

**Title:**

Fire Resistance Test  
In Accordance With  
BS EN 1365-2: 2014,  
On A Loadbearing  
Timber Floor  
Construction Protected  
By A Plasterboard  
Ceiling And  
Incorporating Ten  
Down Lighters

**Date of Test:**

1<sup>st</sup> August 2020

**Issue 1:**

1<sup>st</sup> October 2020

**WF Report No.**

429645/R



**Prepared for:**

**Orlight Ltd**

Victor Way  
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0249

# Test Construction

## Summary of Tested Construction

The timber floor had overall nominal dimensions of 4288 mm long by 2970 mm wide by 321 mm deep and comprised 'Mitek PS1', metal web, Posi-joists with a length of 4200 mm at 600 mm centres. The unexposed surface of the floor comprised nominally 22 mm thick tongue and grooved chipboard flooring. 100 mm thick glass mineral wool insulation with a density of 6 kg/m<sup>3</sup> was fitted in the void between the joists to the exposed face. Resilient bar was fixed to the underside of the joists. The floor assembly was protected on its underside by two layers of 15 mm thick British Gypsum Fireline plasterboard which were fixed to the resilient bar.

The ceiling incorporated ten 'Orlight Limited' downlighter light fittings. The lights are referenced as follows:

| Test Ref. | Model Ref.   | Description                |
|-----------|--------------|----------------------------|
| A         | ORL1009      | Fixed Downlight            |
| B         | ORL1019      | Direction Downlight        |
| C         | ORL009       | Fixed Downlight            |
| D         | ORLCL        | Fixed IP54 Rated Downlight |
| E (1-2)   | AQUASPOT-FG  | Fixed IP65 Rated Downlight |
| F         | STEAMSPOT-FG | Fixed IP65 Rated Downlight |
| G         | SHOWERSPOT   | Fixed IP65-Rated Downlight |
| H         | ORL1005      | Fixed IP20 Rated Downlight |
| I         | ORL6009      | Fixed Downlight            |

The floor supported a uniformly distributed load of 1.5 kN/m<sup>2</sup>. This load was provided by the test sponsor as to represent the expected maximum working load for the floor construction in practice.

*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

## Loadbearing Capacity

This is the time in completed minutes for which the test specimen continues to maintain its ability to support the test load during the test. Support of the test load is determined by both the amount and the rate of deflection. The limiting deflection and the limiting rate of deflection for the specimen, as specified by the Standard, are calculated as:

| Criteria                                                           | Value        |
|--------------------------------------------------------------------|--------------|
| (L) Length of clear span, <i>in mm</i>                             | 4100         |
| (d) Depth of Structural Section, <i>in mm</i>                      | 253          |
| <b>Max Deflection (<math>L^2/400d</math>) - <i>in mm</i></b>       | <b>166.1</b> |
| <b>Rate (<math>L^2 / 9000d</math>) - <i>in mm/min</i></b>          | <b>7.4</b>   |
| <b>Max Deflection (<math>L^2/400d</math>) * 1.5 - <i>in mm</i></b> | <b>249.2</b> |

Failure to support the load is deemed to have occurred when a '**Measured Deflection**' greater than or equal to '**1.5 x Limiting Deflection**' is observed

Or

Both the '**Limiting rate of deflection**' and '**Limiting deflection**' are exceeded.

The criterion was satisfied for the **90-minute** test duration.

## 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
- subsequent failure of loadbearing capacity

**These requirements were satisfied for the periods shown below:**

## Sustained flaming

90 minutes\*

## Gap gauge

90 minutes\*

## Cotton pad

90 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

90 minutes No failure\*

\*Test duration. The test was discontinued after a period of 90 minutes.

## Date of Test

1<sup>st</sup> August 2020

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## Signatories

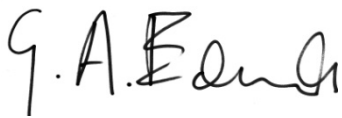
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Responsible Officer

**C. Sweeney\***

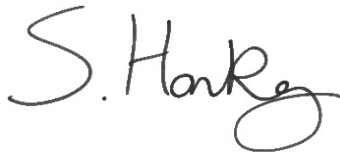
Technical Officer



Approved

**G. Edmonds\***

Senior Technical Officer



Head of Department

**S. Hankey\***

Business Unit Head – Fire Resistance

\* For and on behalf of **Warringtonfire**.Report Issued: 1<sup>st</sup> October 2020

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## Revision History

|                      |                |
|----------------------|----------------|
| Issue No:            | Re-issue Date: |
| Revised By:          | Approved By:   |
| Reason for Revision: |                |

