

TEST REPORT

No. : XMIN2208008555CM

Date : Oct 14, 2022

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scan to see the report



XMIN2208008555CM

CUSTOMER NAME: JCC LIGHTING PRODUCTS
ADDRESS: CHICHESTER BUSINESS PARK, CITY FIELDS WAY, TANGMERE,
CHICHESTER, WEST SUSSEX, PO20 2FT

Sample Name : LED FIRE RATED DOWNLIGHT

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

Date of Receipt : Aug 30, 2022
Testing Start Date : Aug 30, 2022
Testing End Date : Sep 20, 2022
Test result(s) : For further details, please refer to the following page(s)
(Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd Xiamen Branch
Testing Center

Bryan Hong
Authorized signatory



SGS-CSTC Standards Technical Services Co., Ltd.
Xiamen Branch Testing Center Commercial Construction Material Laboratory

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SUMMARY

To determine the fire resistance of a timber floor assembly protected by a plasterboard ceiling designed to provide 90 minutes fire resistance, incorporating 12 LED FIRE RATED DOWNLIGHT fittings, when tested in accordance with BS EN 1365-2: 2014, "Fire resistance tests for loadbearing elements Part 2: Floors and roofs"

Test Results:

Loadbearing Capacity:		90min (No failure)
Integrity:	sustained flaming:	90min (No failure)
	Gap gauge:	90min (No failure)
	Cotton pad:	90min (No failure)
Insulation:		90min (No failure)

Note: According to sponsor requirements, the test was discontinued after a period of 90 minutes.

Summary of Tested Assembly

The timber floor assembly had overall nominal dimensions of 4800 mm long by 3230 mm wide and comprised solid wood joists at 400mm centres. The depth of the solid wood joist was 195mm. The upper surface of the floor comprised nominally 22mm thick T&G chipboard and screwed fixed to the upside of the floor joists. The floor assembly was protected on its underside by a direct fixed ceiling, formed from two layer of 15mm thick Knauf Fire Shield Gypsum Board, the ceiling was screw fixed to the underside of the floor joists.

One layer of 50mm thick rockwool was filled into the cavity between the floor and the ceiling.

The floor supported a uniformly distributed load of 1080N/m². This load value was specified by the sponsor of the test.



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The ceiling incorporated 12 LED FIRE RATED DOWNLIGHT fittings referenced as follows:

Test Ref.	Product Name	Reference
A	Fireguard Next Generation	JC010023 WH/CH/BN/BLK
B	V50	JC1017
C	Fireguard Next Generation	JC010035 WH/CH/BN/BLK
D	V50	JC1002 with JC1004
E	V50	JC1010
F	V50	JC1013
G	V50	JC1015
H	Fireguard Next Generation	JC010028 WH/CH/BN/BLK
I	V50	JC1019
J	V50	JC1026
K	V50	JC 1001 with JC1003
L	Fireguard Next Generation	JC010033 WH/CH/BN/BLK



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SCHEDULE OF COMPONENTS

(Refer to Figures 1 to 14)

(All values are nominal unless stated otherwise, all other details are as stated by the sponsor)

<u>Item</u>	<u>Description</u>
1. Floor Joists	
Material	: Solid Timber Joist, softwood
Size	: 195mm deep; 45mm thick
Centres:	: 400mm
2. Floorboards	
Material	: Egger T&G chipboard
Thickness	: 1 No. layer, 22mm thick
Fixing method	: All board screw fixed to all joists using drywall steel screws, at 200 mm centers along joists and 150 mm centers along perimeter of floor.
3. Ceiling boards	
Material	: Knauf Fire Shield Gypsum Board
Thickness	: 2 No. layer, each 15mm thick
Fixing method	: All board screw fixed to all joists using Drywall steel screws at max.230mm c/c. The joints between the boards were filled with joint filler with was also used to cover the heads of the screws.
4. Rockwool	
Manufacturer	: ROCKWOOL
Thickness	: 50mm
Density	: 80 kg/m ³
Fixing method	: filled into the cavity between the floor and the ceiling
5. End Joists	
Material	: Glulam
Size	: 195mm high x 50mm thick
Fixing method	: Fitted across the ends of the joists and through screwed to each joist.
6. Noggings	
Material	: Glulam
Size	: 195mm high x 45mm thick, 45mm highx45mm thick
Fixing method	: Fitted between the joists.



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7.Specimen 'A'

Product Name : Fireguard Next Generation
 Reference : JC010023 WH/CH/BN/BLK Fireguard Tilt Downlight
 Manufacturer : JCC Lighting Products
 Type : Fireguard Recessed Downlight
 Overall dimensions and construction : 101mm (H) x 100mm (∅), See figure 3
 Hole size in ceiling boards : 84mm ∅
 Materials :
 i: Casing: Mild Steel
 ii: Cover: Aluminum
 iii: Spring clip: Steel
 iv: Connection Block: Polycarbonate Housing
 Approx. weight: 0.261 Kg
 Details of fireproof material:
 i: Manufacturer: JCC Lighting Products
 ii: Type: Mild Steel 'can'
 iii: Thickness: 0.8mm
 iv: Location: Main chassis

8.Specimen 'B'

Product Name : V50
 Reference : V50 Slim Converter 72-165mm
 Manufacturer : JCC Lighting products
 Type : JC1017
 Overall dimensions and construction : 63mm H x 170mm W, See figure 4
 Hole size in ceiling boards : 150mm
 Materials :
 i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)
 iii: Spring clip: Sprung Steel
 iv: Connection Block: Polycarbonate (housing)
 Approx. weight: 0.30 Kg
 Details of fireproof material:
 i: Manufacturer: JCC Lighting products
 ii: Type: Mild Steel (can)
 iii: Thickness: 1.1mm (painted)



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Details of expanding material:

- iv: Location: Main chassis
- i: Manufacturer: JCC Lighting products
- ii: Type: Disc
- iii: Material: Graphite based intumescent
- iv: Thickness: 0.89mm
- v: Location: Top of steel can

9.Specimen 'C'

Product Name : Fireguard Next Generation
 Reference : JC010035 WH/CH/BN/BLK Fireguard Downlight
 Manufacturer : JCC Lighting Products
 Type : Fireguard IP65 Recessed Downlight
 Overall dimensions and construction : 98mm (H) x 94mm (∅), See figure 5
 Hole size in ceiling boards : 80mm ∅
 Materials :
 i: Casing: Mild Steel
 ii: Cover: Aluminum
 iii: Spring clip: Steel
 iv: Connection Block: Polycarbonate Housing
 Approx. weight: 0.261 Kg

Details of fireproof material:

- i: Manufacturer: JCC Lighting Products
- ii: Type: Mild Steel 'can'
- iii: Thickness: 0.8mm
- iv: Location: Main chassis

10.Specimen 'D'

Product Name : V50
 Reference : V50 Converter plate for use with JC1002
 Manufacturer : JCC Lighting Products
 Type : JC1002 with JC1004
 Overall dimensions and construction : 46mm H x 170mm W, See figure 6
 Hole size in ceiling boards : 140mm
 Materials :
 i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)



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Details of fireproof material:

- iii: Spring clip: Sprung Steel
- Approx. weight: 0.32 Kg
- i: Manufacturer: JCC Lighting Products
- ii: Type: Intumescent Material
- iii: Thickness: 0.89mm
- iv: Location: Main chassis

Details of expanding material:

- i: Manufacturer: JCC Lighting Products
- ii: Type: Disc
- iii: Material: Graphite based intumescent
- iv: Thickness: 0.89mm
- v: Location: Rear of main chassis

11.Specimen 'E'

Product Name : V50

Reference : V50 Fire rated downlight

Manufacturer : JCC Lighting products

Type : JC1010

Overall dimensions and construction : 54mm H x 84mm W, See figure 7

Hole size in ceiling boards : 70mm

Materials

- i: Casing: Mild Steel (can)
- ii: Cover: Aluminum (bezel)
- iii: Spring clip: Sprung Steel
- iv: Connection Block: Polycarbonate (housing)

Approx. weight: 0.29 Kg

Details of fireproof material:

- i: Manufacturer: JCC Lighting products
- ii: Type: Mild Steel (can)
- iii: Thickness: 1.1mm (painted)
- iv: Location: Main chassis

Details of expanding material:

- i: Manufacturer: JCC Lighting products
- ii: Type: Disc
- iii: Material: Graphite based intumescent
- iv: Thickness: 0.89mm



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v: Location: Top of steel can

12.Specimen 'F'

Product Name : V50
 Reference : V50 Slim 72-100mm Converter Bezel
 Manufacturer : JCC Lighting products
 Type : JC1013
 Overall dimensions and construction : 54mm H x 100mm W, See figure 8
 Hole size in ceiling boards : 80mm
 Materials
 i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)
 iii: Spring clip: Sprung Steel
 iv: Connection Block: Polycarbonate (housing)
 Approx. weight: 0.32 Kg
 Details of fireproof material:
 i: Manufacturer: JCC Lighting products
 ii: Type: Mild Steel (can)
 iii: Thickness: 1.1mm (painted)
 iv: Location: Main chassis
 Details of Expanding material
 i: Manufacturer: JCC Lighting products
 ii: Type: Disc
 iii: Material: Graphite based intumescent
 iv: Thickness: 0.89mm
 v: Location: Top of steel can

13.Specimen 'G'

Product Name : V50
 Reference : V50 Pro Retrofit 135mm Firerated LED Downlight
 Manufacturer : JCC Lighting Products
 Type : JC1015
 Overall dimensions and construction : 54mm H x 135mm W, See figure 9
 Hole size in ceiling boards : 100mm
 Materials
 i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)



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- iii: Spring clip: Sprung Steel
- iv: Connection Block: Polycarbonate (housing)
Approx. weight: 0.37 Kg
- Details of fireproof material:
 - i: Manufacturer: JCC Lighting products
 - ii: Type: Mild Steel (can)
 - iii: Thickness: 1.1mm (painted)
 - iv: Location: Main chassis
- Details of Expanding material
 - i: Manufacturer: JCC Lighting products
 - ii: Type: Disc
 - iii: Material: Graphite based intumescent
 - iv: Thickness: 0.89mm
 - v: Location: Top of steel can

14.Specimen 'H'

- Product Name : Fireguard Next Generation
- Reference : JC010028 WH/CH/BN/BLK
- Manufacturer : JCC Lighting Products
- Type : Fireguard IP65 Recessed Downlight
- Overall dimensions and construction : 85mm (H) x 86mm (Φ), See figure 10
- Hole size in ceiling boards : 74mm Φ
- Materials
 - i: Casing: Mild Steel
 - ii: Cover: Aluminum
 - iii: Spring clip: Steel
 - iv: Connection Block: Polycarbonate Housing
Approx. weight: 0.2 Kg
- Details of fireproof material:
 - i: Manufacturer: JCC Lighting Products
 - ii: Type: Mild Steel 'can'
 - iii: Thickness: 0.8mm
 - iv: Location: Main chassis

15.Specimen 'I'

- Product Name : V50
- Reference : V50 Slim Anti-Glade LED Downlight



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Manufacturer : JCC Lighting Products
 Type : JC1019
 Overall dimensions and construction : 107mm H x 85mm W, See figure 11
 Hole size in ceiling boards : 80mm
 Materials :
 i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)
 iii: Spring clip: Sprung Steel
 iv: Connection Block: Polycarbonate (housing)
 Approx. weight: 0.32 Kg
 Details of fireproof material: :
 i: Manufacturer: JCC Lighting products
 ii: Type: Mild Steel (can)
 iii: Thickness: 1.1mm (painted)
 iv: Location: Main chassis
 Details of Expanding material :
 i: Manufacturer: JCC Lighting products
 ii: Type: Disc
 iii: Material: Graphite based intumescent
 iv: Thickness: 0.89mm
 v: Location: Top of steel can

16.Specimen 'J'

Product Name : V50
 Reference : V50 Pro Tilt Fire-rated LED Downlight
 Manufacturer : JCC Lighting Products
 Type : JC1026
 Overall dimensions and construction : 63mm H x 100mm W, See figure 12
 Hole size in ceiling boards : 80mm
 Materials :
 i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)
 iii: Spring clip: Sprung Steel
 iv: Connection Block: Polycarbonate (housing)
 Approx. weight: 0.36 Kg
 Details of fireproof material: :
 i: Manufacturer: JCC Lighting products



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Details of Expanding material

- ii: Type: Mild Steel (can)
- iii: Thickness: 1.1mm (painted)
- iv: Location: Main chassis
- i: Manufacturer: JCC Lighting products
- ii: Type: Disc
- iii: Material: Graphite based intumescent
- iv: Thickness: 0.89mm
- v: Location: Top of steel can

17.Specimen 'K'

Product Name : V50
 Reference : V50 Converter plate for use with JC1001
 Manufacturer : JCC Lighting Products
 Type : JC 1001 with JC1003
 Overall dimensions and construction : 46mm H x 170mm W, See figure 13
 Hole size in ceiling boards : 115mm
 Materials : i: Casing: Mild Steel (can)
 ii: Cover: Aluminum (bezel)
 iii: Spring clip: Sprung Steel

Approx. weight: 0.29Kg
 Details of fireproof material: i: Manufacturer: JCC Lighting Products
 ii: Type: Intumescent Material
 iii: Thickness: 0.89mm
 iv: Location: Main chassis

Details of Expanding material : i: Manufacturer: JCC Lighting Products
 ii: Type: Disc
 iii: Material: Graphite based intumescent
 iv: Thickness: 0.89mm
 v: Location: Rear of main chassis

18.Specimen 'L'

Product Name : Fireguard Next Generation
 Reference : JC010033 WH/CH/BN/BLK Fireguard Downlight



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Manufacturer : JCC Lighting Products
Type : Fireguard Recessed Downlight
Overall dimensions and construction : 101mm (H) x 100mm (∅), See figure 14
Hole size in ceiling boards : 84mm ∅
Materials :
i: Casing: Mild Steel
ii: Cover: Aluminum
iii: Spring clip: Steel
iv: Connection Block: Polycarbonate Housing
Approx. weight: 0.261 Kg
Details of fireproof material:
i: Manufacturer: JCC Lighting Products
ii: Type: Mild Steel 'can'
iii: Thickness: 0.8mm
iv: Location: Main chassis



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TEST PROCEDURE

The ambient temperature at the beginning of the test was 31 °C.

The furnace temperature was measured by means of nine thermocouples distributed evenly in the furnace, and each thermocouple shall be (100 ± 50) mm from the nearest point of exposed face of the specimen. The furnace was controlled so that the mean of the nine thermocouple readings followed as closely as possible the time/temperature relationship specified Clause 5.1 of BS EN 1363-1: 2020.

