

C A M B R I D G E
FIRE RESEARCH

REPORT NUMBER
CFR1712201_1 Rev 1

FIRE RESISTANCE TEST
IN ACCORDANCE WITH BS 476: PART 22: 1987

Sponsor: Exitex Limited
Address: Mountpleasant
Dundalk
County Louth
Ireland
Date of test: 20th December 2017

Results:

Test duration: 36 minutes
Integrity: 36 minutes, no failure the test having been terminated.
Insulation: 36 minutes, no failure the test having been terminated.



Summary of test specimen:

A timber single acting latched doorset tested as an insulated doorset with self-adhesive stick-on seals to jambs and head of frame.

Leaf size:
2040 high x 925 wide x 44 thick



0 CONTENTS PAGE

0 CONTENTS PAGE	2
1 PREPARATION FOR TESTING	3
1.1 Specimen conditioning.....	3
1.2 Associated construction	3
1.3 Specimen construction.....	3
1.4 Specimen verification	3
1.5 Specimen installation and fixity	3
1.6 Specimen selection.....	4
2 PRE-TEST MEASUREMENTS AND SETTING	5
2.1 Gap measurements	5
2.2 Closer force measurement.....	5
3 TEST CONDITIONS, INSTRUMENTATION AND MEASURING.....	6
3.1 Furnace temperature	6
3.2 Furnace pressure.....	7
3.3 Ambient temperature	7
3.4 Unexposed face specimen thermocouples	8
3.5 Deflection.....	10
4 TEST OBSERVATIONS	11
5 LIMITATIONS	12
APPENDIX 1 SPECIMEN CONSTRUCTION	13
Appendix 1 Table 1	13
Appendix 1 Figure 1 – Elevation viewed from the unexposed side incl. hidden detail	16
Appendix 1 Figure 2 – Section A – A	17
Appendix 1 Figure 3 – Section B – B	17
APPENDIX 2 PHOTOGRAPHS.....	18
Appendix 2.1 Pre-test photos.....	18
Appendix 2.2 During test photos.....	20
Appendix 2.3 Post-test photos	22
APPENDIX 3 POSITIONING OF INSTRUMENTATION.....	23
APPENDIX 4 RECORDED THERMOCOUPLE DATA.....	24

1 PREPARATION FOR TESTING

1.1 Specimen conditioning

The specimen components were at Cambridge Fire Research for a period of more than 7 days. During the last 7 days the temperature and relative humidity were measured and recorded within the range of 8 to 16°C and 50 to 72% respectively.

1.2 Associated construction

Cambridge Fire Research constructed a softwood timber-stud partition, which was clad with 1 No. British Gypsum FireLine board 15mm thick on the exposed side and 1 No. British Gypsum FireLine board 12.5mm thick on the unexposed side to provide an aperture for the specimen of 2085 mm high x 1005 mm wide.

The partition was installed into a refractory block test frame with an aperture of 2400mm high x 1350mm wide.

In accordance with Fire Test Study Group Resolution No. 51 continuity of the threshold was simulated by the installation of a solid non-combustible threshold extension by Cambridge Fire Research, such that the extension was flush with the threshold onto which the specimen was positioned.

1.3 Specimen construction

The complete specimen was supplied by the sponsor.

1.4 Specimen verification

Cambridge Fire Research carried out a detailed survey of the specimen to verify the information provided by the Sponsor. This included verifying the weight, densities, materials and dimensions of construction components wherever possible.

Details and drawings of the construction are shown in Appendix 1.

Photographs of details of the construction taken before the test are shown in Appendix 2.

1.5 Specimen installation and fixity

Cambridge Fire Research installed the specimen into the associated construction. The specimen was asymmetrical and fitted such that the door opened towards the heating conditions of the test. The leaf was latched prior to the start of the test.

The specimen was affixed to the associated construction as described in Appendix 1.

1.6 Specimen selection

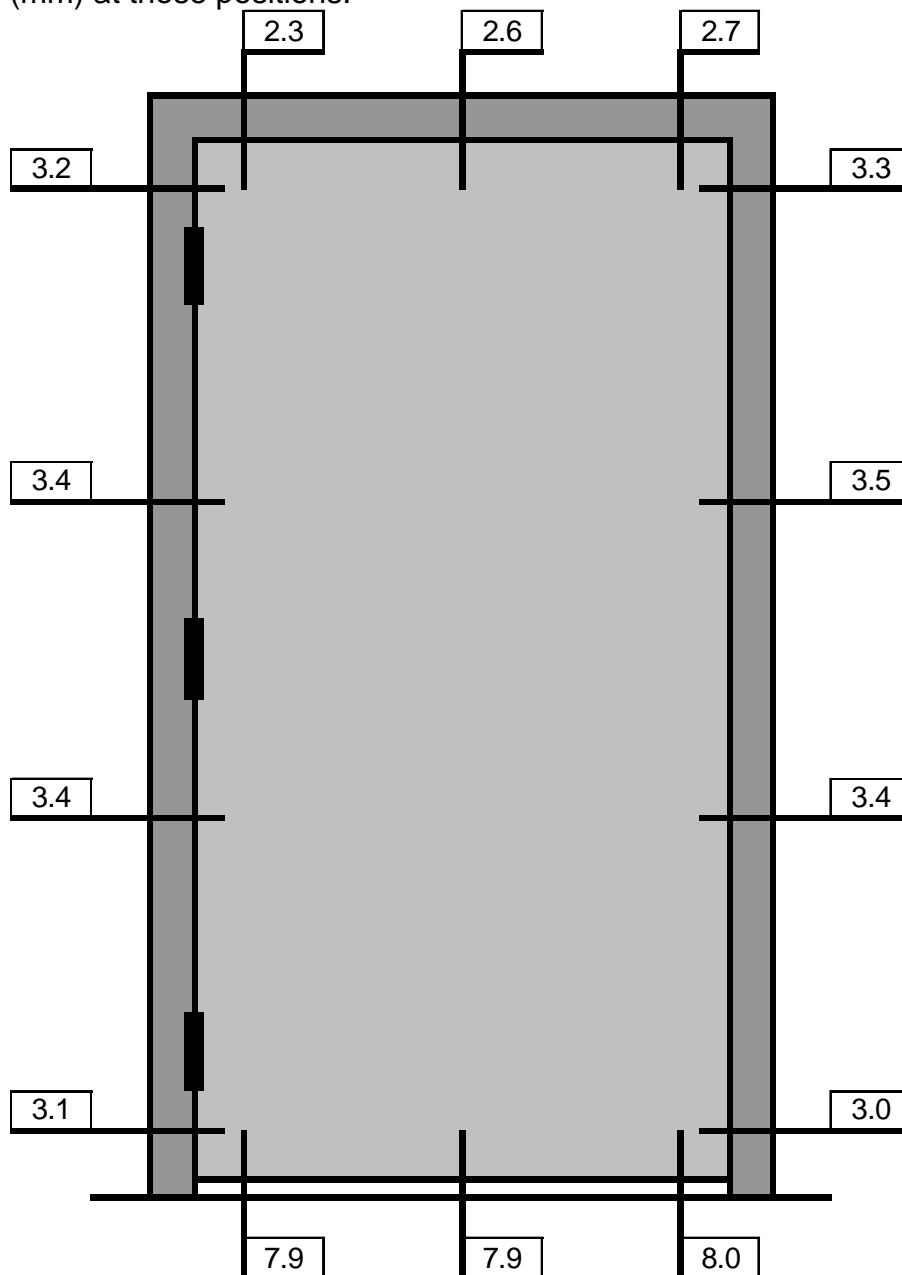
Cambridge Fire Research was not involved in any selection or sampling procedures for the tested specimen.