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# Test Conditions

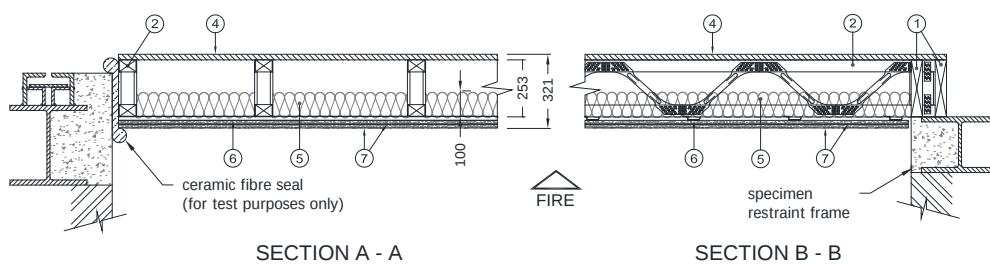
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|                                      |                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Standard</b>                      | <p>BS EN 1365-2: 2014, 'Fire resistance tests for loadbearing elements – Part 2: Floors and Roofs'</p> <p>The purpose of the test was to evaluate the performance of a timber floor construction protected by a ceiling of known fire resistance, when incorporating down lighter light fitting assemblies.</p>                                                                                         |
| <b>Sampling</b>                      | <p><b>Warringtonfire</b> was not involved in the sampling or selection of the tested specimen or any of the components.</p>                                                                                                                                                                                                                                                                             |
| <b>Installation</b>                  | <p>Representatives of <b>Warringtonfire</b> assembled the floor construction and installed the downlighters between the 29<sup>th</sup> and 31<sup>st</sup> July 2020.</p>                                                                                                                                                                                                                              |
| <b>Conditioning</b>                  | <p>The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of four 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 18.5°C to 30.5°C and 35% to 69.5% respectively.</p>                                                         |
| <b>Instruction to Test</b>           | <p>The test was conducted on the 1st August 2020 at the request of <b>Orlight Ltd</b>, the test sponsor.</p> <p>Mr. C. Kanji and Mr. P. Burke, representatives of the test sponsor witnessed the test.</p>                                                                                                                                                                                              |
| <b>Ambient Temperature</b>           | <p>The ambient air temperature in the vicinity of the test construction was 24°C at the start of the test with a maximum variation of +/-1°C during the test.</p>                                                                                                                                                                                                                                       |
| <b>Furnace</b>                       | <p>The furnace was controlled so that its mean temperature complied with the requirements of BS EN 1363-1: 2020 Clause 5.1 using eight plate thermometers, distributed over a plane 100 mm from the underside of test assembly.</p>                                                                                                                                                                     |
| <b>Thermocouples</b>                 | <p>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.</p>                                                                                                                     |
| <b>Application of the load</b>       | <p>The full test load was applied via dead load rams uniformly distributed over the test Specimen 60 minutes before the commencement of the test.</p>                                                                                                                                                                                                                                                   |
| <b>Loadbearing Capacity Criteria</b> | <p>A linear deflection transducer was provided at the approximate centre on the unexposed surface of the specimen to record its vertical deflection.</p>                                                                                                                                                                                                                                                |
| <b>Furnace Pressure</b>              | <p>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 100 mm below the soffit of the specimen was 18 (± 5) Pa between 5 and 10 minutes and 18 (± 3) Pa thereafter.</p> |