The pressure distribution over the height of a furnace is mainly influenced by natural buoyancy effect of the gases. For the purpose of controlling the pressure, it can be assumed that the pressure gradient will be approximately 8.5 Pa per meter height of furnace. The furnace shall be operated so that the neutral pressure plane (a pressure of zero) is established 500 mm above nominal floor level.

Thermocouples were provided to monitor the unexposed surface of the floor assembly and the output of all instrumentation was recorded at no less than one-minute intervals. The locations and reference numbers of the various unexposed surface and internal thermocouples are shown in Figure 1.

TEST DATA AND INFORMATION

Details of the specimen structure are shown in Figure 1 to 14. The photographs of the LED FIRE RATED DOWNLIGHT are shown in Photo 1 to 24

Photographs of the test are shown in Photos 25 to 34. A summary of the observations made on the general behavior of the specimen is given in Appendix 1.

The mean furnace temperature records are shown in Appendix 2, and the actual time-temperature curve of furnace in relation to the specified time-temperature curve is shown in Figure 15.

The unexposed surface temperature records are shown in Appendix 3, and the individual temperatures recorded adjacent to the spotlight fittings at mid-height of the cavity are shown in Appendix 4. The unexposed surface maximum and mean temperature curve are shown in Figure 16. The vertical deflection at the centre of the floor assembly was continuously measured during the test, and the data records are given in Appendix 5. The deflection curve is shown in Figure 17.



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PERFORMANCE CRITERIA

This test was according to performance criteria which specified in BS EN 1365-2: 2014, section 11 to determine the loadbearing capacity, integrity and insulation of the specimen:

Loadbearing capacity:

The following definitions are used for flexural loaded elements:

Limiting deflection
$$D_{\text{limit}} = \frac{L^2}{400d} \text{ mm}$$

Limiting rate of deflection
$$\left(\frac{dD}{dt}\right)_{\text{limit}} = \frac{L^2}{9000d} \text{ mm/min}$$

Where

L is the clear span of the test specimen, in millimetres;

d is the distance from the extreme fibre of the cold design compression zone to the extreme fibre of the cold design tension zone of the structural section, in millimetres.

For the purposes of this standard, failure to support the test load is deemed to have occurred when:

(i) measured deflection $\geq 1.5 \times D_{\text{limit}}$; or (ii) D_{limit} and $(dD/dt)_{\text{limit}}$ are exceeded

In this test:

Limiting deflection
$$D_{\text{limit}} = \frac{(4500)^2}{400 \times 247} = 205 \text{ (mm)}$$

Limiting rate of deflection
$$\left(\frac{dD}{dt}\right)_{\text{limit}} = \frac{(4500)^2}{9000 \times 247} = 9.1 \text{ (mm/min)}$$

1.5 X limiting deflection
$$1.5D_{\text{limit}} = 1.5 \times 205 = 307.5 \text{ (mm)}$$

Integrity:

These are the times in completed minutes for which the test specimen continues to maintain its separating function during the test without.

- causing the ignition of cotton pad.
- permitting the 6 mm diameter gap gauge to be passed through the test specimen, such that the gauge projects into the furnace, and can be moved a distance of 150 mm along the gap; or
- permitting the 25 mm diameter gap gauge to be passed through the test specimen such that the gauge projects into the furnace.
- resulting in sustained flaming.



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Insulation:

This is the time in completed minutes for which the test specimen continues to maintain its separating function during the test without developing temperatures on its unexposed surface which:

- a) increase the average temperature above the initial average temperature by more than 140°C; or
- b) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180°C.

CONCLUSIONS

A specimen of a timber floor assembly protected by a plasterboard ceiling incorporating 12 LED FIRE RATED DOWNLIGHT fittings has been subjected to a fire resistance test in accordance with BS EN 1365-2: 2014.

At the heating period of 90 minutes, the maximum deflection was 86.0mm; the rate of deflection was 2.0 mm/min. The loadbearing capacity was satisfied.

At the heating period of 90 minutes, there was no collapse of the specimen, no sustained flaming on the unexposed surface and no loss of impermeability. The integrity requirement was satisfied.

At the heating period of 90 minutes, the mean temperature rise of the unexposed face was 47.1°C, the max temperature rise of the unexposed face was 58.6°C. The insulation requirement was satisfied.

The floor assemblies satisfied the performance requirements specified in Clause 7 of BS EN 1365-2: 2014, for the following periods:

Loadbearing Capacity:		90min (No failure)
Integrity:	sustained flaming:	90min (No failure)
	Gap gauge:	90min (No failure)
	Cotton pad:	90min (No failure)
Insulation:		90min (No failure)

Note:

According to sponsor requirements, the test was discontinued after a period of 90 minutes.



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TEST PHOTOGRAPHS



Photo 1: Front view of specimen 'A'



Photo 2: Side view of specimen 'A'

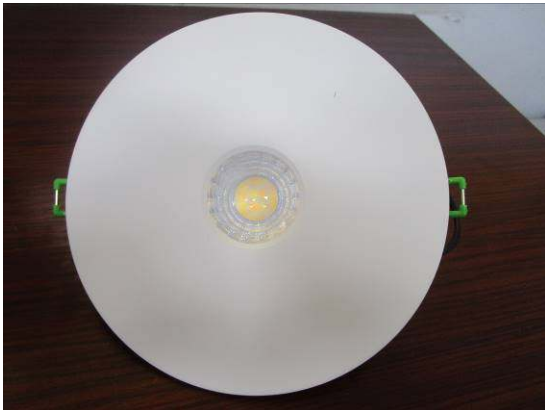


Photo 3: Front view of specimen 'B'



Photo 4: Side view of specimen 'B'



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Photo 5: Front view of specimen 'C'



Photo 6: Side view of specimen 'C'



Photo 7: Front view of specimen 'D'



Photo 8: Side view of specimen 'D'



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Photo 9: Front view of specimen 'E'



Photo 10: Side view of specimen 'E'



Photo 11: Front view of specimen 'F'



Photo 12: Side view of specimen 'F'



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Photo 13: Front view of specimen 'G'



Photo 14: Side view of specimen 'G'



Photo 15: Front view of specimen 'H'



Photo 16: Side view of specimen 'H'



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Photo 17: Front view of specimen 'I'



Photo 18: Side view of specimen 'I'



Photo 19: Front view of specimen 'J'



Photo 20: Side view of specimen 'J'



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Photo 21: Front view of specimen 'K'



Photo 22: Side view of specimen 'K'



Photo 23: Front view of specimen 'L'



Photo 24: Side view of specimen 'L'



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Photo 25: The exposed surface of the specimen before the test



Photo 26: The unexposed surface of the specimen before the test.

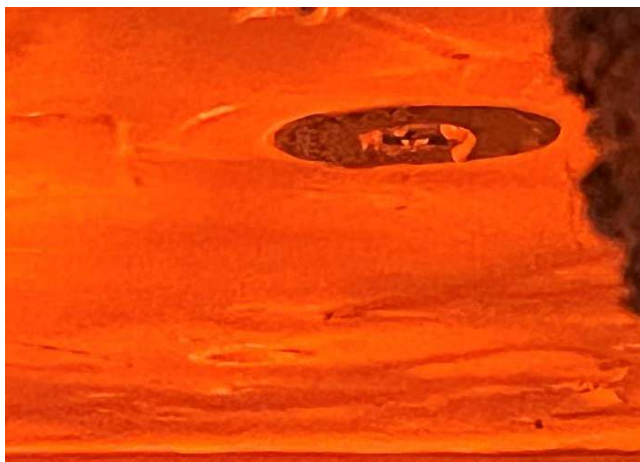


Photo 27: The exposed surface of the specimen after test duration of 5 minutes, showing the lens of specimen was fusing.