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2 PRE-TEST MEASUREMENTS AND SETTING

2.1 Gap measurements

The gap between the leaf edges and the frame and at the threshold was measured on the exposed face prior to the start of the test and prior to the fitting of the frame intumescent. The following figure shows the position at which the measurements were made and the recorded gap (mm) at those positions.



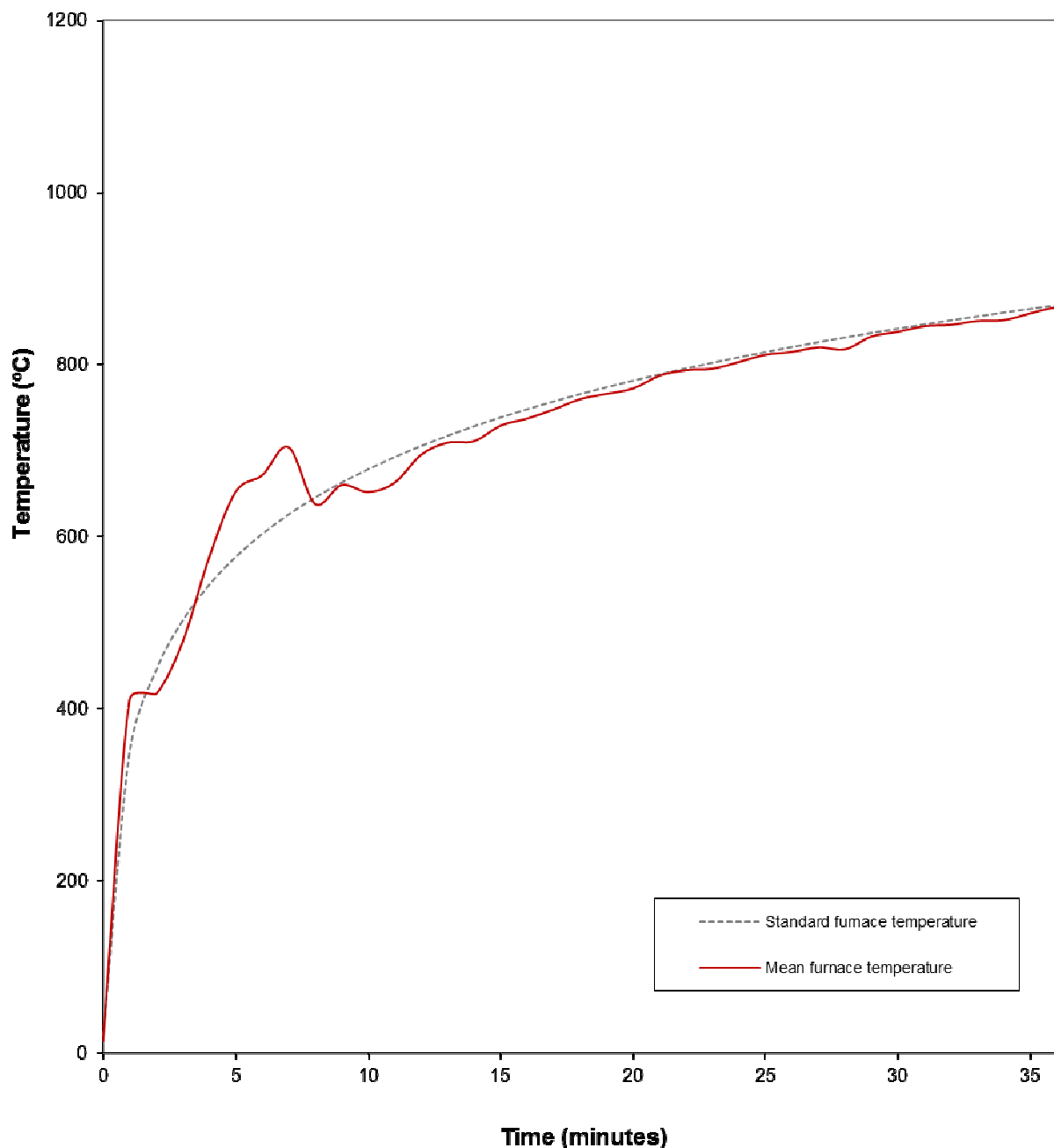
2.2 Closer force measurement

The closer forces were not measured as no closer was fitted.

