United Kingdom Testing and Certification

Test Report

Project ID: 20210322-001718

United Kingdom Testing & Certification Ltd
Cairnmuir House, Cairnmuir Road,
East Kilbride, G74 4GY

Trusted to Ensure.

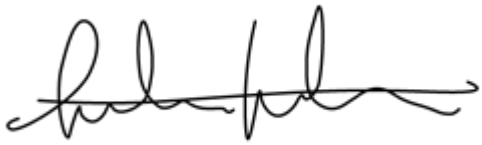
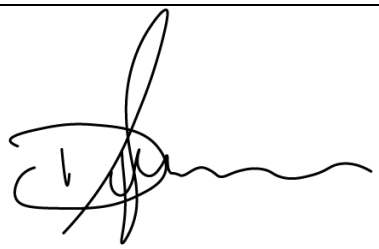
UKAS TESTING

21542

Change History

Issue Date	Version	Created by	Description of change
29/04/2022	A	AH	Initial Issue
29/04/2022	B	AH	Amendments to schematics in section A.2 to show direction of heating conditions

Signatories

	
Authorised Andrew Hutchison MEng AMIMechE* Technical Manager	Checked Daniel Fitzsimmons* Testing Manager

*For and on behalf of United Kingdom Testing and Certification.

Table of Contents

1 Test Summary

1.1 Test Details

Test Sponsor:	Evolution Fasteners
Sponsor Address:	2A & 2B Clyde Gateway Trade Park Dalmarnock Rd Rutherglen Glasgow G73 1AN
Date of Test:	30 June 2021

1.2 Test Basis

The test was carried out in accordance with BS EN 1364-1: 2015 as instructed by the test sponsor and employed the following standard methods:

BS EN 1363-1: 2020	Fire resistance tests – Part 1: General requirements.
BS EN 1364-1: 2015	Fire resistance tests for non-loadbearing elements – Part 1: Walls
BS EN 1363-2: 1999 § 8	Fire resistance tests – Part 2: Alternative and additional procedures.

1.3 Expression of Results

	Performance Criteria	**Results (mins)**
Integrity[1]:	Sustained Flaming (> 10 s)	121*
	Gap Gauge (Ø6 mm)	121*
	Gap Gauge (Ø25 mm)	121*
	Cotton Pad	121*
Insultation[2]:	Mean Temperature Rise (ΔT_{MEAN} > 140 °C)	121*
	Max Temperature Rise (ΔT_{MAX} >180 °C)	121*

*Test was discontinued after a period of 121 minutes.

[1] The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without: a) causing ignition to the cotton pad applied in accordance with BS EN 1363-1:2020 § 10.4.5.2 b) permitting the penetration of a gap gauge as specified in BS EN 1363-1:2020 § 10.4.5.3 c) resulting in sustained flaming.

[2] The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which: a) increase the average temperature above the initial average temperature by more than 140 °C; b) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180°C.

2 Test Construction and Specimen(s)

2.1 Summary

The specimen had overall nominal dimensions of 3000 mm wide by 3050 mm high by 272 mm thick and was formed from 72 mm deep Metsec steel stuck framing and 25 mm thick Knauf mineral wool insulation, lined with two layers of 12.5 mm thick Knauf Aquapanel wallboard to each side. 150 mm thick Rockwool insulation panels were affixed to the unexposed surface. The specimen incorporated assorted Evolution Fasteners fixings.

All items were provided by the Test Sponsor.

Please refer to Appendix A for full details of these items.

2.2 Specimen(s) Verification

United Kingdom Testing and Certification carried out a comprehensive survey to verify the information provided by the Test Sponsor. This included verifying the materials, dimensions, and manufacturing methodologies of the test specimen(s) wherever possible. Refer to Appendix A for full details of this survey.

2.3 Specimen(s) Installation and Fixity

The Specimen(s) were installed into the test construction by United Kindom Testing and Certification.

3 Test Procedure

3.1 Heating Conditions

The specimen(s) were subject to heating conditions in accordance with BS EN 1363-1:2020 § 5.1. This was monitored and controlled for the duration of the test using eight type K thermocouples which were uniformly distributed across a vertical plane 100 ± 50 mm from the exposed face of the test construction. The resulting Time-Temperature distribution is presented below. Refer to Appendix B.1 for the full details of the temperatures recorded.

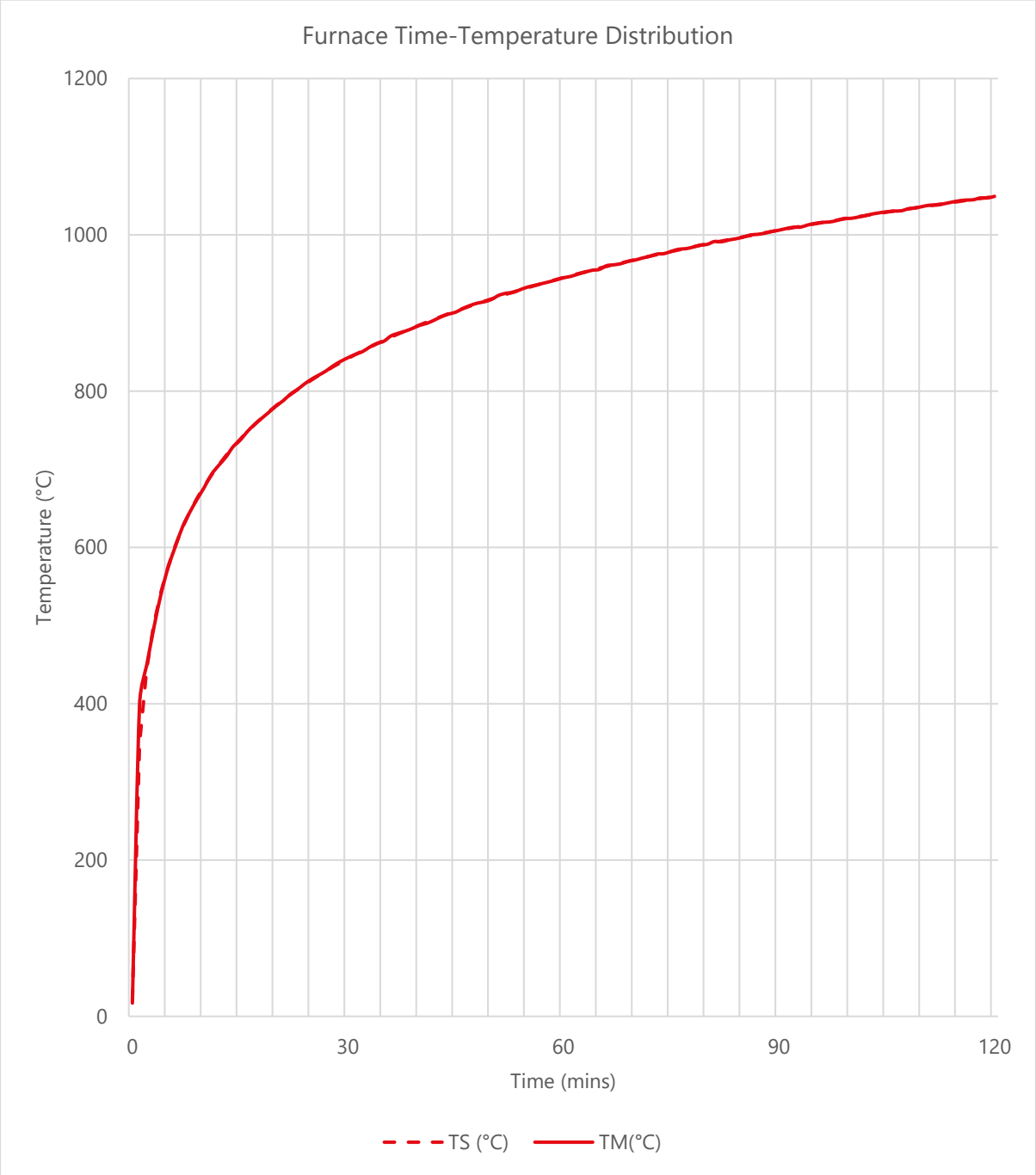


Figure 1 Time-Temperature Distribution

The percentage deviation of the resulting time-temperature curve has been evaluated against the standard time-temperature curve in accordance with BS EN 1363-1:2020 § 5.1.2. The Time-Percentage Deviation is presented below.