**Figure 1 - General plan view of test specimen showing thermocouple positions - Unexposed face**

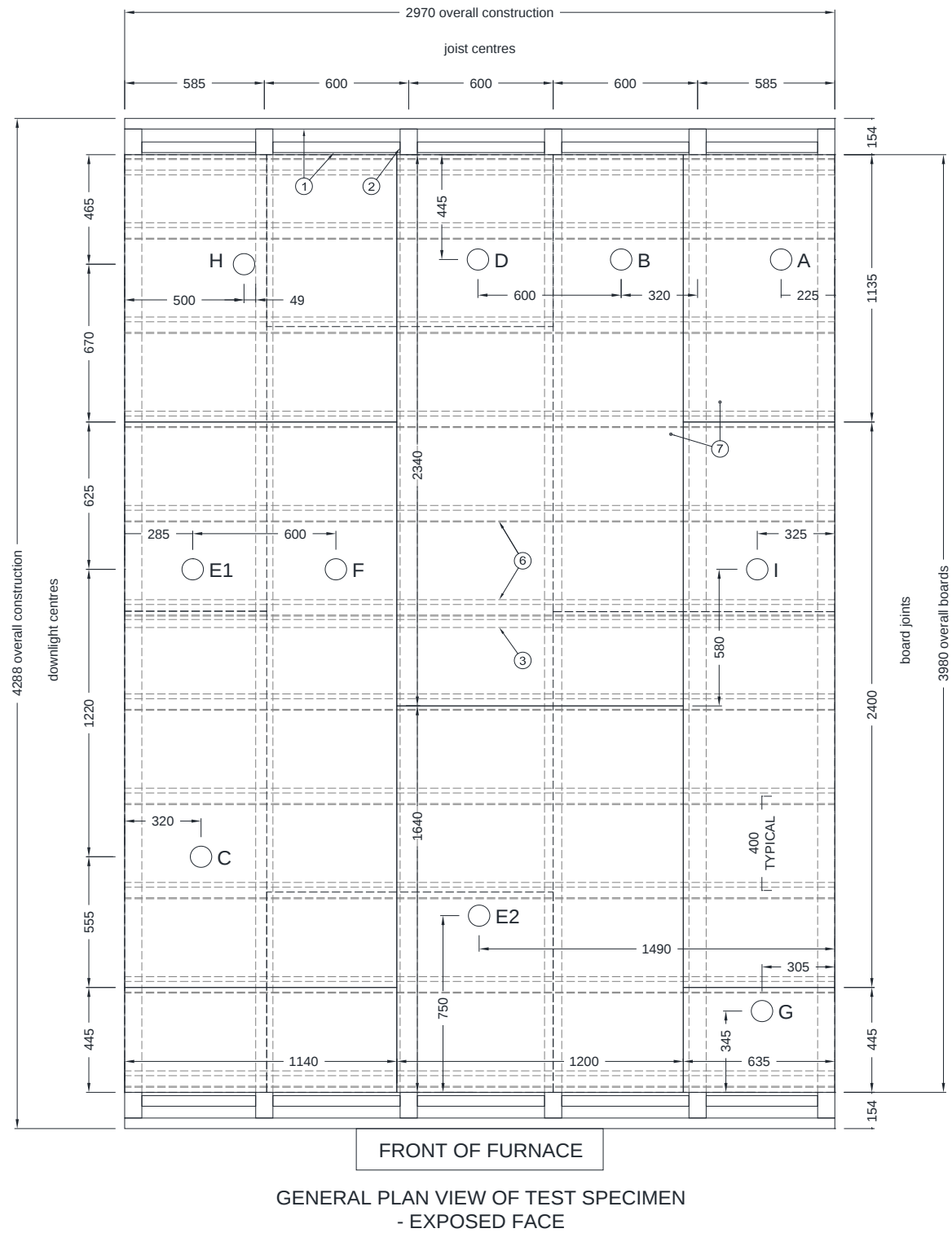


- Positions of surface thermocouples
- ⊗ Positions of minerally insulated thermocouples at mid-cavity, adjacent to each downlight