3 TEST CONDITIONS, INSTRUMENTATION AND MEASURING

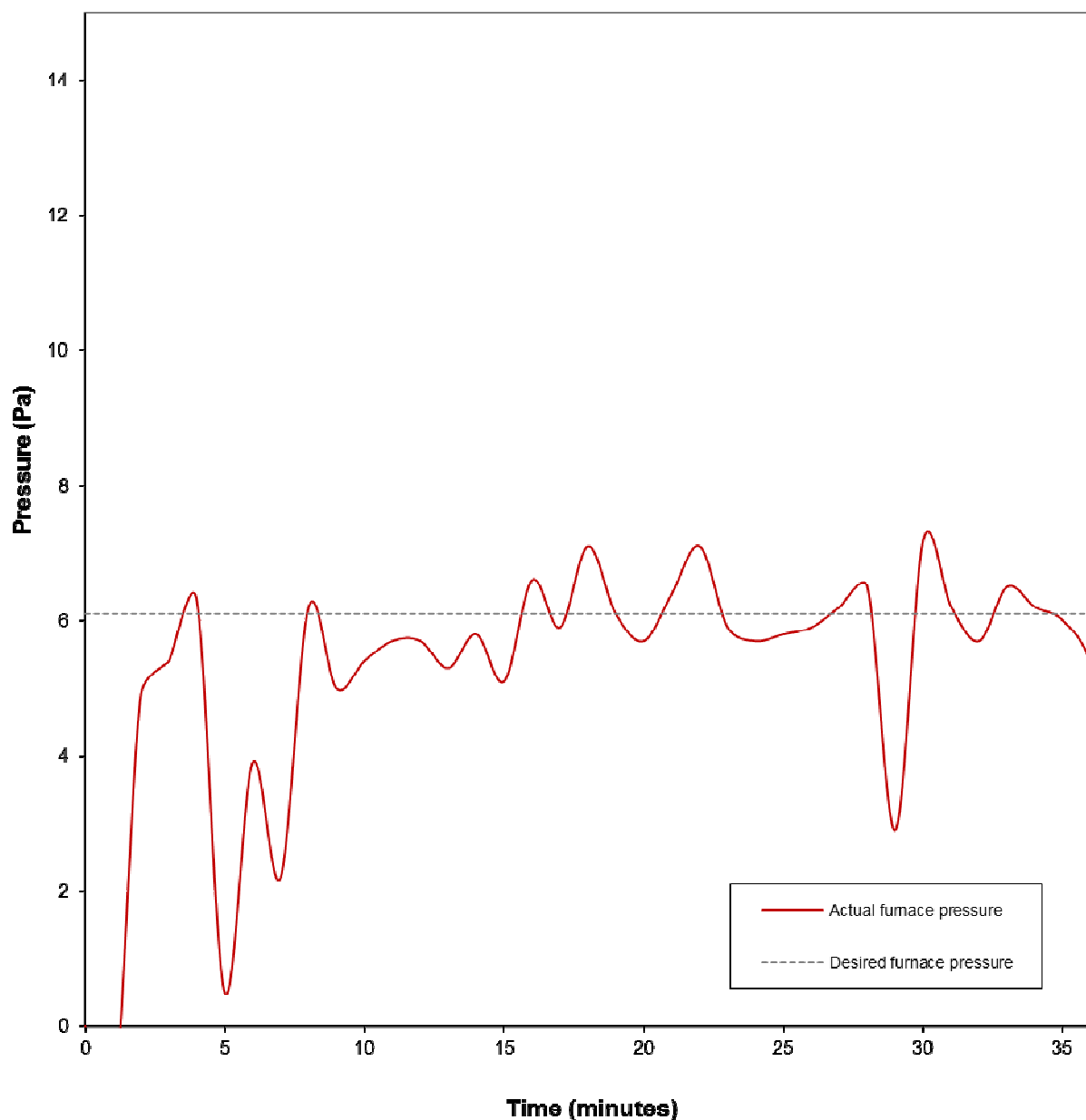
3.1 Furnace temperature

Furnace temperature was controlled so as to follow the standard temperature/time curve defined in the test standard and within the tolerances permitted. The furnace mean temperature was calculated from the output recorded using five furnace thermocouples of the design specified in the test standard. The following graph shows the standard and mean furnace temperature/time data.



3.2 Furnace pressure

Furnace pressure was maintained for the duration of the test at a nominal + 6.1 Pa measured at the pressure sensing head. When a linear pressure gradient of 8.5 Pa/m is applied this equates to + 0 Pa at 1 m above the notional floor level. The furnace pressure was controlled within the tolerances permitted in the test standard except for 4 instantaneous occasions which were transient events. The following graph shows the actual and desired furnace pressure/time data.



3.3 Ambient temperature

Ambient temperature at the start of the test was 12°C.
Ambient temperature ranged between 12 and 13°C during the test.

3.4 Unexposed face specimen thermocouples

Surface temperature measuring thermocouples of the design specified in the test standard were affixed to the unexposed face of the specimen to monitor the temperature rise as follows:

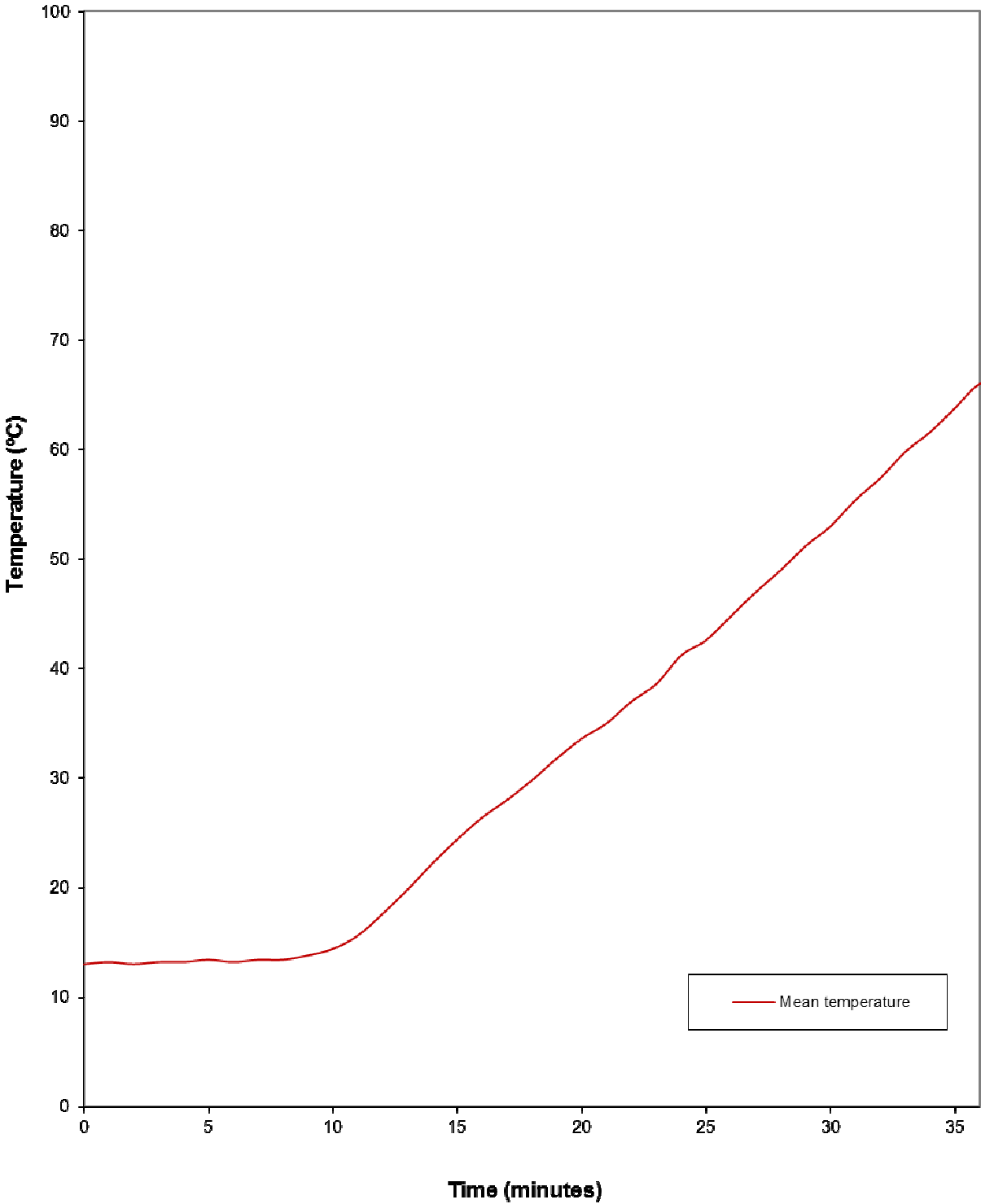
Doorset	Channels 16, 17, 18, 19 and 20	(mean & maximum)
Doorset frame	Channels 21, 22 and 23	(maximum only)