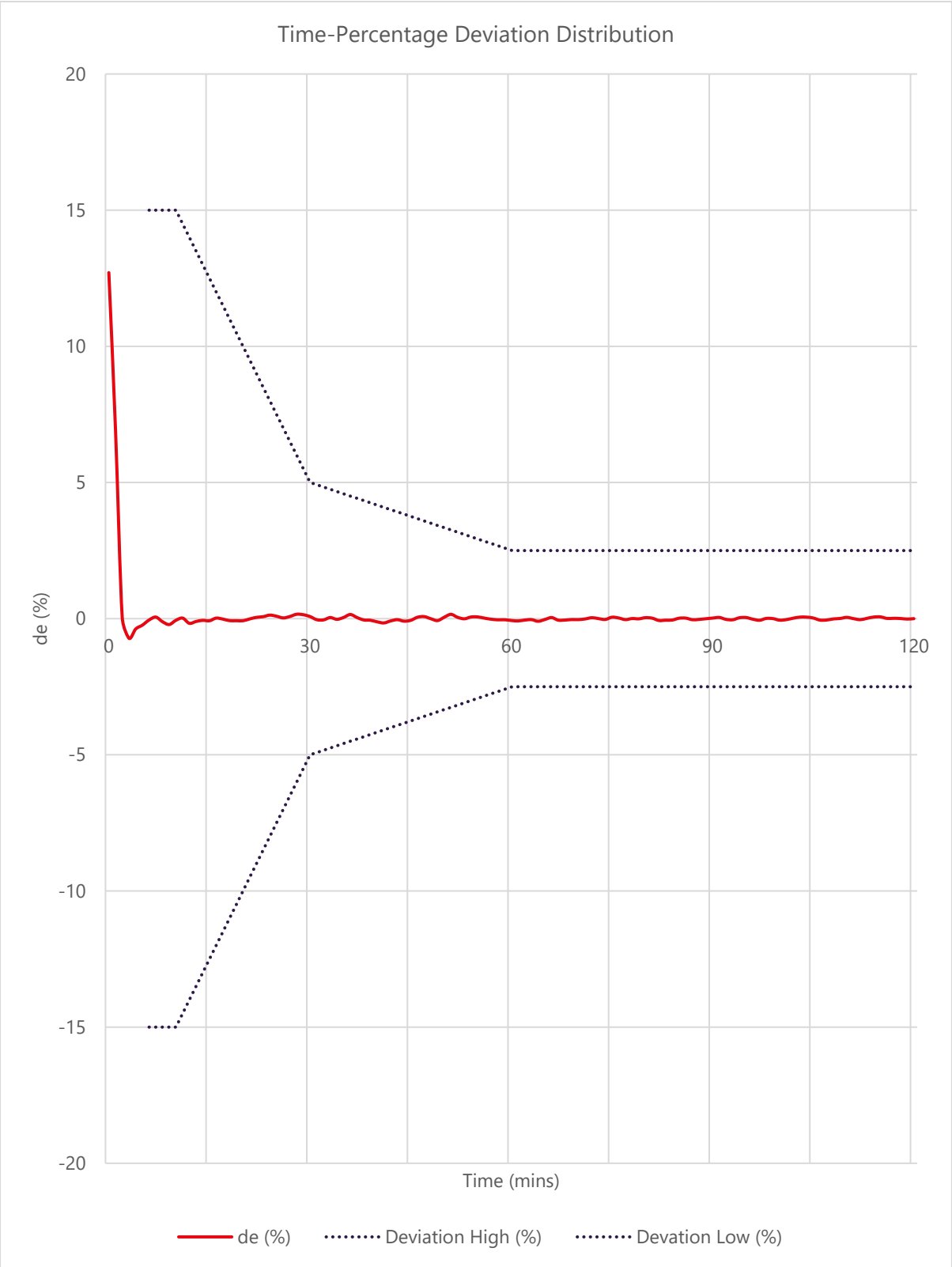


Figure 2 Time-Percentage Deviation Distribution

3.2 Pressure Conditions

The specimen(s) were subject to a pressure regime in accordance with BS EN 1363-1:2020 § 5.2. This was monitored and controlled for the duration of the test via a pressure sensing head located at 2850 mm from the furnace floor. The Time-Pressure distribution is presented below.