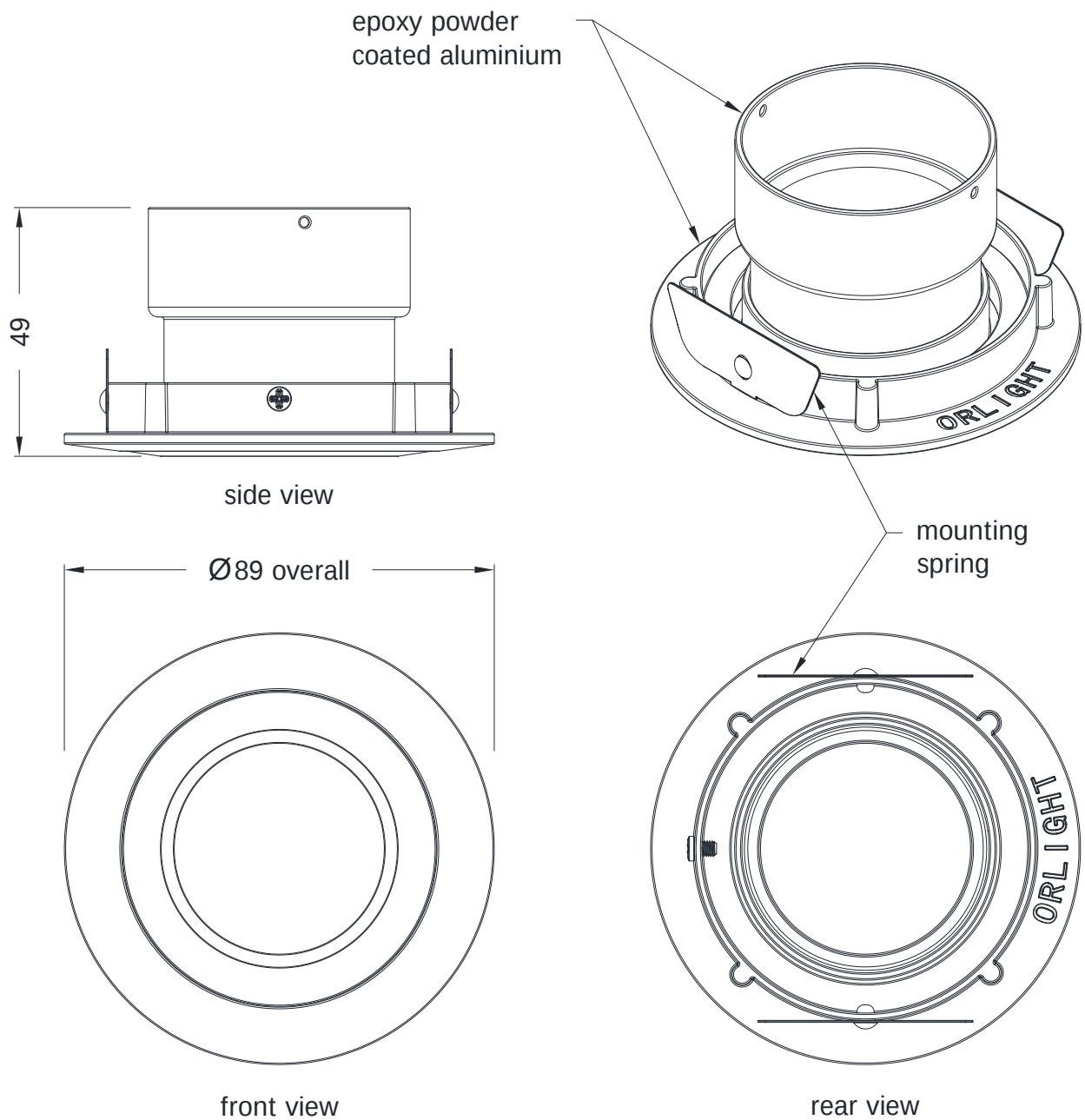


Do not scale. All dimensions are in mm

**Figure 2 – General plan view showing ceiling board layout & downlights 'A' to 'I' - Exposed face**