The positions of these thermocouples are shown in Appendix 3.

A roving thermocouple was available for measurement of any specific hotspots. Any instances of the use of the roving thermocouple are noted in the observations in Section 4.

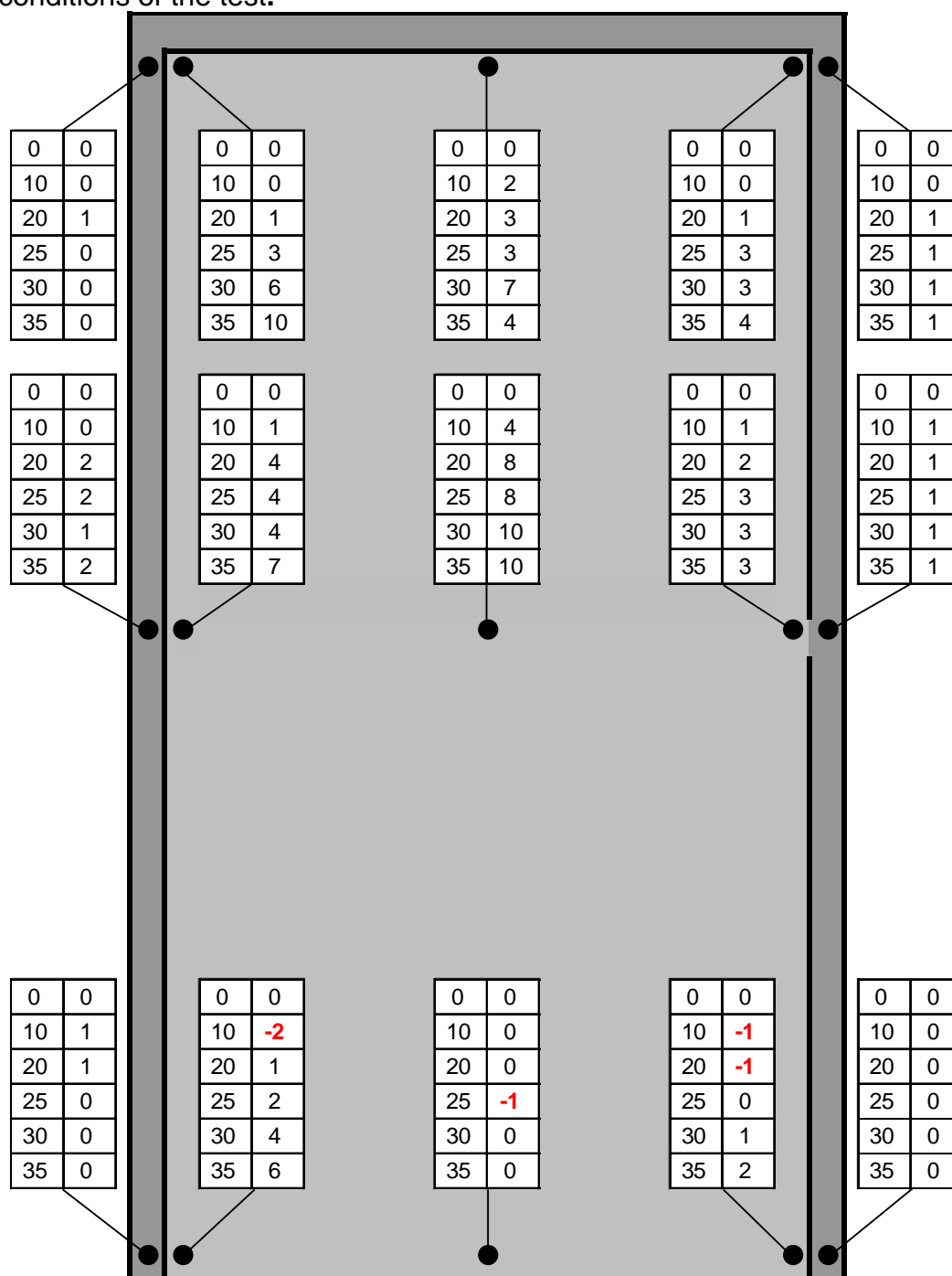
The recorded data of all individual thermocouples is shown in the tables in Appendix 4.

The following time/temperature graph shows the mean leaf temperature.



3.5 Deflection

Taut stainless steel wires were anchored horizontally across the unexposed face of the specimen such that any deflection experienced by the test specimen could be measured. One wire was positioned 10 mm vertically below the head of the leaf, the second at mid-height and the third 10 mm vertically above the threshold. The following figure shows these positions with the elapsed time (minutes) in the left hand column and the recorded deflection (mm) in the right hand column. Positive values indicate deflection towards the heating conditions of the test.



4 TEST OBSERVATIONS

Photographs taken during and after the test are shown in Appendix 2.

