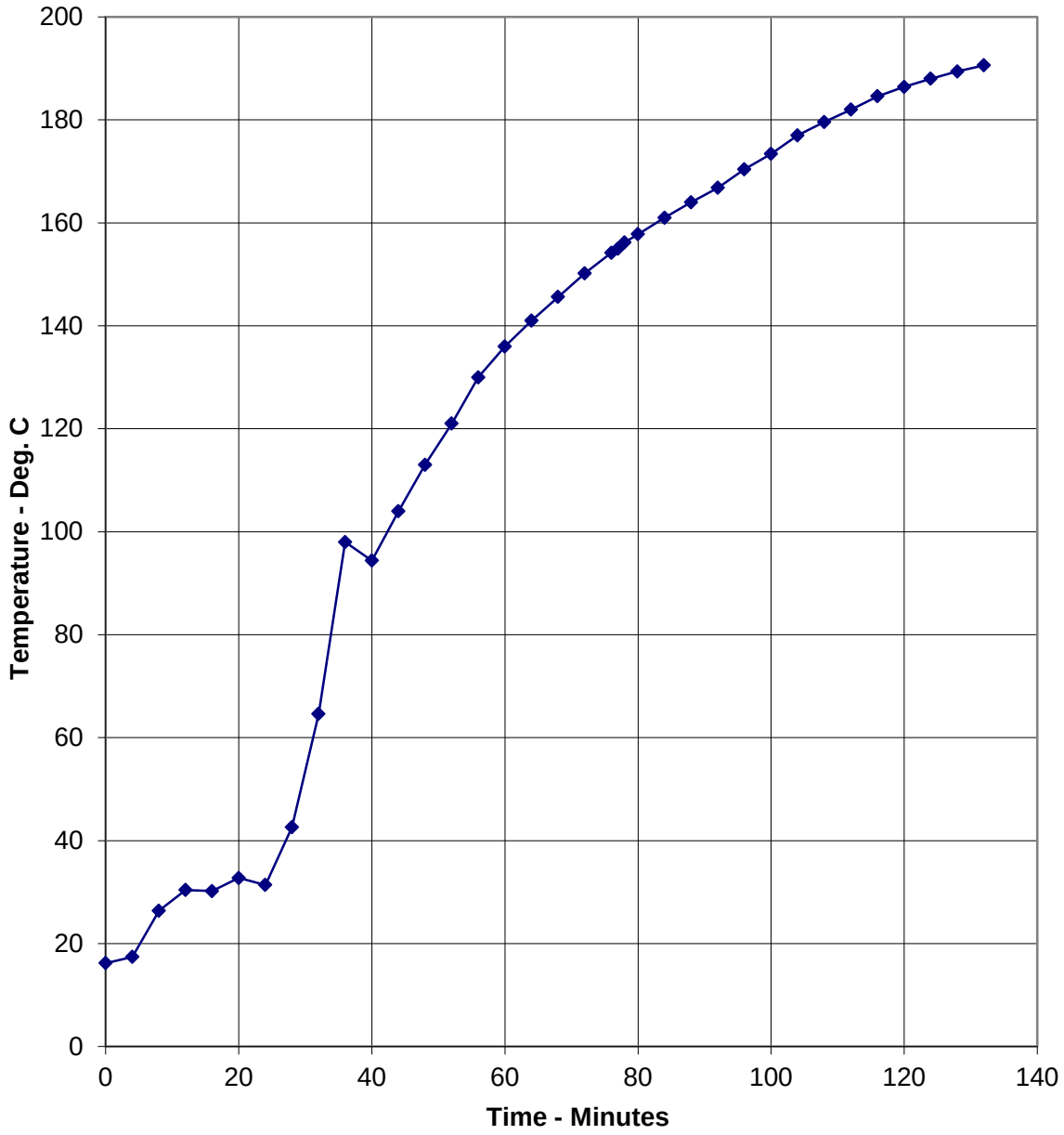
Recorded Heat Radiation Intensity From The Specimen

Time Minutes	Radiation Intensity kW/m^2
0	0
4	0
8	0
12	0
16	0
20	0
24	0
28	0
32	0
36	0
40	0
44	0.21
48	0.42
52	0.341
56	0.394
60	0.315
64	0.341
68	0.499
72	0.394
76	0.604
80	0.525
84	0.472
88	0.656
92	0.499
96	0.682
100	0.551
104	0.656
108	0.63
112	0.708
116	0.787
120	0.656
124	0.656
128	0.708
132	0.682