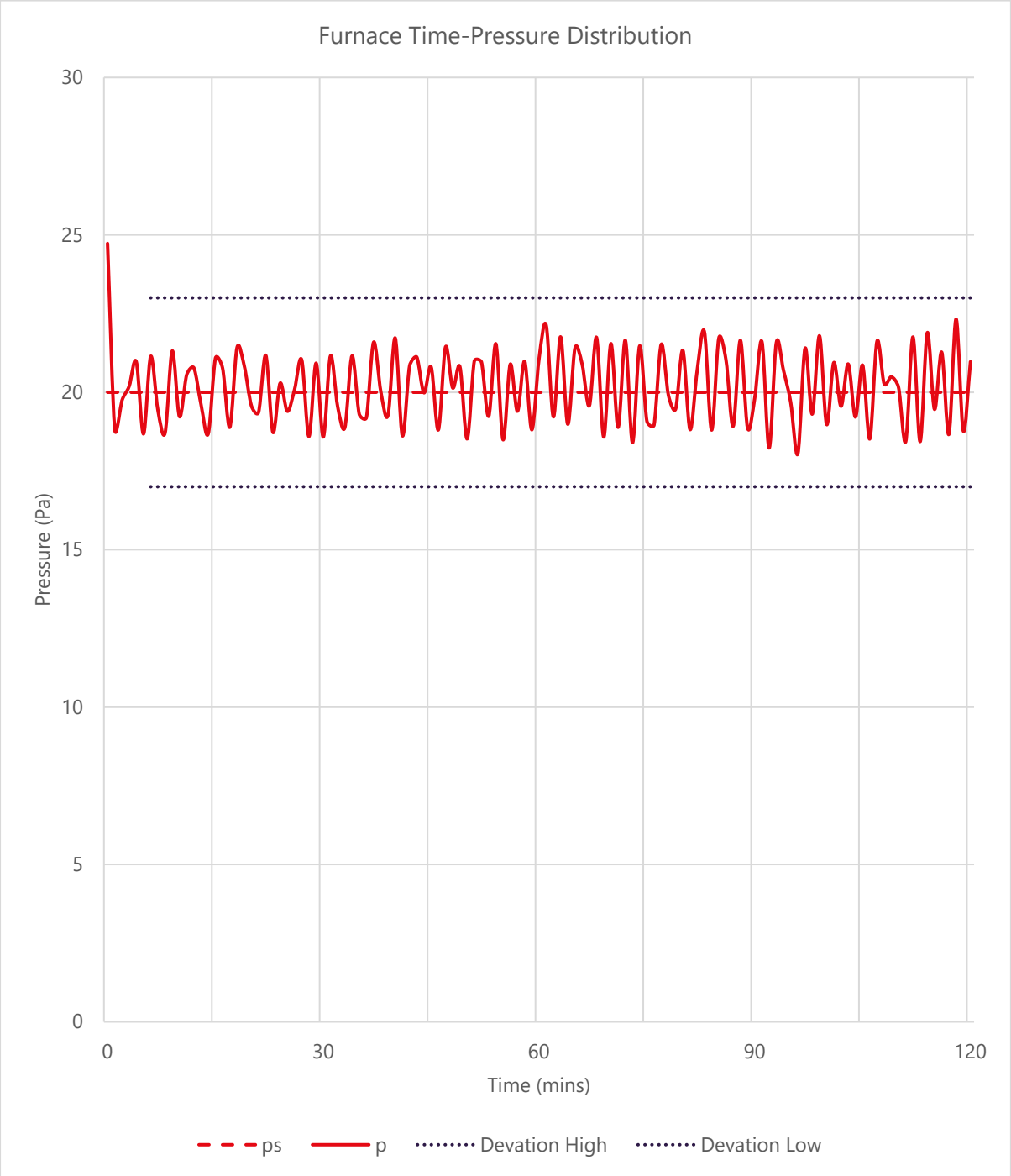


Figure 3 Time-Pressure Distribution of Furnace

3.3 Environmental Conditions

The ambient temperature prior to the commencement of the test was 15.8 ºC. The Average Furnace Temperature prior to the commencement of the test was 16.1 °C. The ambient temperature immediately after the test was 18.2 ºC.

3.4 Unexposed Surface Temperature

A roving thermocouple was available for the temperature measurement of any localised hot areas that were not monitored by surface thermocouples and any measurements using it were noted on a Test Observation Record.

Disc thermocouples were affixed to the unexposed surface of the specimen(s) in accordance with BS EN 1363-1:2020 § 9.1.2 to measure and monitor the maximum and the mean temperature rise of the unexposed face of the specimen for the duration of the test. The resulting time-temperature distribution and a summary of the key results is presented below. Refer to appendix B.1 for full details of temperatures recorded.

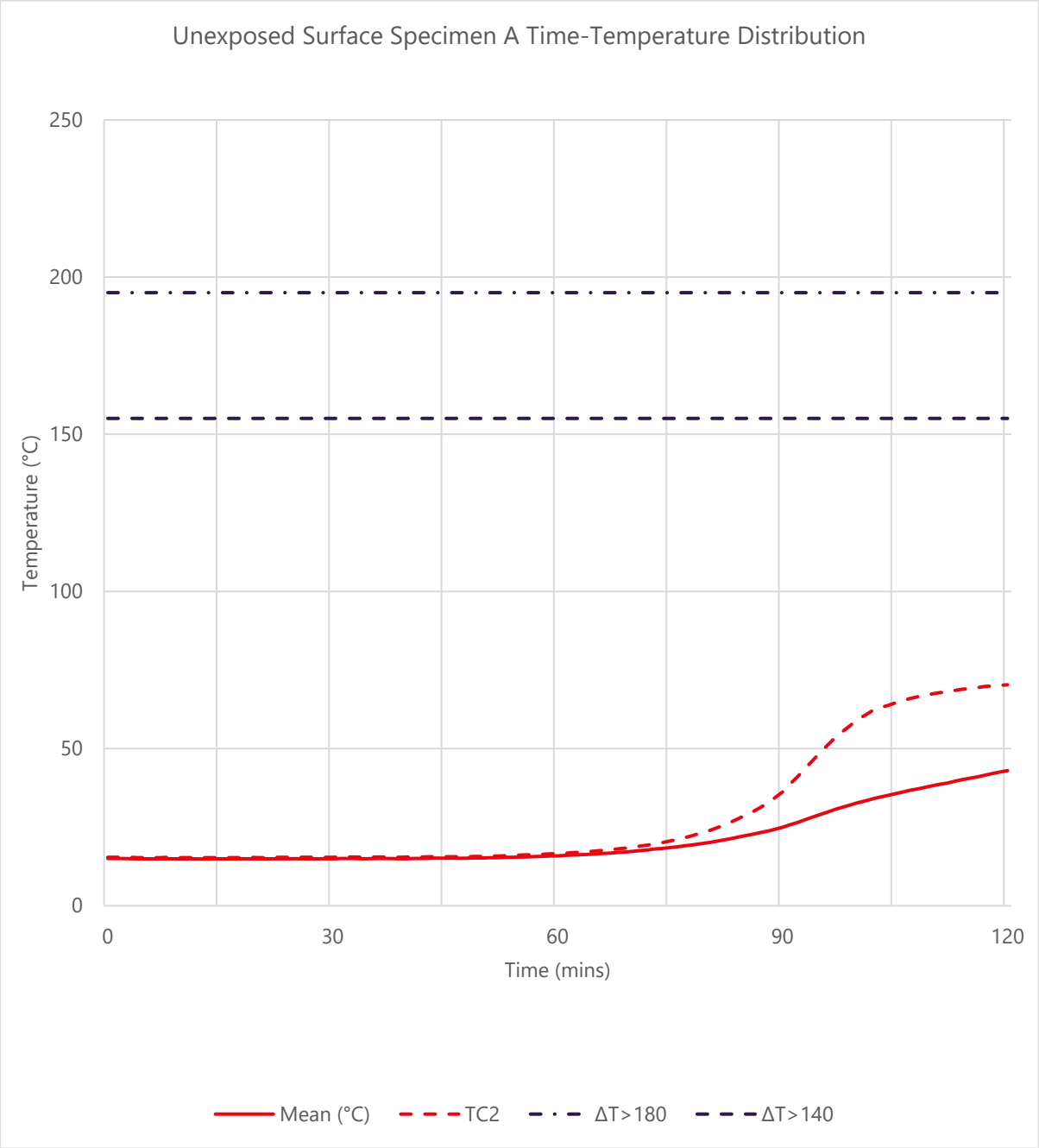


Figure 4 Time-Temperature Distribution of Unexposed Face

3.5 Radiation

The radiation of the specimen was measured using a 180º field of view, water cooled heat flux meter. This was positioned in accordance with BS EN 1363-2:1999 § 8 to evaluate the average radiation of the specimen for the duration of the test. The Time-Radiation distribution is presented below. Refer to Appendix B.2 for full details of the radiation recorded.