Photo 28: The unexposed surface of the specimen after test duration of 15 minutes.



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Photo 29: The exposed surface of the specimen after test duration of 25 minutes, large areas of coating of the plasterboard ceiling fell away.



Photo 30: The unexposed surface of the specimen after test duration of 30 minutes.

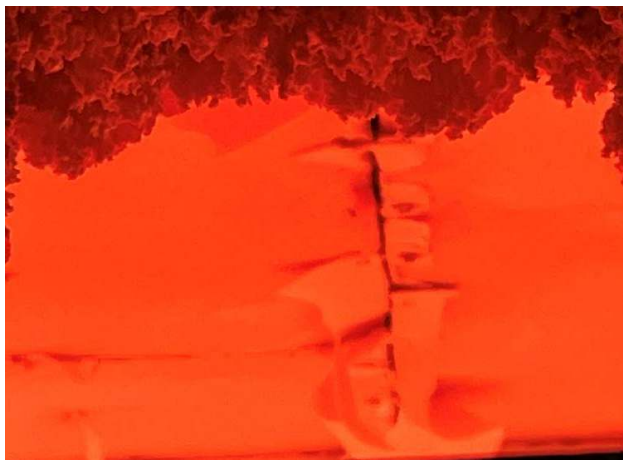


Photo 31: The exposed surface of the specimen after test duration of 44 minutes, the first layer plasterboard ceiling started to sag slightly and joints began to open.



Photo 32: The unexposed surface of the specimen after test duration of 60 minutes.



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Photo 33: The unexposed surface of the specimen after test duration of 90 minutes.



Photo 34: The unexposed surface of the specimen after the test.



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DETAILS OF TEST SPECIMEN

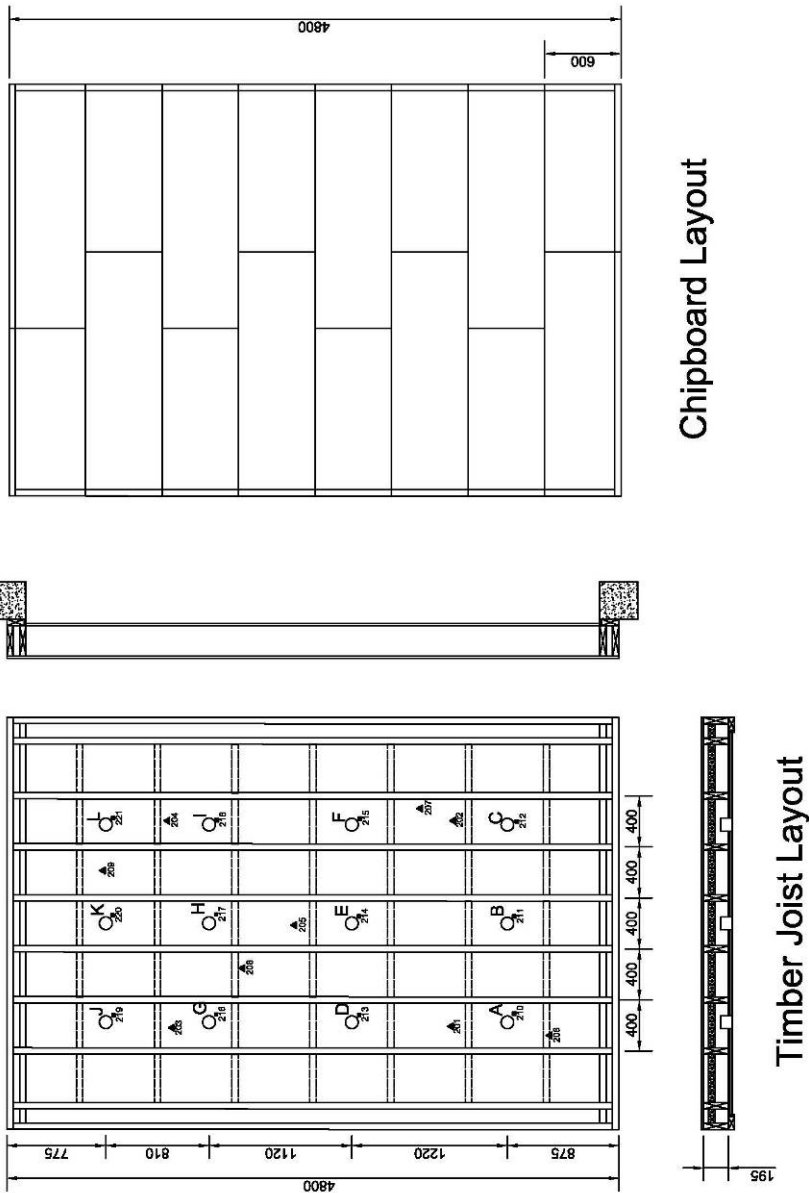


Figure 1 - Specimen General Plan



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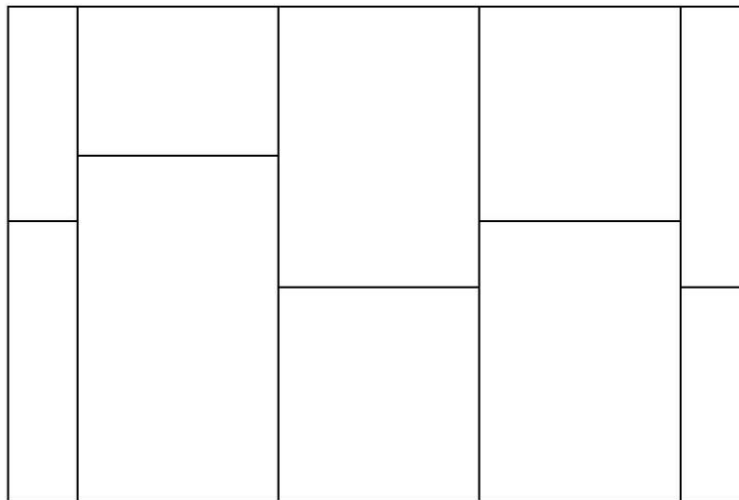
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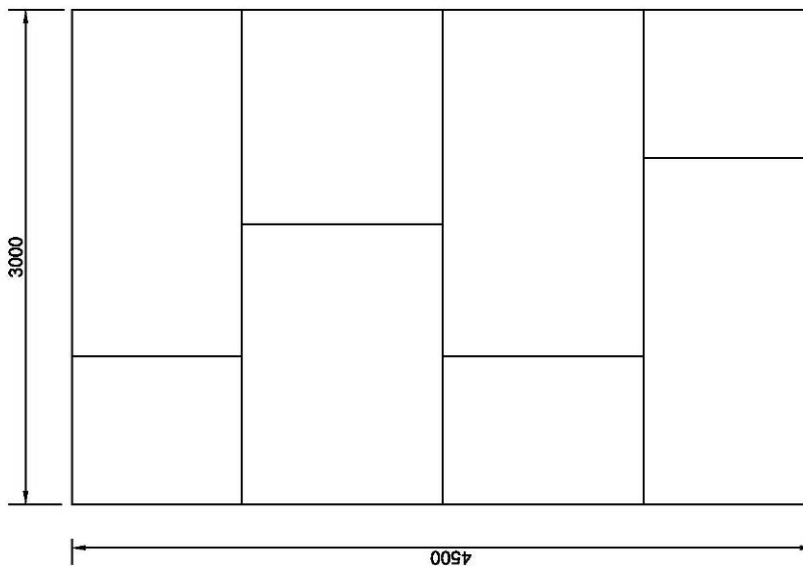
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2st Layer
Plasterboard Layout