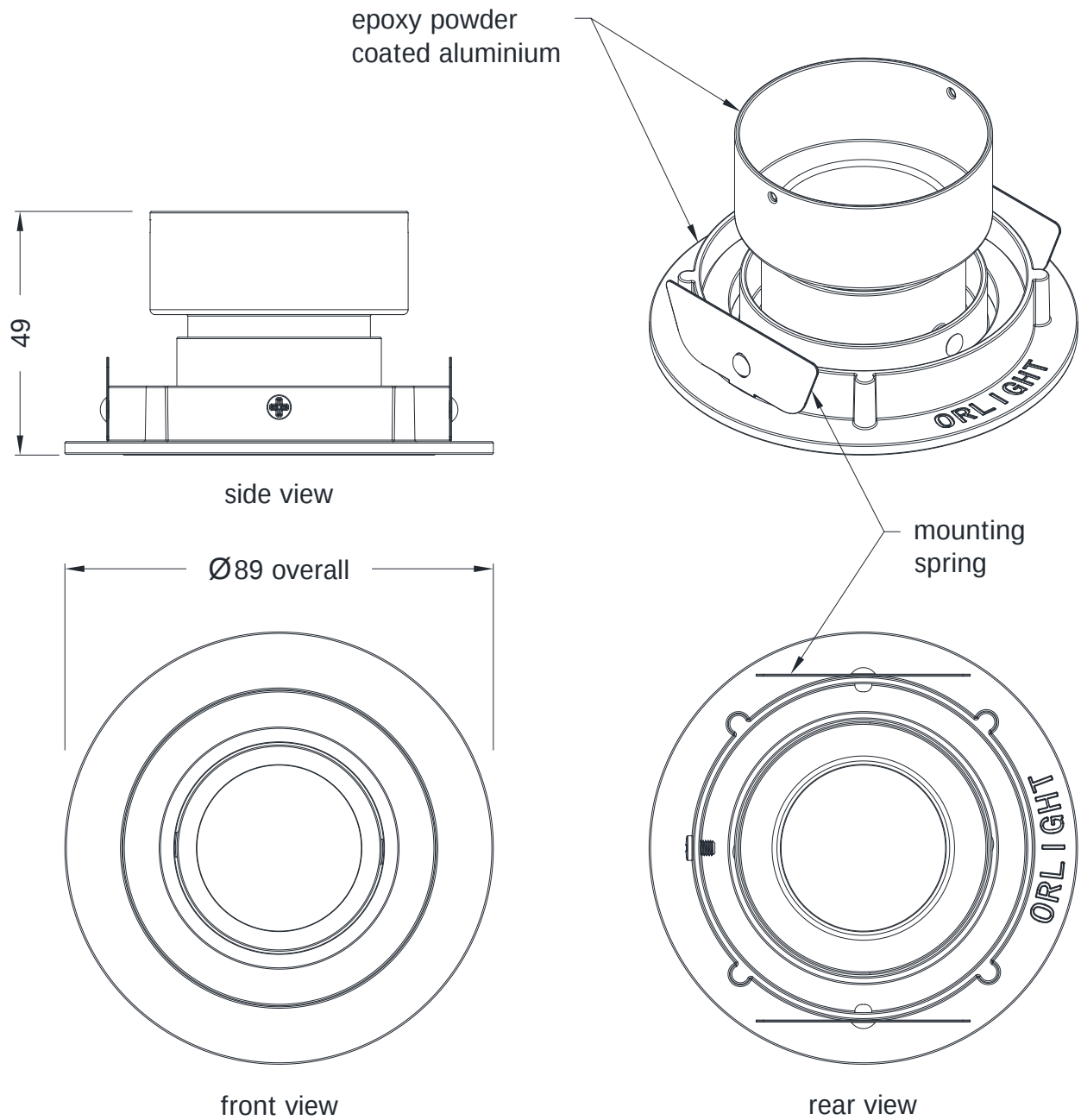


Do not scale. All dimensions are in mm

**Figure 3 – Details of Downlight A - ORL1009**

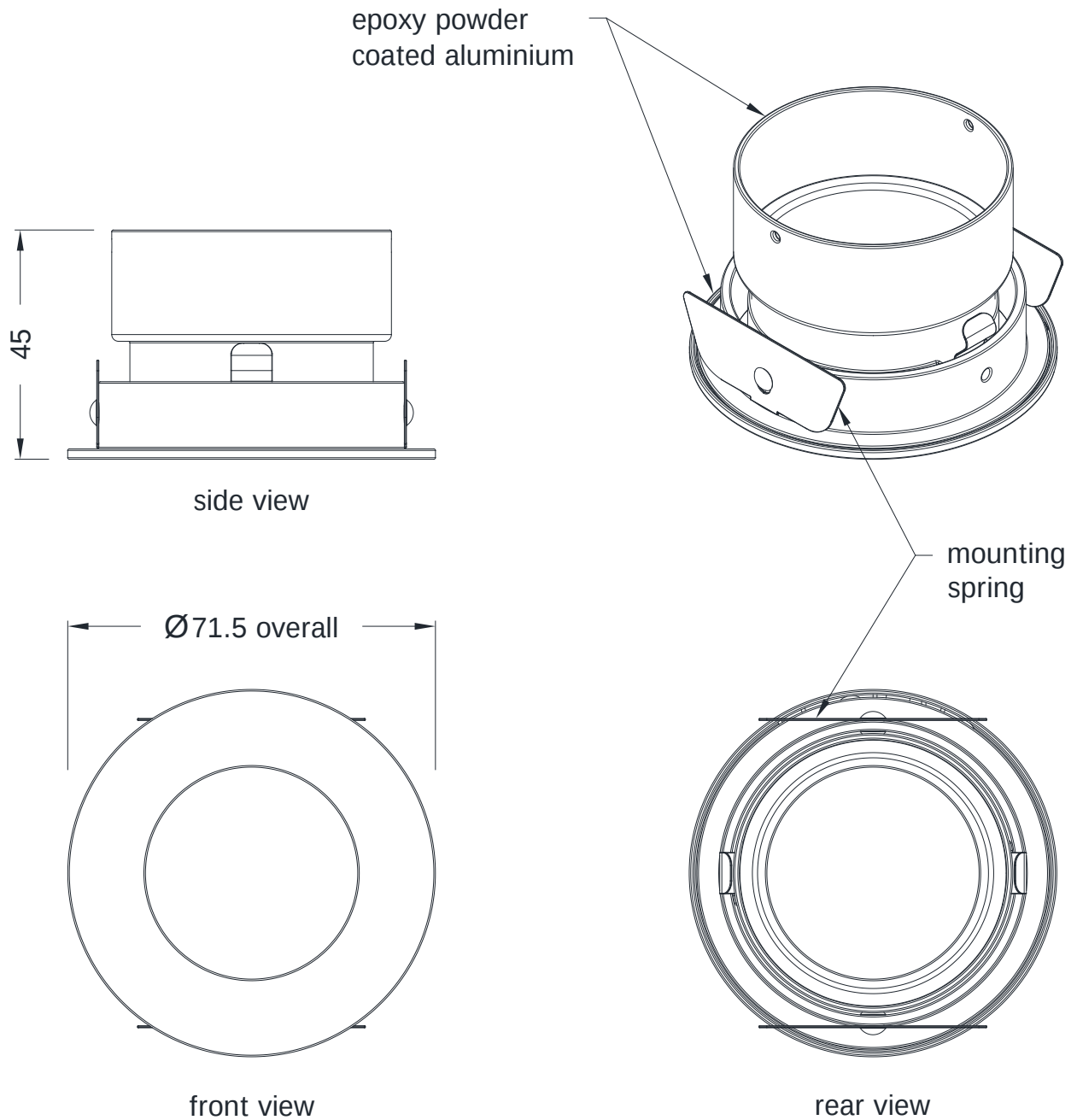
ORL1009