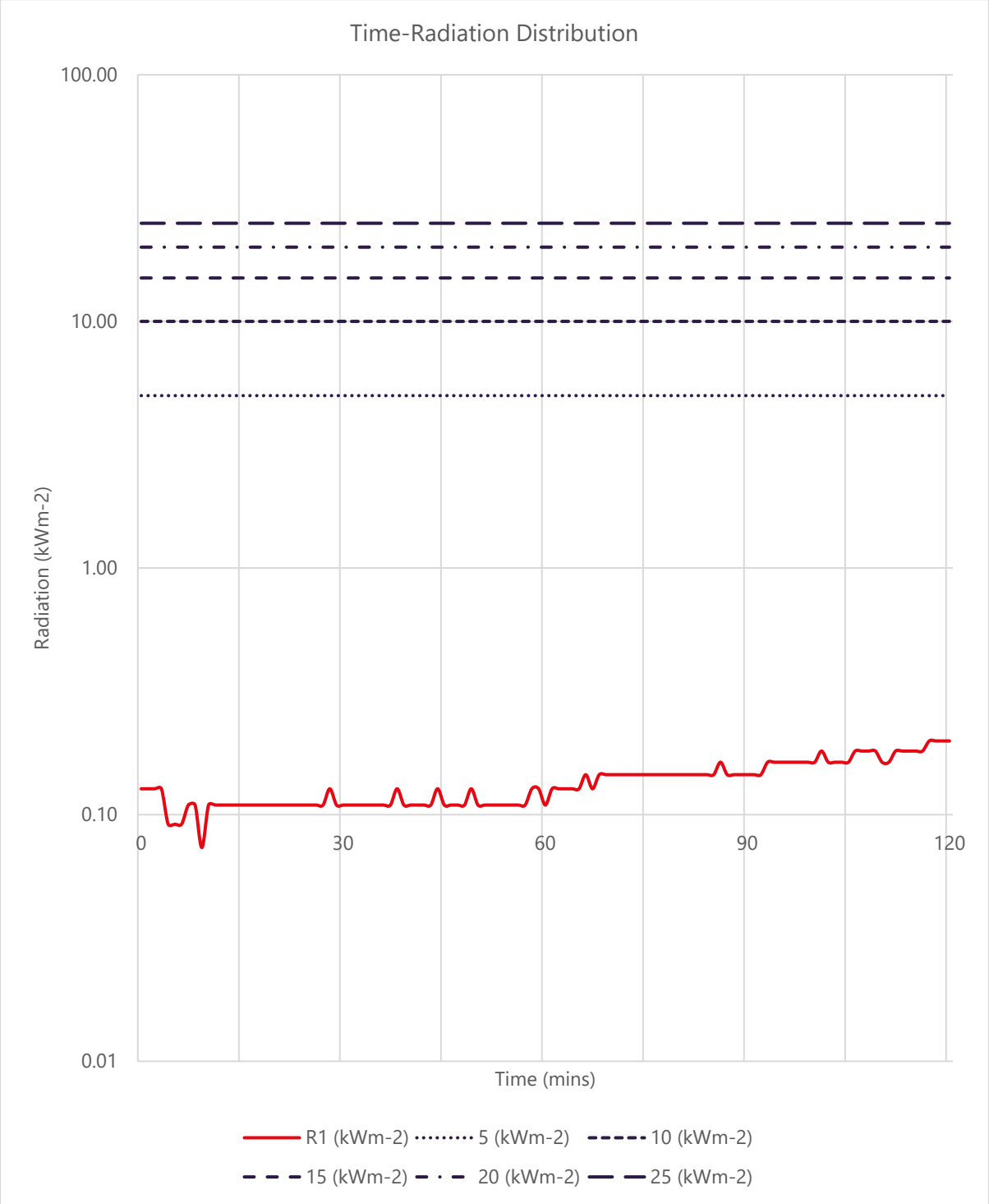


Figure 5 Time-Radiation Distribution of Unexposed Face

3.6 Deflection

A levelling line laser was positioned along a plane parallel to the specimen to provide a fixed datum for the measurement of deflection in accordance BS EN 1363-1: 2020 § Annex G. Measurements were recorded at intervals for the duration of the test and recorded on a Deflection Measurement Record. The results are presented below. Refer to Appendix A.3 for details on measurement locations and B.4 for full details on the measurements recorded.

N.B: positive values indicate movement toward the heating conditions.

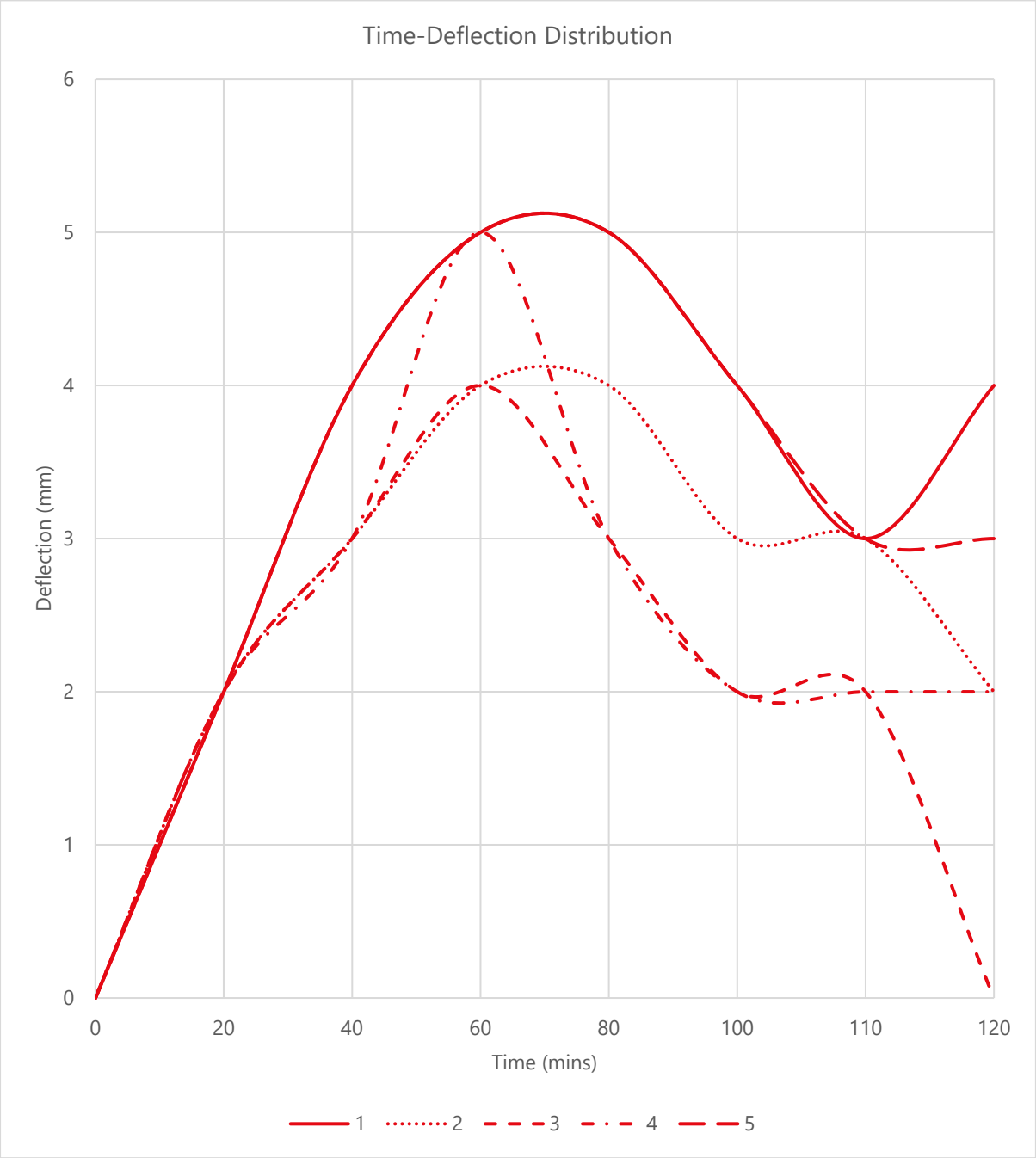


Figure 6 Time-Deflection Distribution

4 Specimen Behaviour

4.1 Observations

Observations relating to the general behaviour of the specimen(s) were made for the duration of the test and recorded on a Test Observations Record. A summary of these observations is presented below.