1st Layer
Plasterboard Layout

Figure 2 - Specimen Structural Drawing

Note: the specimen details provided by the sponsor



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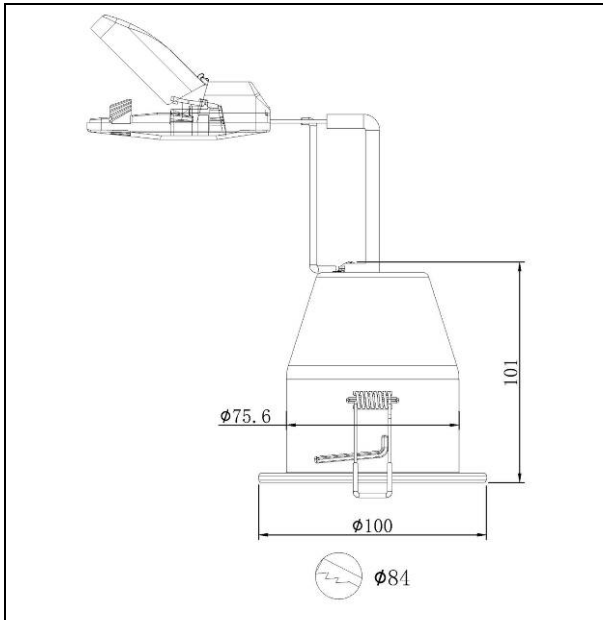


Figure 3 – Details of specimen 'A'

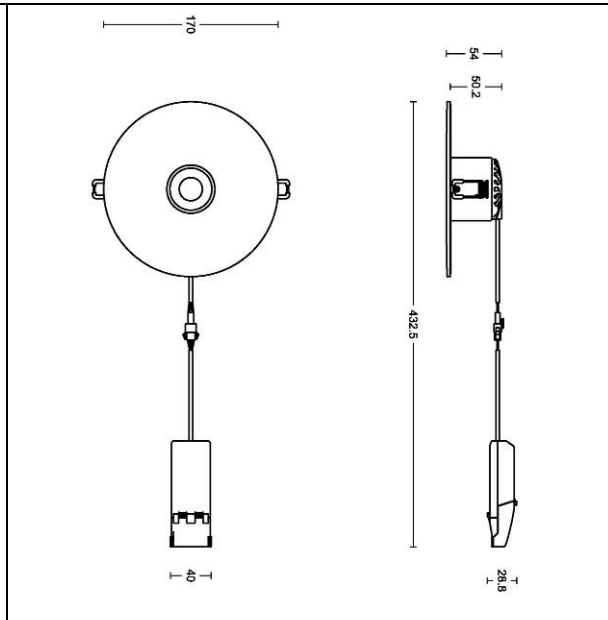


Figure 4 – Details of specimen 'B'

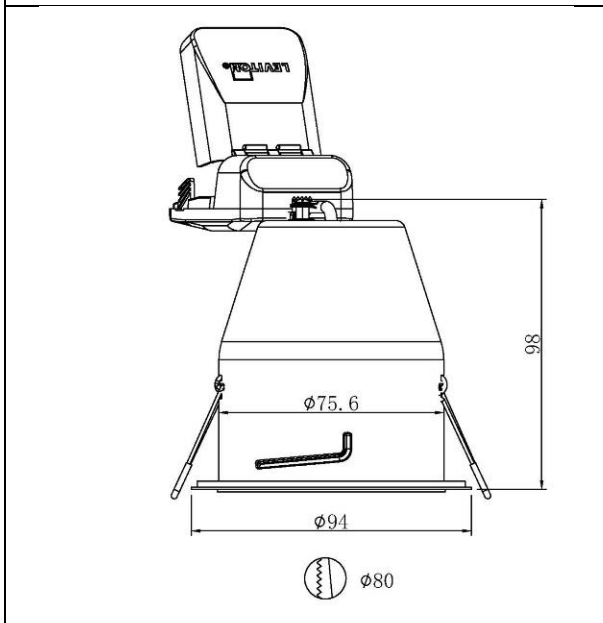


Figure 5 – Details of specimen 'C'

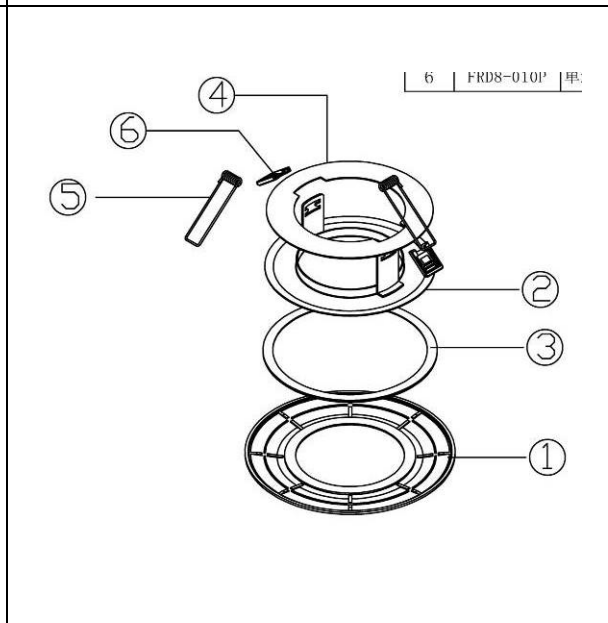


Figure 6 – Details of specimen 'D'