Do not scale. All dimensions are in mm

**Figure 4 – Details of Downlight B - ORL1019**

ORL1019

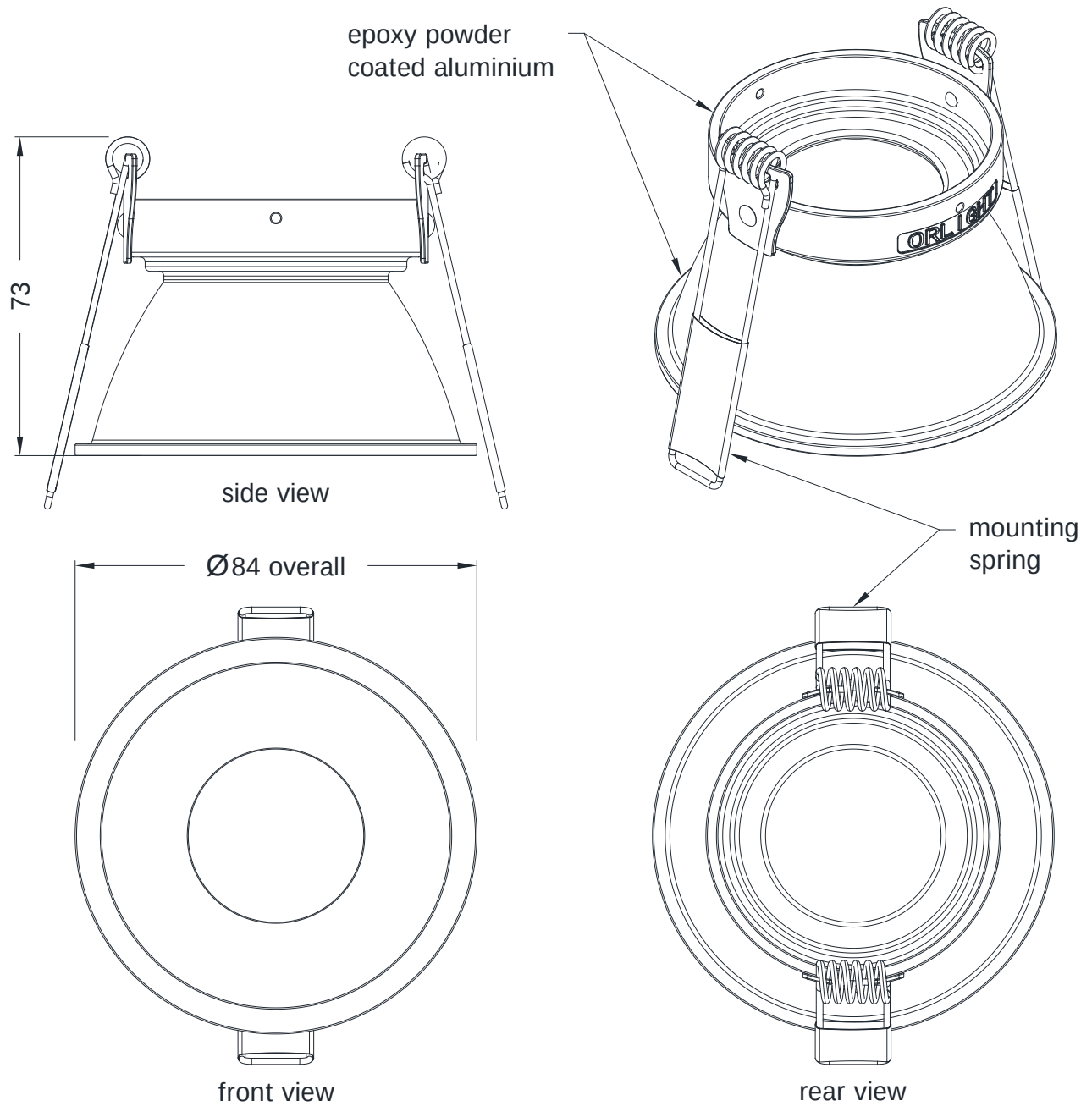
Do not scale. All dimensions are in mm