Time			E[3]	U[4]	Observation
HH	**MM**	**SS**			
00	**00**	**00**			**Test commenced**
01	21	21		X	Joints between insulation boards have begun to open
01	21	31	X		Smoke egress @ top corner fixed edge
01	55	28		X	Moisture release @ fixing locations
02	**01**	**00**			**Test discontinued**

[3] Viewed from exposed face of specimen
[4] Viewed from unexposed face of specimen

5 Limitations

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 procedure outlined in EN 1363-1, and where appropriate EN 1363-2. 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 and should be the subject to design appraisal by a competent individual.

BS EN 1364-1:2015 § 13 provides guidance on the field of direct application of results. The permissible variations included in this guidance can be applied automatically without the need for the sponsor to seek additional evaluation, calculation or approval.

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.

No statement of conformity with the testing specifications is made or implied in this report. However, measurement results are reviewed, where applicable, to establish where measurement results exceed the control parameters established in the relevant fire resistance test standards.

Appendix A

A.1 Schedule of Components

1 Inner Wallboards	
	
Manufacturer	Knauf
Reference	Aquapanel Cement Board - Indoor
Material	Glass Fibre Reinforced Cement
Dimensions (w x l x d)	1200 x 2400 x 12.5
Density (kg/ m³)	880[5]
Fixing	Wing Drill Screw Fixed @ max 300 mm C/C

[5] https://mdbapi.knauf.com/v1/pdf_download.php?p=g&action=download&a=918310&c=c04fbc73cf89e39c1012ad6df8c90c0a

2 Outer Wallboards	
	
Manufacturer	Knauf
Reference	Aquapanel Cement Board - Indoor
Material	Glass Fibre Reinforced Cement
Dimensions (w x l x d)	1200 x 2400 x 12.5
Density (kg/ m³)	880[6]
Fixing	Wing Drill Screw Fixed @ max 300 mm C/C

[6] https://mdbapi.knauf.com/v1/pdf_download.php?p=g&action=download&a=918310&c=c04fbc73cf89e39c1012ad6df8c90c0a

3 Floor Track	
	
Manufacturer	Metsec
Reference	90M12-40
Material	Galvanised Steel
Dimensions (w x h x t)	72 X 40 x 1.2
Fixing(s)	Screw fixed at each vertical stud

4 Ceiling Track

Manufacturer	Metsec
Reference	94M16S – Slotted Head Track
Material	Galvanised Steel
Dimensions (w x h x t)	72 x 70 x 1.2
Fixing(s)	Tek screw to each stud flange

5 'C' Studs

Manufacturer	Metsec
Reference	90M12-50 Metsec Stud Section
Material	Galvanised Steel
Dimensions (w x d x t)	90 x 48 x 1.2
Fixing(s)	Screw fixed to floor/ceiling track

6 Cavity Insulation	
	
Manufacturer	Knauf
Reference	Glass Mineral Wool Insulation Acoustic Roll – 25mm 2400366
Material	Glass Mineral Wool
Dimensions (w x l x t)	600 x 1000 x 25
Fixing(s)	Compression fitted between 'C' studs

7 Insulation Board	
	
Manufacturer	Rockwool
Reference	RWA45
Location	Exposed Face Only
Dimensions (w x h x d)	1200 x 600 x 150
Fixing(s)	Evolution Fasteners @ perimeter and mid points (see appendix A.2)

8 Fixing (Inner wallboard exposed side)	
	
Manufacturer	Evolution
Reference	BMWD4.8 - 38 -3
Material	AISI 304 (A2) Stainless Steel
Dimensions (Ø X l)	Ø4.8 x 38

9 Fixing (Outer wallboard Exposed Side)

Manufacturer	Evolution
Reference	BMWD5.5 – 62 - 3
Material	AISI 304 (A2) Stainless Steel
Dimensions (Ø x l)	Ø5.5 x 62

10 Fixing (Inner Wallboard Unexposed Side)

Manufacturer	Evolution
Reference	TSTF4.8 – 38 - 3
Material	C1022 Carbon Steel with 500 Hr EvoShield® coating
Dimensions (Ø X l)	Ø4.8 x 38
Special Features	Coating – 500hr Evoshield

11 Fixing (Outer Wallboard Unexposed Side)

Manufacturer	Evolution
Reference	TSTF5.5 – 62 - 3
Material	C1022 Carbon Steel with 500 Hr EvoShield® coating
Dimensions (Ø x l)	Ø5.5 x 62
Special Features	Coating – 500 Hr EvoShield®

12 Fixing (Ceiling Track)

Manufacturer	Evolution
Reference	A4HH6.3 – 57 - 516
Material	AISI 316 (A4) Stainless Steel
Dimensions (Ø x l)	Ø6.3 X 57mm
Special Features	Coating – Electrodeposited zinc (passivated)

13 Fixing (Floor Track)

Manufacturer	Evolution
Reference	A4HH6.3 – 57 - 516
Material	AISI 316 (A4) Stainless Steel
Dimensions (Ø x l)	Ø6.3 x 57
Special Features	Coating – Electrodeposited zinc (passivated)

14 Insulation Board Fixing (Perimeter)

Manufacturer		Evolution
Reference	**Washer**	SPR70
	Fastener	IS220
Material	**Washer**	Galvanised Steel with Aluzinc coating
	Fastener	C1022 Carbon Steel with 500 Hr EvoShield® coating
Dimensions	**Washer**	Ø70
	Fastener	Ø4.8 x 220
Location		Perimeter of Insulation slab @ 600mm C/C