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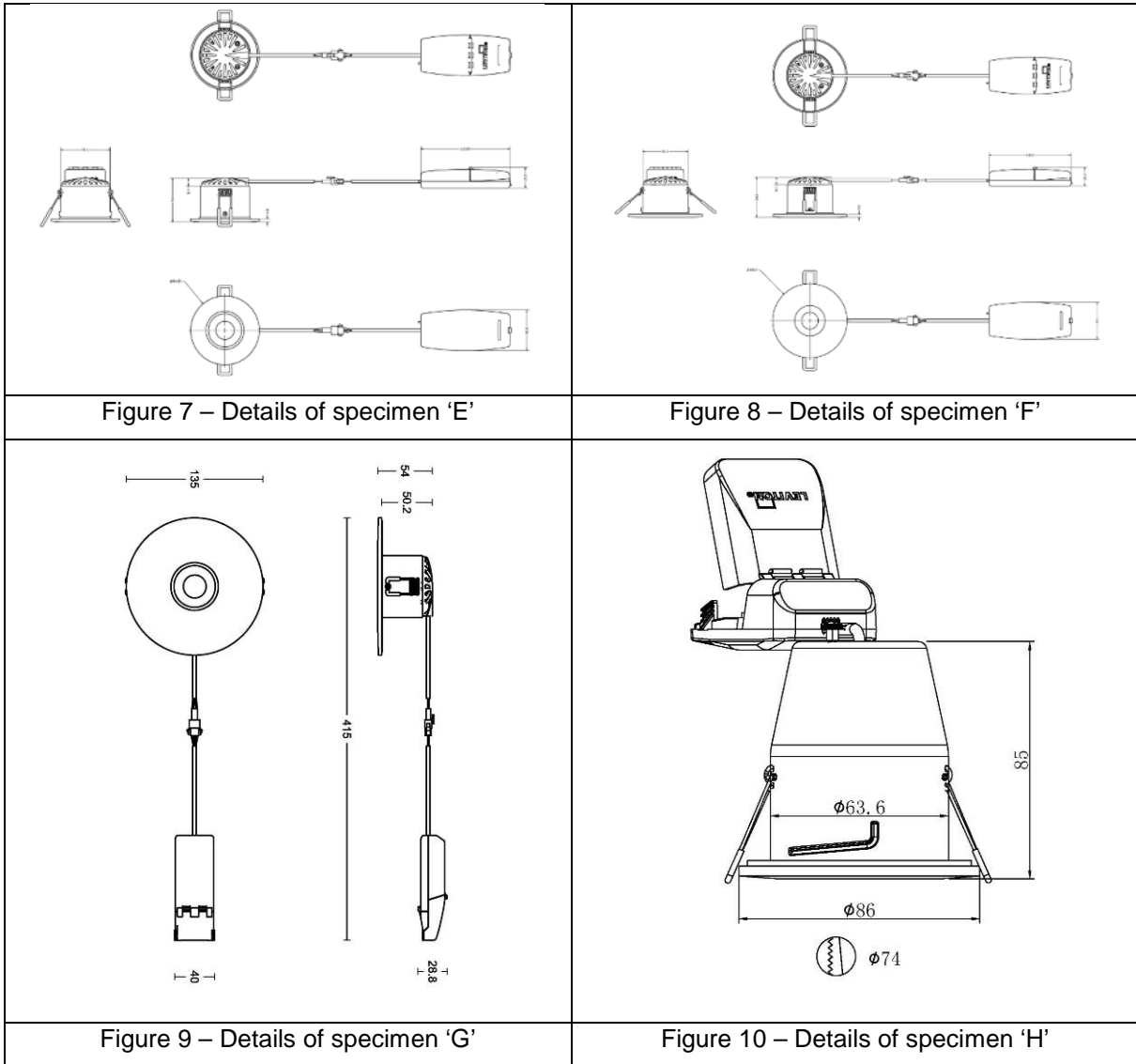
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<p>Figure 11 – Details of specimen 'I'</p>	<p>Figure 12 – Details of specimen 'J'</p>
<p>Figure 13 – Details of specimen 'K'</p>	<p>Figure 14 – Details of specimen 'L'</p>

Note: the specimen details provided by the sponsor



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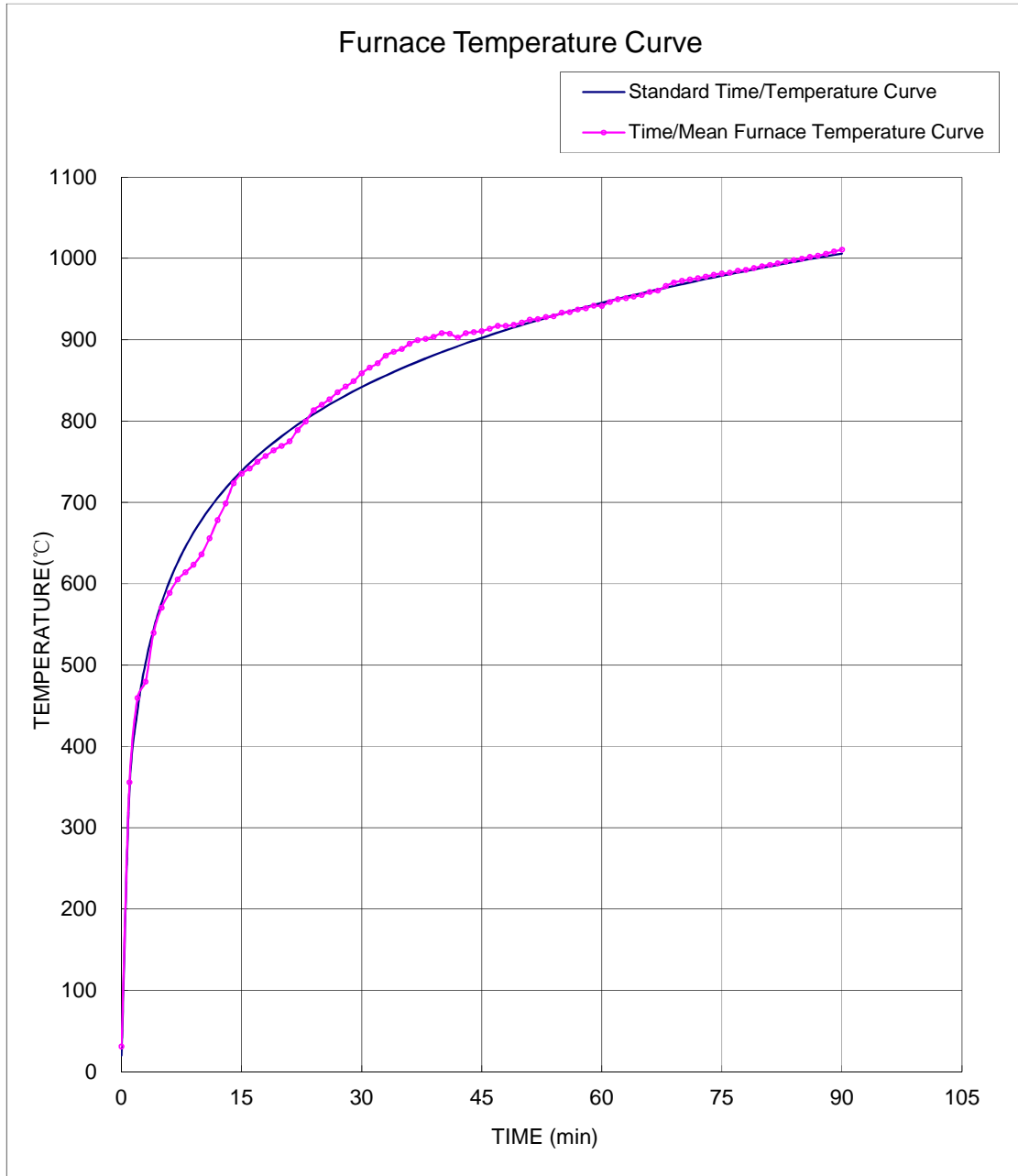