TEST OBSERVATIONS (E = Exposed face: U = Unexposed face)		
Time (min:sec)	Face	Observation
00:00	U	Start of the test.
03:54	U	Medium smoke/steam issuing at head and at jambs above mid height.
07:00	E	Veneer detaching.
10:15	E	Core and frame fissured.
11:16	U	Smoke/steam decreased to light at head and jambs above mid height.
25:00	E	Facing partially missing
31:48	U	Light smoke/steam issuing at head of leaf.
33:36	U	Leaf dropping onto threshold at hanging stile.
36:46		Test terminated

Key

Light smoke/steam – faint wispy

Medium smoke/steam – partially obscuring specimen

Heavy smoke/steam – completely obscuring specimen

5 LIMITATIONS

1. The test results relate only to the specimen tested. Appendix A of BS476: Part 20: 1987 provides guidance information on the application of fire resistance tests and the interpretation of test data. Application of the results to specimens of different dimensions, orientation or incorporating different components should be the subject of a design appraisal or further testing.
2. The results relate only to the behaviour of the specimen of the element of construction under the particular conditions of test. They are not intended to be the sole criteria for assessing the potential fire performance of the element in use, nor do they reflect the actual behaviour in fires.
3. The doorset was asymmetrical and was tested such that the door leaf opened towards the heating conditions of the test. The test results may not be appropriate to situations where the door leaves open away from the heating conditions.

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APPENDIX 1 SPECIMEN CONSTRUCTION

The item numbers listed in Appendix 1 Table 1 and shown in the figures in Appendix 1 refer to the components of the specimen construction. Any photo numbers refer to those in Appendix 2.

Please note that unless otherwise indicated the following applies:

- a) All dimensions and materials of construction were verified by the laboratory.
- b) Figures are not to scale.
- c) All dimensions are given in mm.

Appendix 1 Table 1

Item	Component	Information
1	Frame Supplier: Description: Density (kg/m ³): Fixing to associated construction: Overall size (h x w x d): Cross section size (h x d):	Cotswold Doors A 3 sided MDF** frame with 15 high rebated joints affixed vertically using 2No Ø3.9 x 60 steel countersunk woodscrews at 45 centres. 710* ** The jambs are affixed to the associated construction using No.10 x 3" steel countersunk wood screws positioned 220 down, 250 up and 3No. equispaced. 2080 x 993 x 100 30 x 100
2	Stops Supplier: Description: Density (kg/m ³): Overall size (h x w x t):	Cotswold Doors MDF** stops with butt joint at corners affixed to frame with steel pins 16swg x 50 long at 290 to 380 centres, with 5 fixings in head and 7 fixings per jamb. 710* ** 13 x 32
3	Leaf Supplier: Description: Overall size (h x w x t): Weight (kg): Sub-components: Core: Manufacturer: Type: Description: Density (kg/m ³): Overall size (h x w x t): Rails: Manufacturer:	Cotswold Doors A Vicaima FD30 door with softwood stiles** and rails**, MDF facings** and hardwood lippings to vertical edges. 2040 x 925 x 44 61.2 including hinges and latch. Vicaima Particle board** 2 part core with vertical joint‡ 510** 1905‡ x 862** x 38** Vicaima**

Item	Component	Information
3 cont	<p>Description: Top rail (h x w x t): Bottom rail (h x w x t): Density (kg/m³):</p> <p>Stiles: Description: Overall size (h x w x t): Hanging stile: Closing stile: Density (kg/m³):</p> <p>Facings: Manufacturer: Species: Density (Kg/m³): Description: Overall size (t):</p> <p>Lipping: Manufacturer: Species: Description: Density (kg/m³): Overall size (h x w):</p>	<p>Softwood** 68⁺ x 848 x 38 66⁺ x 848 x 38 450* **</p> <p>Softwood** 2040 x 33 x 36 2040 x 33 x 36 450* **</p> <p>Cotswold Doors** MDF** with veneer** 750* ** Facings applied using urea formaldehyde adhesive**. 3</p> <p>Cotswold Doors** White hardwood** Lippings to vertical edges affixed with PU adhesive** 650* ** 6 x 44</p>
4	<p>Hinges: Manufacturer: Type: Description:</p> <p>Blade size (h x w x d x t): Knuckle size (Ø): Fixings to frame:</p> <p>Fixings to door:</p>	<p>Eurospec** CF339 Grade 13** 3No. stainless steel butt hinges, set at 178, 958 and 1739 below the leaf head to the top of the hinge blade 102 x 31 x 2.5 13 4No. Ø4.5 x 25 countersunk stainless steel wood screws 4No. Ø4.8 x 31 countersunk stainless steel wood screws</p>
5	<p>Latch/Lock: Manufacturer: Part Number: Type: Description:</p> <p>Overall size: Body (h x d x w): Forend (h x d x t): Strike (h x d x w): Strike box (h x d x w):</p>	<p>Eurospec* TLE8030** Mortice latch A mainly steel tubular latch incorporating a stainless steel forend coverplate, positioned such that the centre line of the spindle is 957 above the base of the leaf affixed using 2No.steel countersunk screws.</p> <p>24 x 13 x 56.5 57.5 x 26 x 1.2 57.5 x 40 x 1.3 including a 25 (h) x 14 (d) tongue. 54 x 14 x 24 plastic</p>

Item	Component	Information
6	Handleset Manufacturer: Part Number: Description: Overall size: Rose (Ø x d x t): Rose cover (Ø x d x t): Handle (l x w):	Eurospec** CSL1190SSS A D shaped lever handleset mainly aluminium with steel sub components. 50 x 7 x 1.4 52 x 8.2 x 0.7 142 x 19
7	Intumescent - frame Supplier: Reference: Description: Overall size (w x t):	Not disclosed (information kept on file by laboratory) Retrofireguard** Graphite based intumescent with a PVC surface coating to the top and edges and with self-adhesive tape on the rear face, adhered directly to the frame head and jambs, positioned adjacent to the stop so that it oversails the hinges and strike. It was partially interrupted at the strike with 50% remaining. 25 x 1.75
8	Intumescent - hinges Manufacturer: Reference: Description: Overall size (w x t):	Wolmann** Interdens** Ammonium phosphate based pad of intumescent material with self-adhesive tape under each blade. 1
9	Fire stopping details Description:	Gaps between the frame and associated construction were packed with Unifrax Insulfrax S blanket and capped with Firewise Intumescent and Acoustic Acrylic Sealant on both faces.