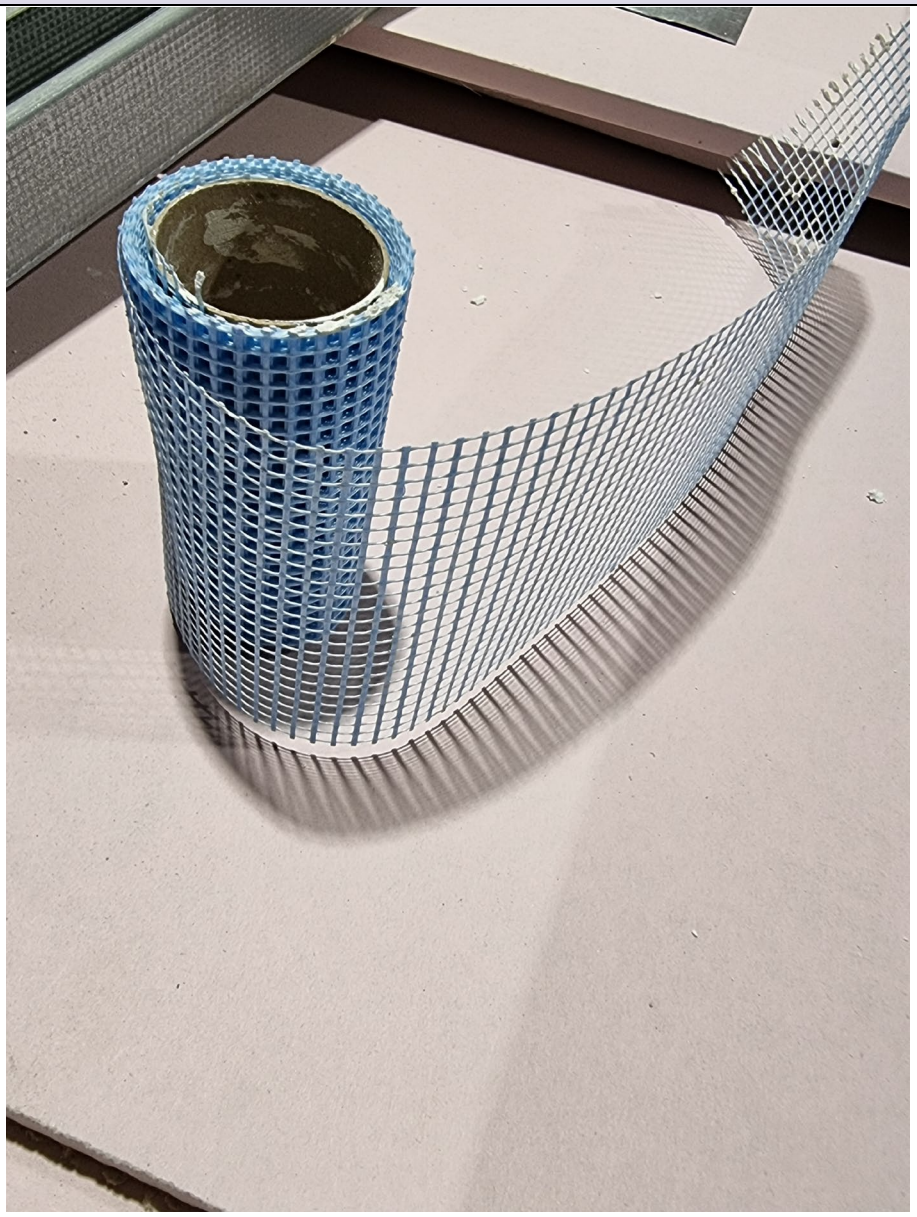
15 Insulation Slab Fixing (Middle)

Manufacturer		Evolution
Reference	**Washer**	SSSPR70
	Fastener	A4IS220
Material	**Washer**	AISI 304 (A2) Stainless Steel
	Fastener	AISI 316 (A4) Stainless Steel
Dimensions (w x h)	**Washer**	Ø70
	Fastener	Ø4.8 x 220
Location		2 Nr Centrally fixed @ 400mm C/C

16 Free Edge Gasket

Manufacturer	Morgan Advanced Materials
Reference	Superwool HT
Dimensions (w x h x d)	150 x 3050 x 25
Fixing(s)	Compression fitted between supporting construction and restraint frame

17 Joint Tape



Manufacturer	Knauf
Reference	Aquapanel Tape
Material	Glass Fibre with alkaline coating
Dimensions (w x l)	100 x 2100mm
Location	Board Joints
Fixing(s)	Embedded to Aquapanel Joint Filler

18 Joint Filler

Manufacturer	Knauf
Reference	Aquapanel Joint Filler and Skim Coat - White
Weight/Bag	20kg
Application	Trowel applied to joints and screw holes

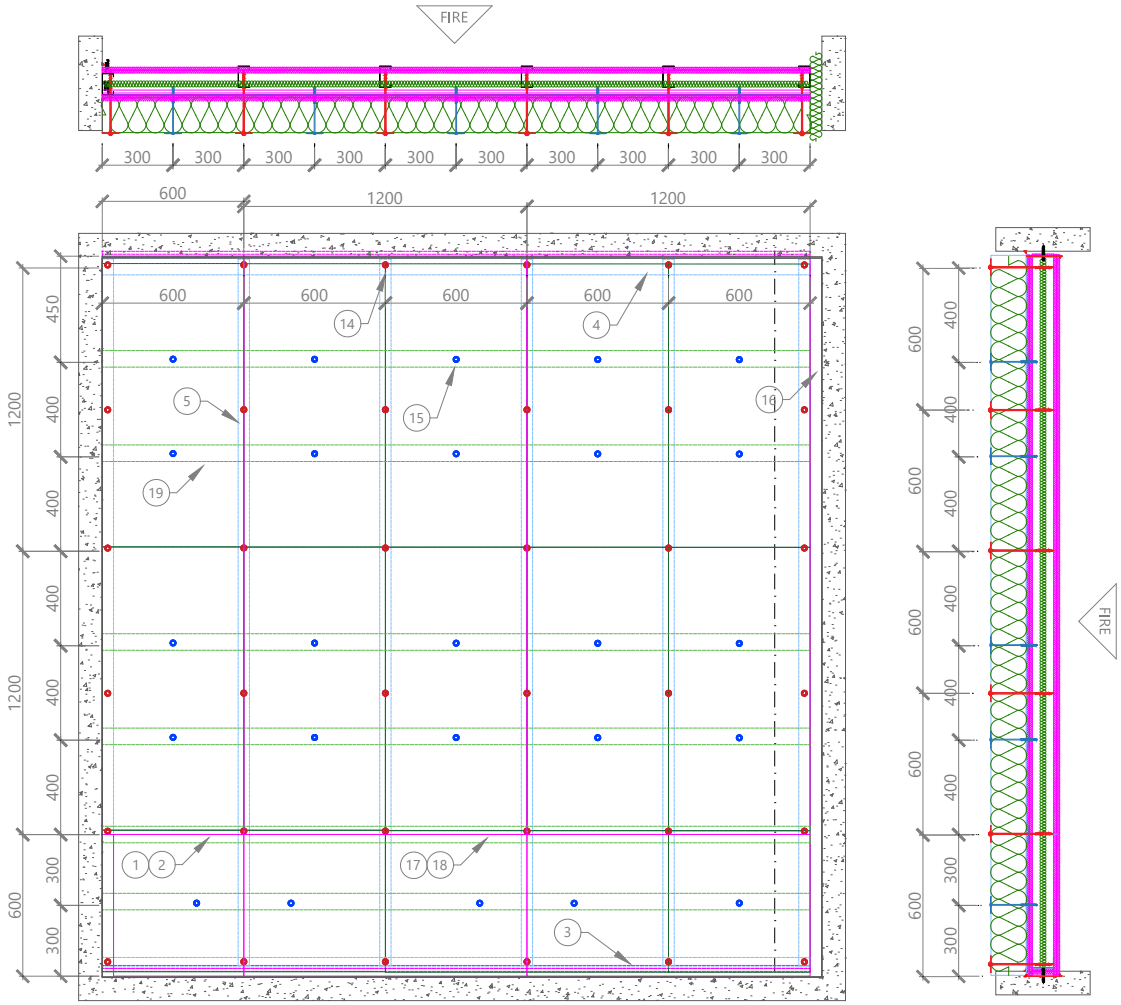
19 Fixing Plate

Manufacturer		Knauf
Reference		Flat Fixing Plate - 258300
Dimensions (w x l x t)		70 x 2400 x 0.7
Material		Steel
Fixing(s)	**Unexposed Side**	BMWD5.5 – 62 – 3 Wing Drill Screws
	Exposed Side	TSTF4.8 – 38 – 3 Wing Drill Screws
Location		300, 600, 1000, 1400, 2200, 2600 mm from bottom of partition to centreline of plate