Figure 15 - Furnace Temperature Curve



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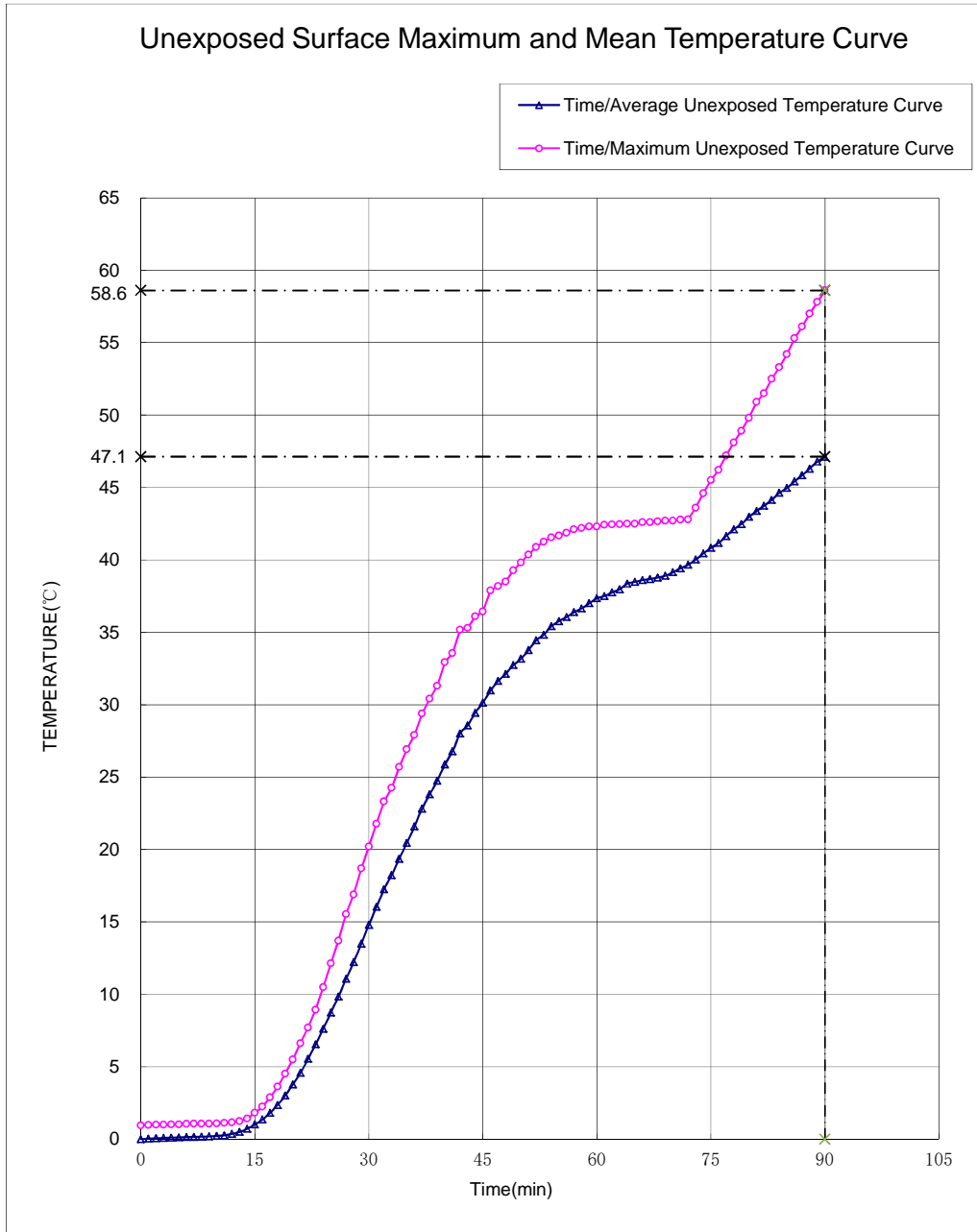


Figure 16 - Unexposed Face Mean and Maximum Temperature Curve



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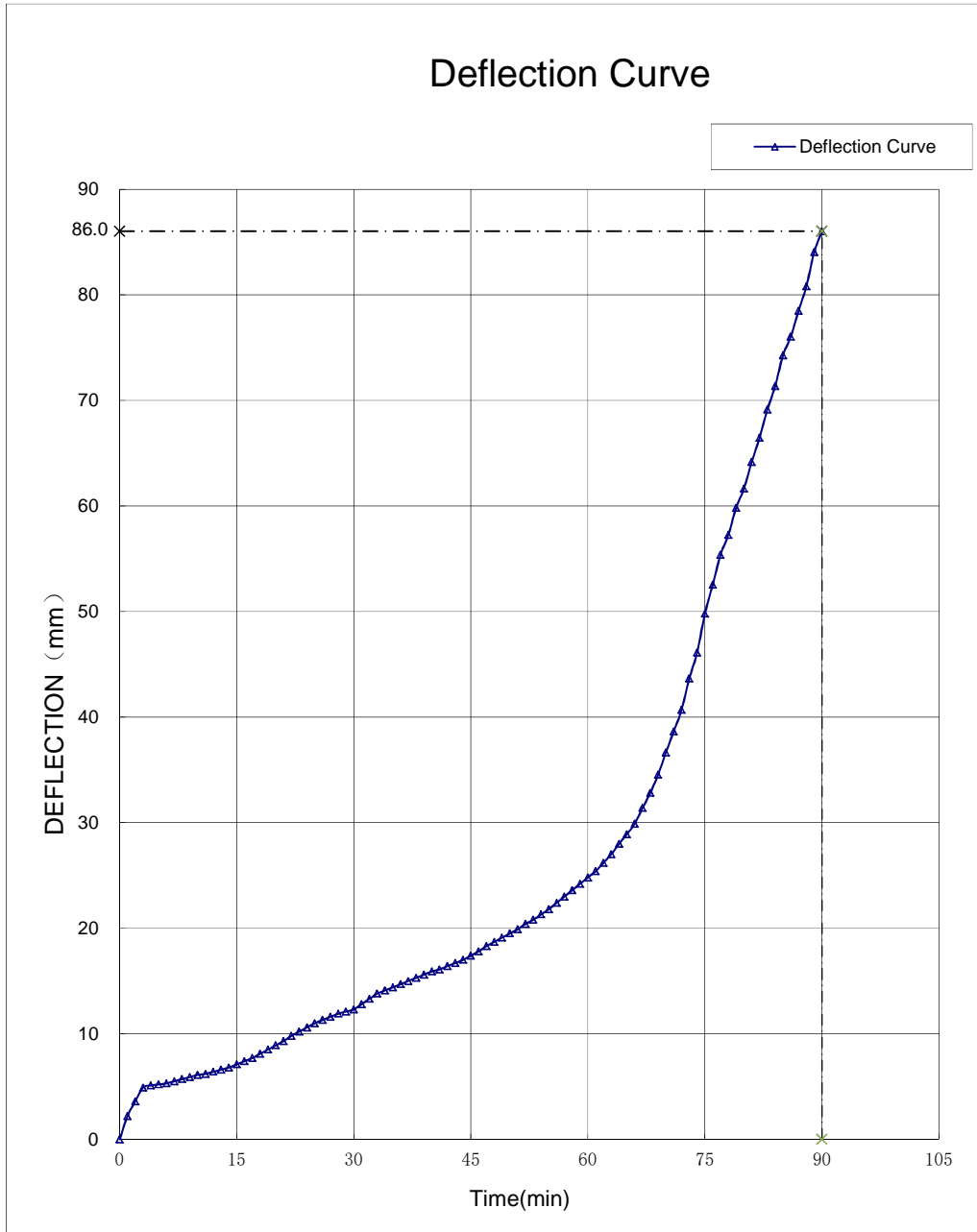


Figure 17 - Deflection Curve



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Time (min)	Observation (All observations are from the exposed face unless noted otherwise)
0	Test started.
5	Some lens of specimen was fusing.
13	Coating of the plasterboard ceiling fell away.
18	Some lamp cups fell out from the light can.
25	Large areas of coating of the plasterboard ceiling fell away.
44	The plasterboard ceiling started to sag slightly and joints began to open.
58	Part of first layer plasterboard ceiling fell into the furnace.
65	White smoke released from the joints of floorboards at the unexposed surface of the specimen.
70	Most of the first layer of plasterboard ceiling fell away.
73	The second layer plasterboard ceiling started to sag and joints began to open.
81	Part of second layer plasterboard ceiling fell into the furnace.
83	Lots of smoke release increased inside the furnace, resulted the observation from the exposed side discontinued.
88	Yellow smoke released from the joints of floorboards at the unexposed surface of the specimen.
90	Test terminated at sponsor's request.