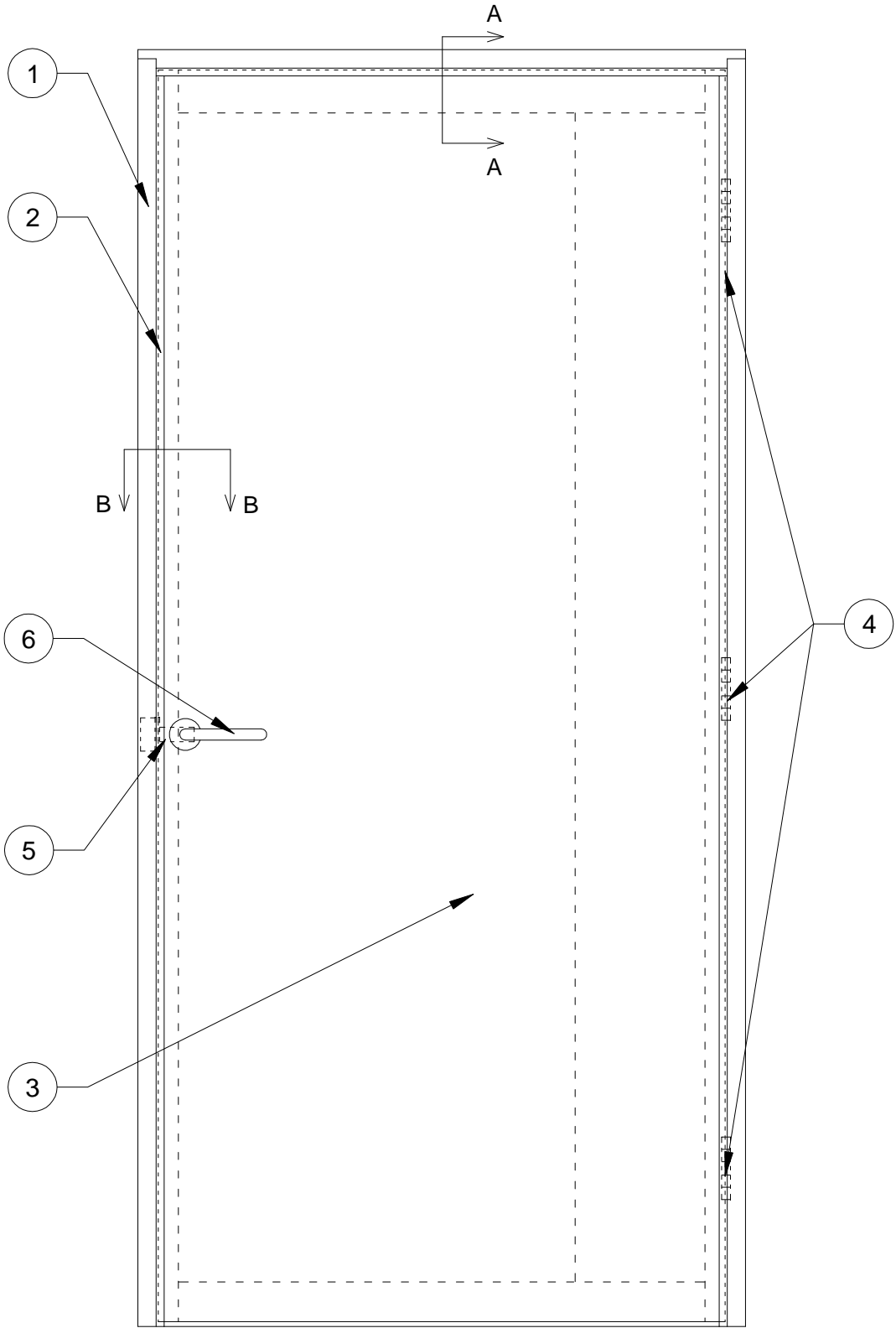
Key:

* Nominal value

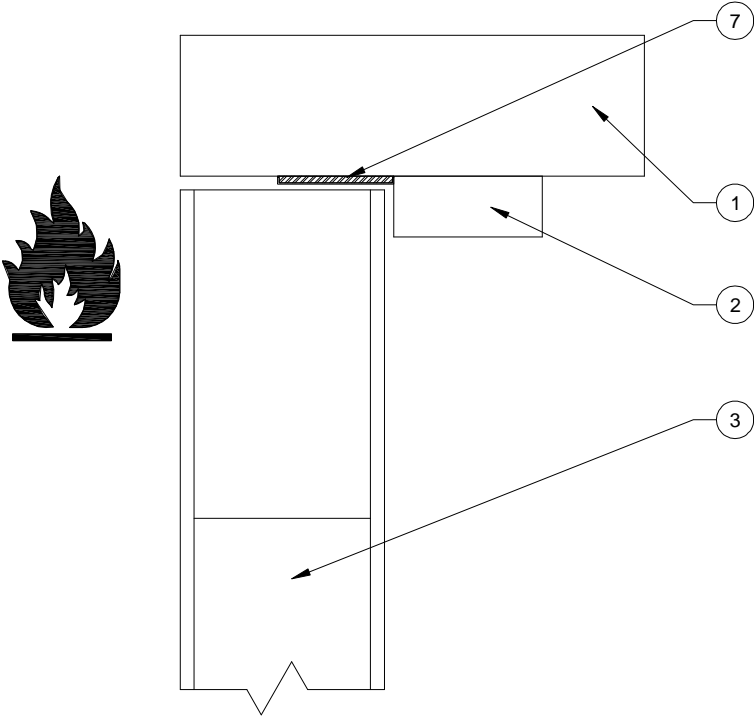
** Sponsor declared value or detail, not verified by laboratory