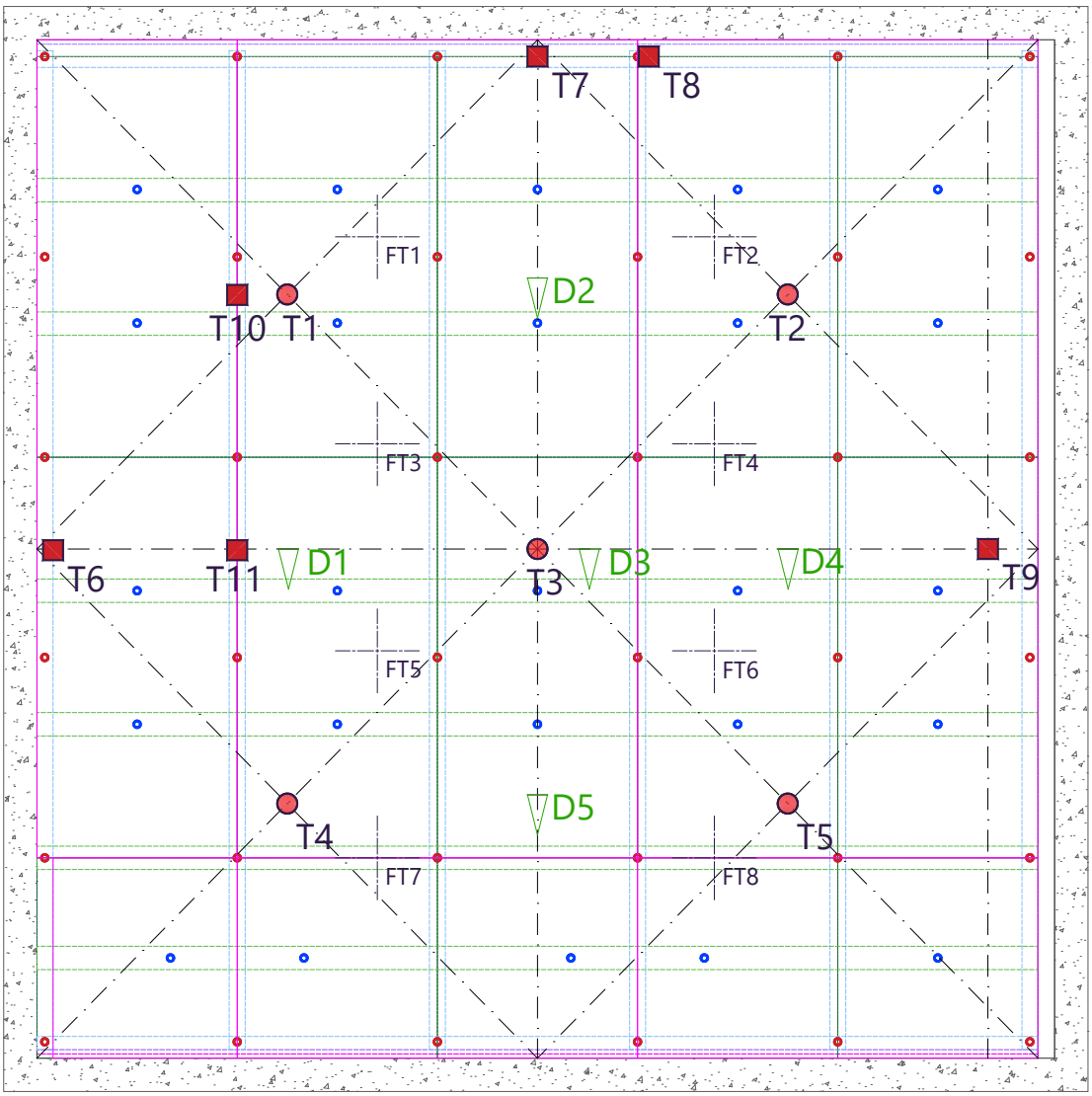
20 Fire Stopping

Manufacturer	Knauf
Reference	Intumescent & Acoustic Mastic
Description	600 ml foil packed
Application	Applied with mastic gun
Location	Junction between - frame and Aquaboards; frame and Floor/Ceiling Track; frame and Stud at the fixed edge