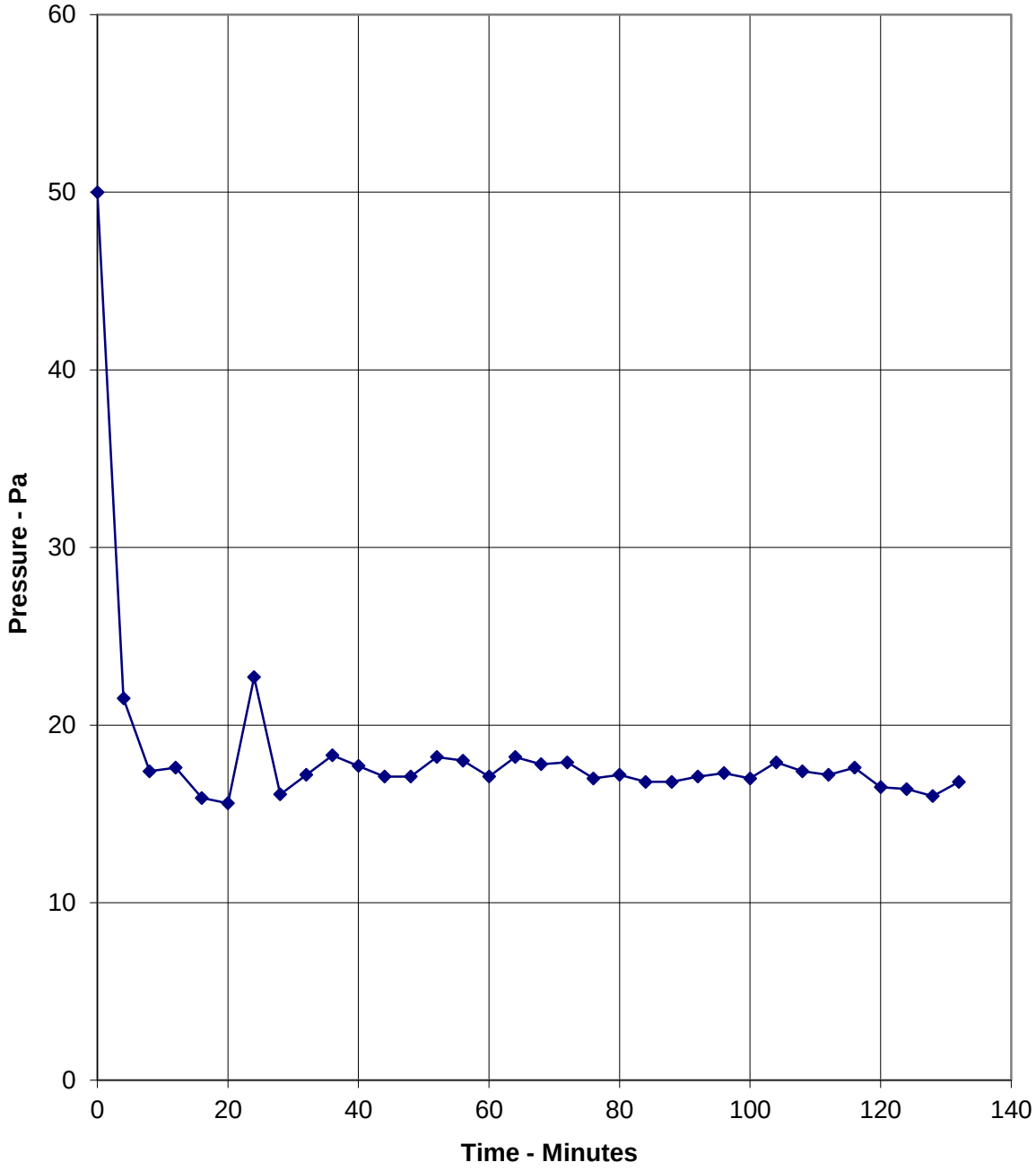
Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard BS EN 1363-1: 2020



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.

This report supersedes report referenced 521289/R Issue 2, Issued 31 January 2024.

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