‡ Identified post test from remains of specimen

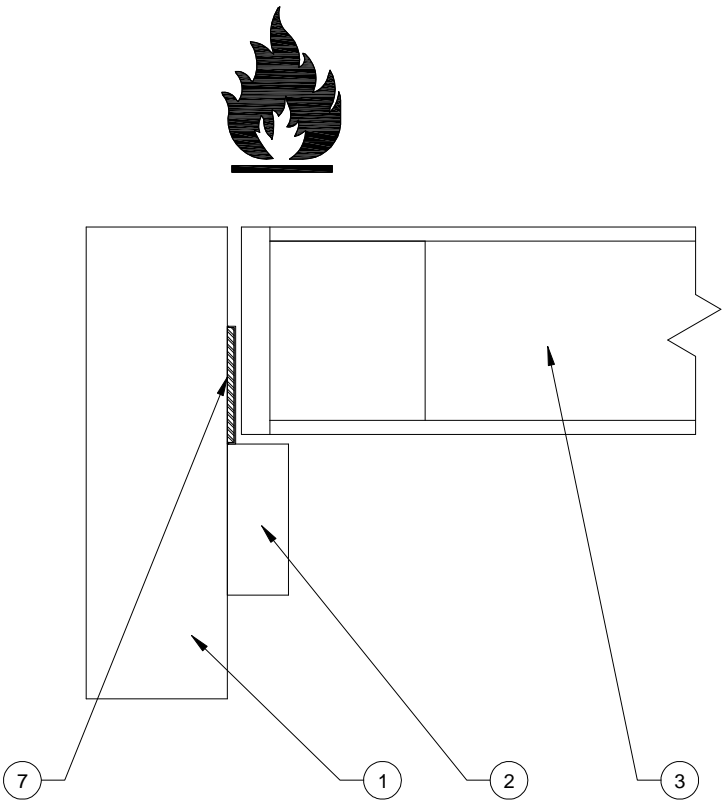
Appendix 1 Figure 1 – Elevation viewed from the unexposed side incl. hidden detail