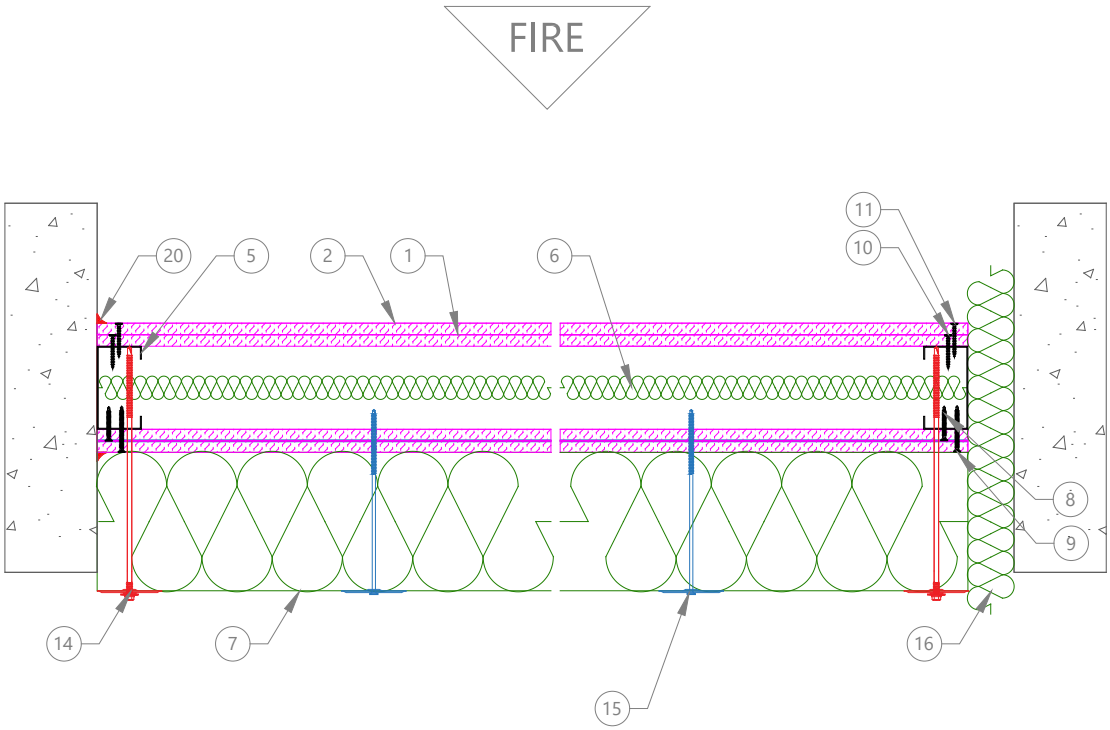
A.2 Test Construction Drawings



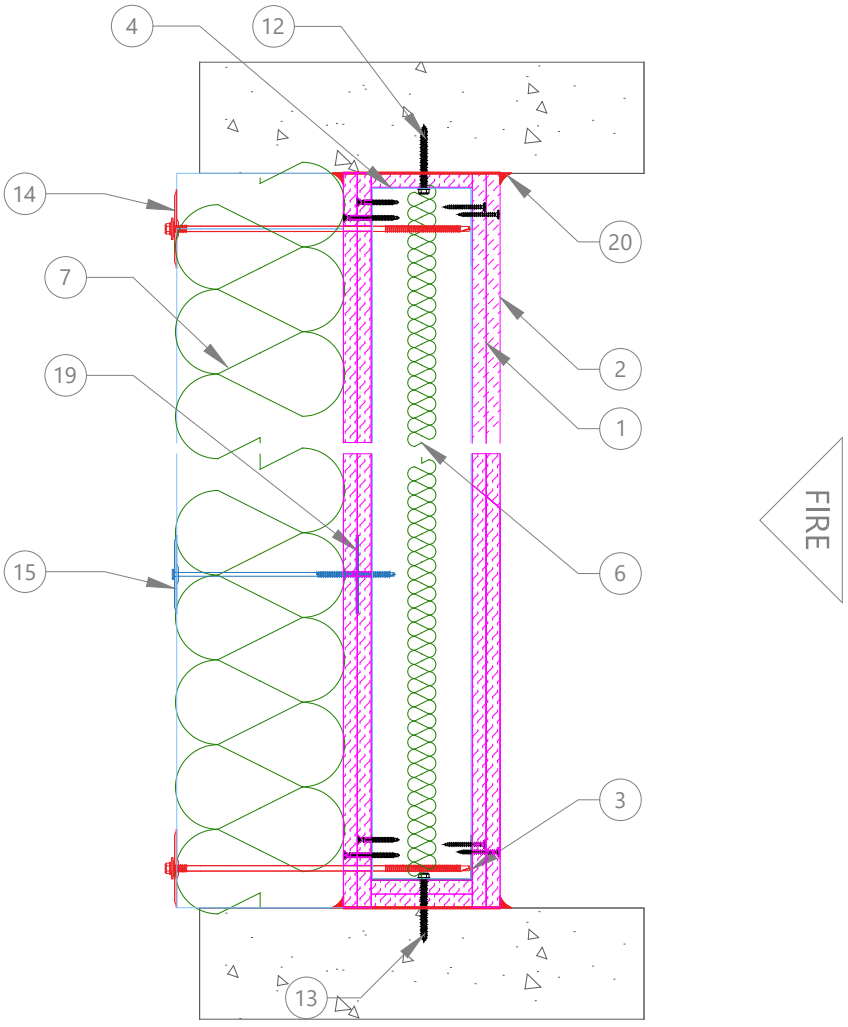
A.2. 1 - General arrangement of test construction



A.2. 2 - Layout of instrumentation when viewed from the unexposed surface of the test construction



A.2. 3 - Typical horizontal section through the specimen



A.2. 4 - Typical vertical section through the specimen

Appendix B

B.1 Unexposed Surface Thermocouple Measurements

*	Instrument malfunction
**	Instrument not in use

Time (mins)	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11
0	15.3	15.4	14.8	15.1	14.6	15.0	15.7	15.7	15.3	15.8	15.2
5	15.1	15.3	14.6	15.0	14.6	14.9	15.6	15.6	15.2	15.6	15.1
10	15.1	15.3	14.6	15.0	14.6	14.9	15.7	15.7	15.1	15.6	15.1
15	15.1	15.3	14.6	15.0	14.6	15.0	16.0	16.0	15.1	15.6	15.0
20	15.1	15.3	14.5	15.0	14.6	15.0	16.4	16.3	15.1	15.6	15.0
25	15.1	15.4	14.6	15.0	14.7	15.1	16.8	16.7	15.1	15.6	15.0
30	15.1	15.4	14.5	15.0	14.6	15.1	17.4	17.1	15.1	15.7	15.1
35	15.2	15.5	14.6	15.0	14.6	15.2	18.0	17.6	15.1	15.9	15.2
40	15.1	15.5	14.6	15.0	14.6	15.3	18.7	18.2	15.1	16.2	15.3
45	15.4	15.6	14.7	15.1	14.7	15.5	19.7	19.2	15.3	16.8	15.6
50	15.5	15.7	14.8	15.2	14.8	15.9	20.8	20.6	15.4	17.5	16.0
55	15.9	16.1	15.1	15.4	15.0	16.5	22.4	23.1	15.7	18.9	16.8
60	16.5	16.5	15.5	15.6	15.2	17.5	24.7	26.2	16.2	20.7	17.9
65	17.3	17.4	16.1	15.9	15.6	19.0	28.0	30.3	16.9	23.2	19.4
70	18.4	18.6	17.0	16.3	16.2	21.1	31.8	34.7	18.2	26.4	21.3
75	20.0	20.6	18.3	16.8	16.9	23.6	35.8	39.0	19.8	29.9	23.6
80	21.7	23.7	19.7	17.4	17.7	26.5	39.5	42.8	21.7	33.0	25.8
85	23.8	28.8	21.6	18.4	18.9	30.0	42.7	45.8	23.9	36.2	28.3
90	25.9	36.2	23.4	19.3	20.1	33.2	45.9	49.3	26.5	38.7	30.7
95	28.5	48.7	25.4	20.8	21.7	36.8	48.2	52.0	29.4	41.6	33.5
100	31.4	59.3	27.4	22.3	23.4	40.2	49.8	54.2	32.6	44.3	36.3
105	35.0	64.5	29.3	24.1	25.3	42.9	51.9	56.6	36.1	46.5	38.5

110	39.1	67.4	31.2	25.9	27.3	46.1	52.7	58.2	39.7	49.2	41.2
115	43.0	69.1	33.3	28.0	29.5	49.5	53.8	59.0	43.2	51.9	44.0
120	46.5	70.3	35.6	30.4	32.1	53.3	55.0	59.9	46.5	54.3	47.0

B.2 Radiometer Measurements

*	Instrument malfunction
**	Instrument not in use

Time (mins)	**R1 (kWm^{-2})**
0	0.127
5	0.091
10	0.109
15	0.109
20	0.109
25	0.109
30	0.109
35	0.109
40	0.109
45	0.109
50	0.109
55	0.109
60	0.109
65	0.127
70	0.145
75	0.145
80	0.145
85	0.145
90	0.145
95	0.163
100	0.163
105	0.163
110	0.163
115	0.181

120	0.199

B.3 Deflection Measurements

*	Instrument malfunction
**	Instrument not in use
-	Indicates movement away from the heating conditions

Time (mins)	D1 (mm)	D2 (mm)	D3 (mm)	D4 (mm)	D5 (mm)
0	0	0	0	0	0
20	2	2	2	2	2
40	4	3	3	3	4
60	5	4	4	5	5
80	5	4	3	3	5
100	4	3	2	2	4
110	3	3	2	2	3
120	4	2	0	2	3