Appendix 1 –Test Observations



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Time min	Specified Furnace Temperature °C	Actual Furnace Mean Temperature °C
0	20	31
5	576	570
10	678	636
15	739	735
20	781	769
25	815	820
30	842	859
35	865	889
40	885	908
45	902	911
50	918	921
55	932	933
60	945	942
65	957	955
70	968	972
75	979	981
80	988	991
85	997	1000
90	1006	1011

Appendix 2 – Furnace Temperature Records



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Time min	TC No.201 °C	TC No.202 °C	TC No.203 °C	TC No.204 °C	TC No.205 °C	TC No.206 °C	TC No.207 °C	TC No.208 °C	TC No.209 °C	Mean Temp °C	Mean Temp Rise °C	Max Temp Rise °C
0	31.0	29.1	31.7	31.4	31.3	30.4	31.4	31.8	31.6	30.9	0.0	0.9
5	31.1	29.2	31.8	31.5	31.4	30.6	31.5	31.9	31.7	31.0	0.1	1.0
10	31.1	29.5	31.9	31.6	31.5	30.9	31.5	32.0	31.7	31.1	0.2	1.1
15	31.5	31.4	32.3	32.7	31.6	31.2	32.1	32.6	32.6	31.9	1.0	1.8
20	34.0	35.8	35.6	36.0	32.0	31.9	34.7	35.9	36.4	34.7	3.8	5.5
25	39.4	41.6	43.0	41.0	33.1	33.2	39.3	41.2	42.5	39.6	8.7	12.1
30	46.7	48.1	51.1	47.6	35.1	35.0	44.8	46.4	48.4	45.7	14.8	20.2
35	52.4	53.8	57.8	54.9	37.8	37.6	50.0	51.1	53.2	51.4	20.5	26.9
40	57.4	58.9	63.8	61.6	42.0	41.0	56.0	56.2	57.7	56.8	25.9	32.9
45	60.5	63.2	67.3	67.2	46.9	45.3	59.9	60.8	60.3	61.0	30.1	36.4
50	62.8	66.1	69.3	70.7	51.5	49.5	63.6	64.4	62.1	64.1	33.2	39.8
55	64.7	68.5	71.2	72.6	56.5	53.6	67.2	68.0	64.3	66.7	35.8	41.7
60	66.4	69.8	71.8	73.2	60.1	57.2	68.2	69.9	65.5	68.2	37.3	42.3
65	67.1	70.6	72.5	73.4	63.3	60.3	68.7	71.1	67.6	69.4	38.5	42.5
70	68.0	71.6	73.0	73.6	64.0	62.4	70.7	72.0	68.7	70.0	39.1	42.7
75	68.7	72.8	76.4	74.0	66.7	63.8	73.5	74.1	70.3	71.7	40.8	45.5
80	70.1	73.8	80.7	75.0	69.7	64.9	76.7	76.2	71.7	73.9	43.0	49.8
85	71.0	74.9	85.1	76.0	72.3	66.2	79.7	78.4	73.3	75.9	45.0	54.2
90	72.1	76.0	89.5	77.3	75.2	67.4	82.7	80.4	75.0	78.0	47.1	58.6

Appendix 3 – Unexposed Surface Temperature Records



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Time min	TC No. 210 °C	TC No. 211 °C	TC No. 212 °C	TC No. 213 °C	TC No. 214 °C	TC No. 215 °C	TC No. 216 °C	TC No. 217 °C	TC No. 218 °C	TC No. 219 °C	TC No. 220 °C	TC No. 221 °C
0	31.5	31.4	31.9	31.9	31.6	31.4	31.4	31.6	31.5	31.1	31.1	31.8
5	36.8	32.4	36.7	32.3	32.3	31.6	31.6	31.9	31.8	31.7	32.7	33.4
10	50.6	43.7	50.4	56.1	43.6	38.5	34.2	41.7	34.2	38.2	43.9	53.9
15	63.7	68.5	63.5	80.0	68.4	59.5	58.4	58.1	58.6	58.9	68.7	86.0
20	78.5	80.1	78.2	90.6	80.1	75.8	78.6	67.2	78.7	77.5	80.3	94.0
25	88.4	85.3	88.3	91.7	84.9	85.6	84.2	71.3	84.3	85.9	85.4	95.6
30	91.4	86.2	91.2	93.1	85.1	87.4	85.8	78.8	85.8	87.5	86.4	96.6
35	92.9	87.2	93.4	93.4	85.3	88.0	87.2	84.9	87.2	90.4	88.6	97.6
40	93.7	89.9	104.4	94.1	85.8	89.2	88.2	87.4	88.3	91.4	90.5	98.1
45	95.0	90.5	109.3	94.5	87.4	90.5	89.4	88.6	89.6	92.2	91.1	98.3
50	103.4	90.8	112.4	94.8	88.8	91.8	90.2	89.1	90.4	93.2	91.2	98.4
55	108.7	92.0	115.2	95.1	90.1	92.8	90.4	90.1	90.5	93.6	93.6	98.7
60	111.2	92.5	122.4	95.3	90.5	93.6	90.8	90.7	90.8	94.0	94.6	99.2
65	114.8	93.0	138.4	95.7	91.2	94.3	90.9	91.5	91.0	94.2	98.0	101.4
70	127.3	93.4	165.8	95.9	91.8	94.7	91.2	92.8	91.3	94.5	101.8	106.0
75	134.7	94.7	191.3	96.5	99.0	94.9	91.5	93.8	91.6	94.8	119.7	113.8
80	140.2	101.1	212.9	97.3	105.2	95.0	92.1	95.1	92.3	95.3	130.1	127.0
85	150.6	105.9	234.6	98.8	128.8	98.4	97.3	95.4	97.5	95.7	136.6	144.3
90	160.9	111.0	256.4	99.3	152.2	104.9	104.1	95.9	99.9	96.9	143.0	161.7

Appendix 4 – Individual Temperatures Recorded Adjacent to the Spotlight Fittings at Mid-height of the Cavity



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Time min	Central Vertical Deflection mm	Rate of Deflection mm/min
0	0.0	0.0
5	5.2	0.1
10	6.1	0.2
15	7.1	0.3
20	8.9	0.4
25	11.0	0.4
30	12.3	0.2
35	14.4	0.3
40	15.9	0.3
45	17.4	0.4
50	19.5	0.4
55	21.8	0.5
60	24.8	0.6
65	28.9	0.9
70	36.6	2.1
75	49.8	3.7
80	61.6	1.8
85	74.3	2.9
90	86.0	2.0

Note: 1. A positive value indicates deflection towards to the furnace

Appendix 5 – Deflection of the floor assembly during the test

2. The above test project/method was carried out by subcontractors.

***** End of report*****



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