Appendix 1 Figure 2 – Section A – A



Appendix 1 Figure 3 – Section B – B



APPENDIX 2 PHOTOGRAPHS

Appendix 2.1 Pre-test photos

Photo 2.1.1



Photo 2.1.2



Photo 2.1.3



Photo 2.1.4



Photo 2.1.5



Photo 2.1.6



Photo 2.1.7



Appendix 2.2 During test photos

Photo 2.2.1

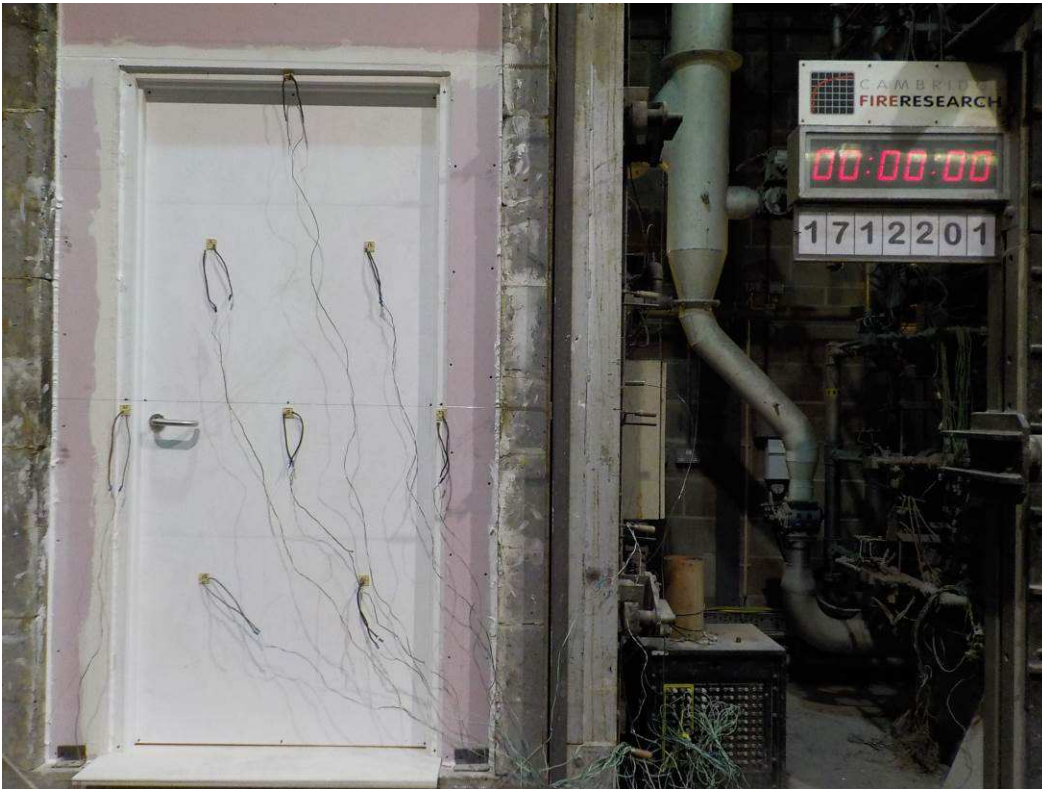


Photo 2.2.2

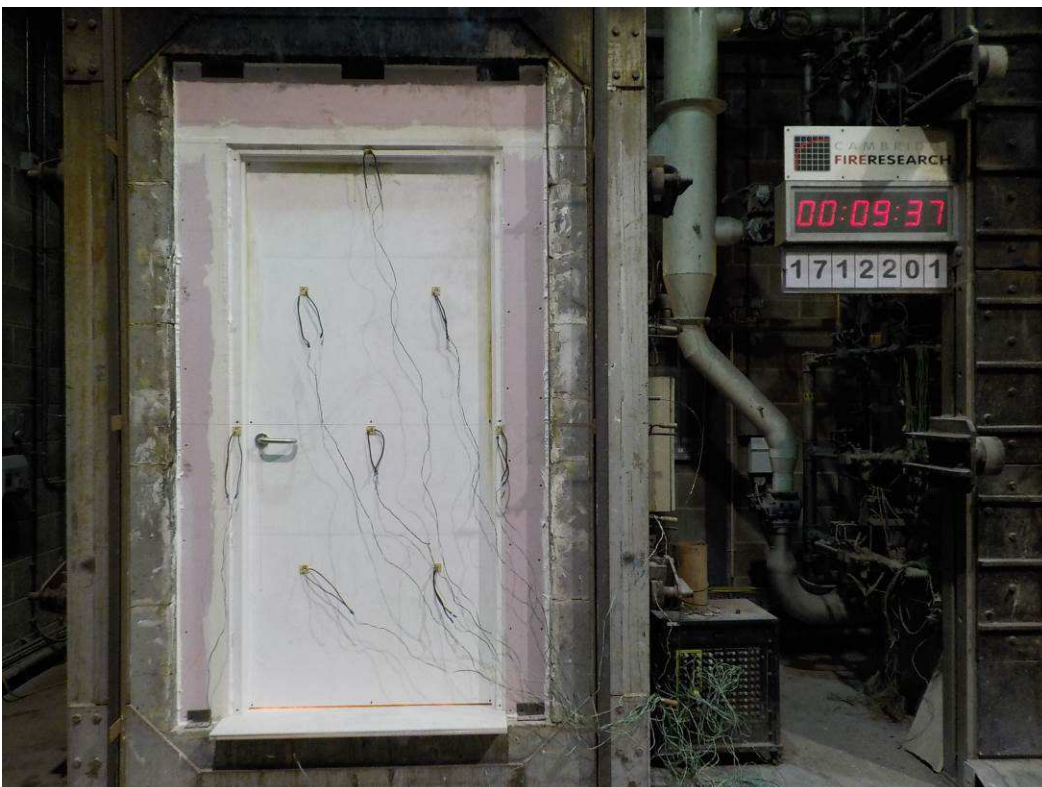


Photo 2.2.3



Photo 2.2.4

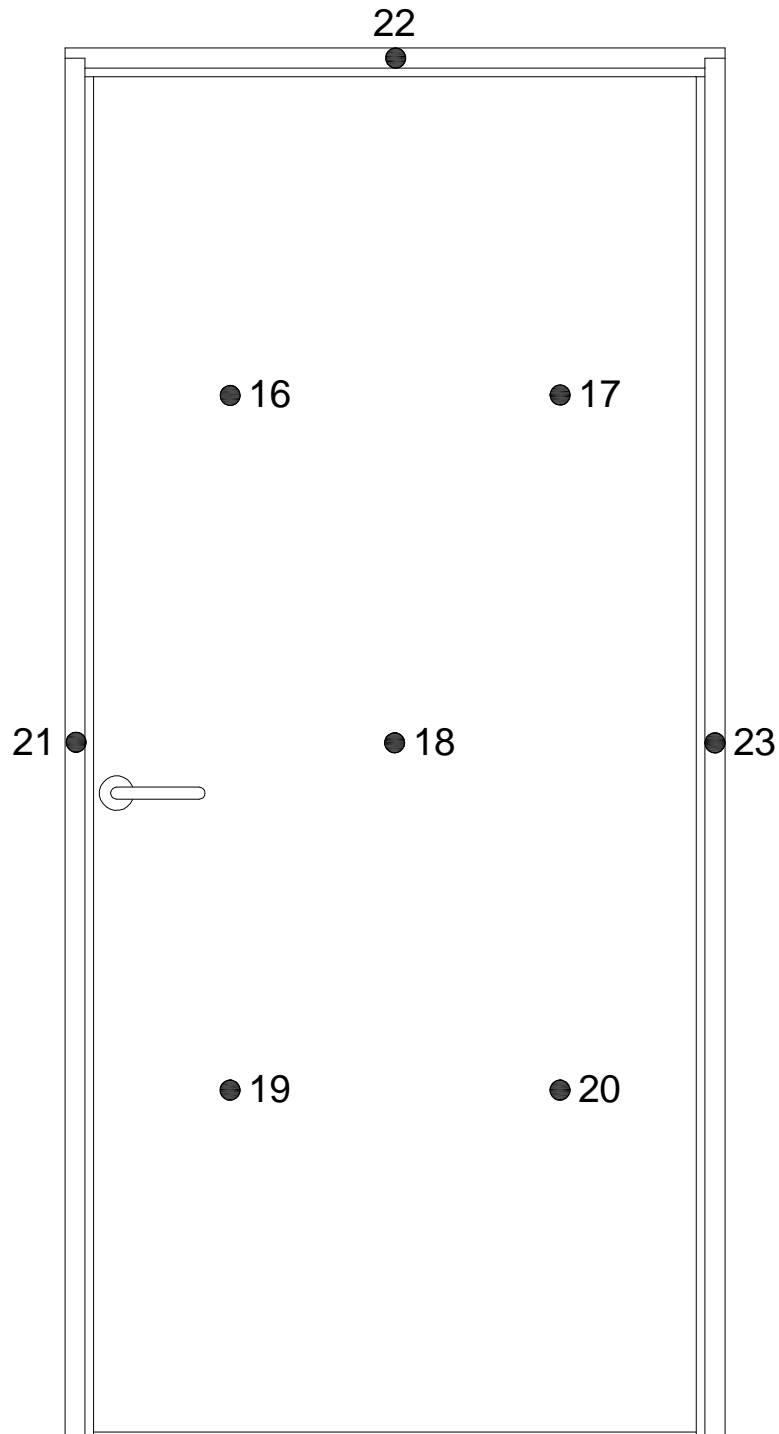


Appendix 2.3 Post-test photos

Photo 2.3.1



APPENDIX 3 POSITIONING OF INSTRUMENTATION



● Unexposed face specimen thermocouple

APPENDIX 4 RECORDED THERMOCOUPLE DATA

Time	Chan 16	Chan 17	Chan 18	Chan 19	Chan 20	Chan 21	Chan 22	Chan 23
min	°C	°C	°C	°C	°C	°C	°C	°C
0	13	13	13	13	13	13	13	13
1	13	14	13	13	13	13	13	13
2	13	13	13	13	13	13	13	13
3	13	14	13	13	13	13	13	13
4	13	14	13	13	13	13	13	13
5	14	14	13	13	13	13	14	13
6	13	14	13	13	13	13	13	13
7	13	14	14	13	13	13	14	13
8	13	14	14	13	13	13	14	13
9	14	14	14	14	13	13	14	13
10	14	15	15	14	14	13	14	13
11	15	16	17	15	15	13	14	13
12	16	18	20	17	17	13	14	14
13	18	20	22	19	20	13	14	13
14	20	23	24	21	23	13	14	14
15	22	25	25	24	26	13	15	13
16	24	27	27	26	28	13	15	14
17	25	29	28	28	30	14	15	13
18	27	31	30	30	31	14	15	14
19	29	33	32	32	33	14	15	14
20	31	35	34	33	35	14	16	14
21	32	37	35	35	36	14	16	14
22	34	39	37	37	38	14	17	15
23	36	40	39	39	39	14	17	15
24	38	43	42	41	42	15	18	17
25	39	44	44	42	44	15	19	18
26	41	47	46	44	46	15	19	19
27	43	49	49	46	48	15	20	20
28	45	51	51	48	50	15	21	20
29	47	53	54	50	52	16	22	21
30	49	55	56	51	54	16	23	22
31	51	57	59	53	57	16	24	23
32	53	59	61	55	59	16	25	24
33	55	62	64	57	61	17	26	25
34	57	63	66	59	63	17	27	26
35	59	65	68	61	66	17	27	27
36	61	67	71	63	68	18	28	28