**Figure 5 – Details of Downlight C - ORL009**

ORL009

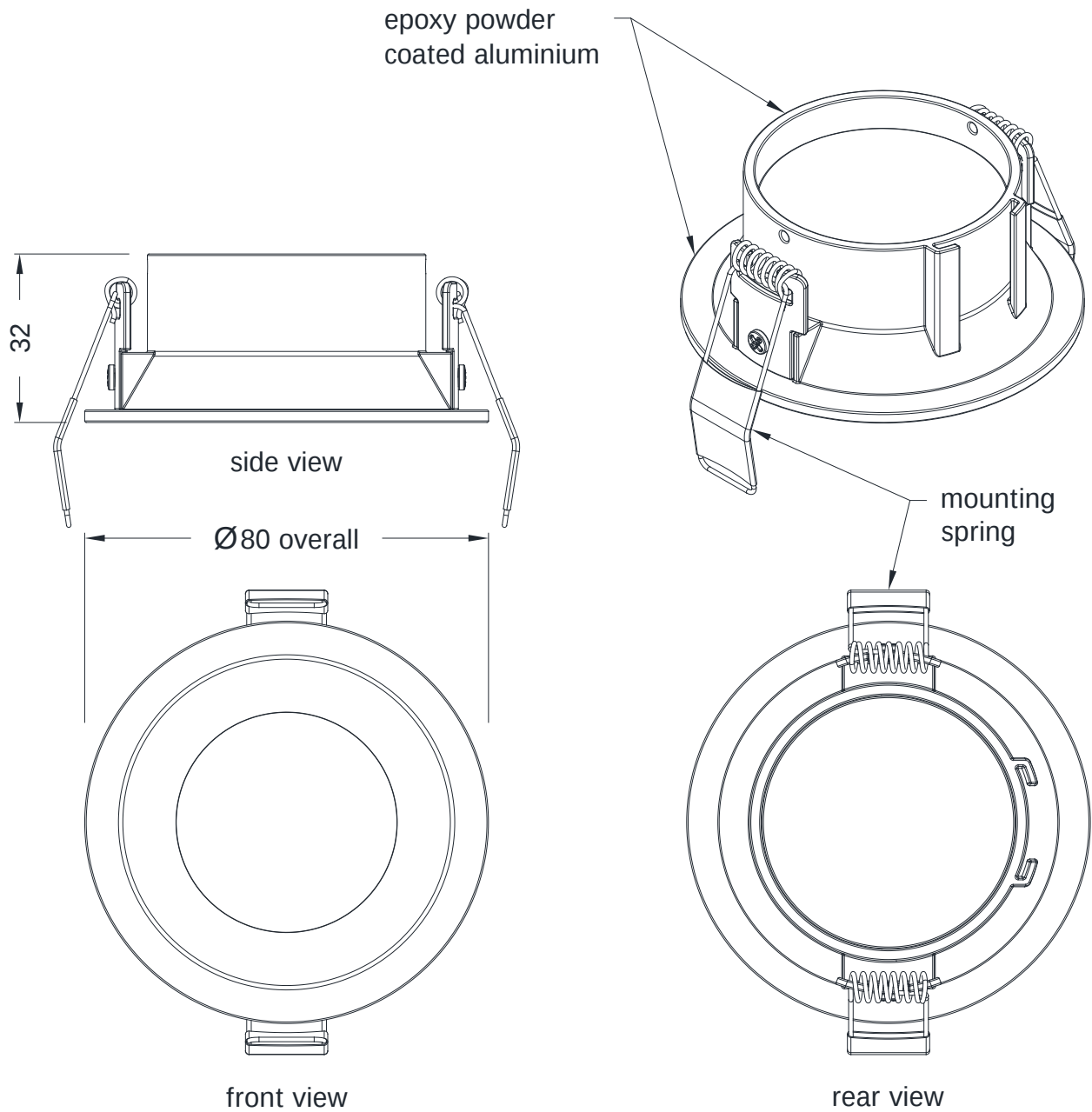
Do not scale. All dimensions are in mm

**Figure 6 – Details of Downlight D - ORLCL-IP54**

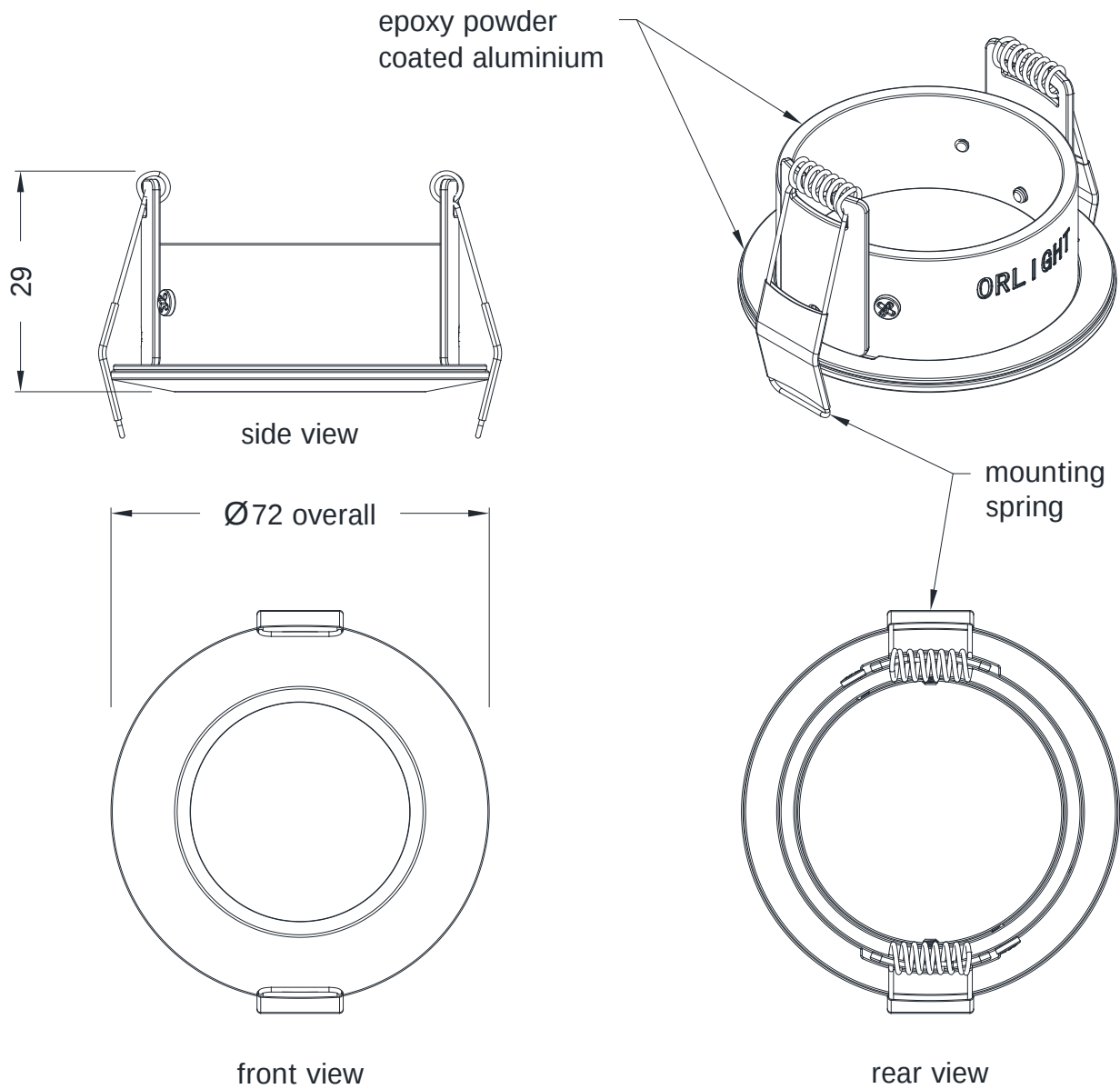


ORLCL-IP54

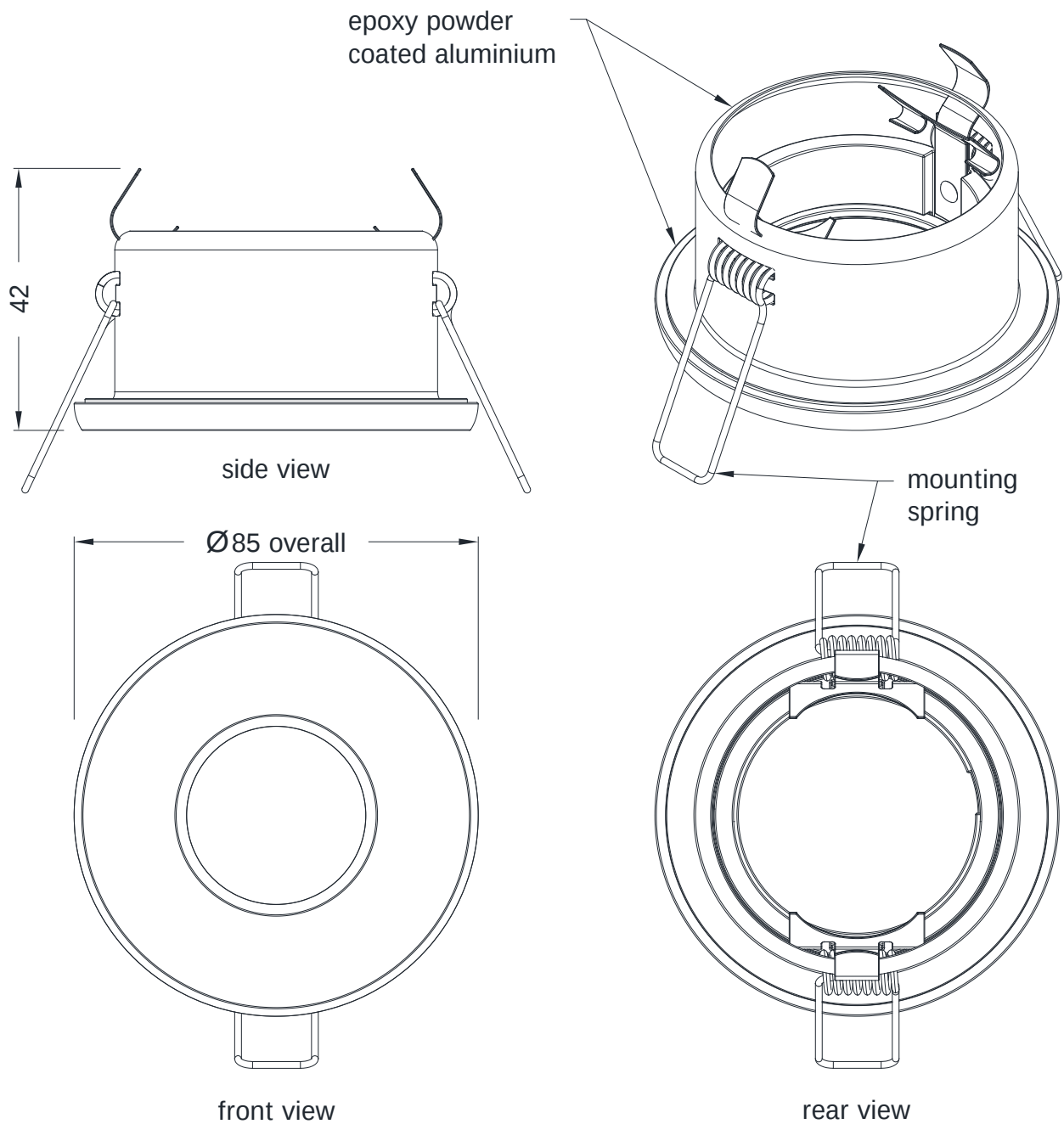
Do not scale. All dimensions are in mm

**Figure 7 – Details of Downlights E1 & E2 - AQUASPOT****AQUASPOT**

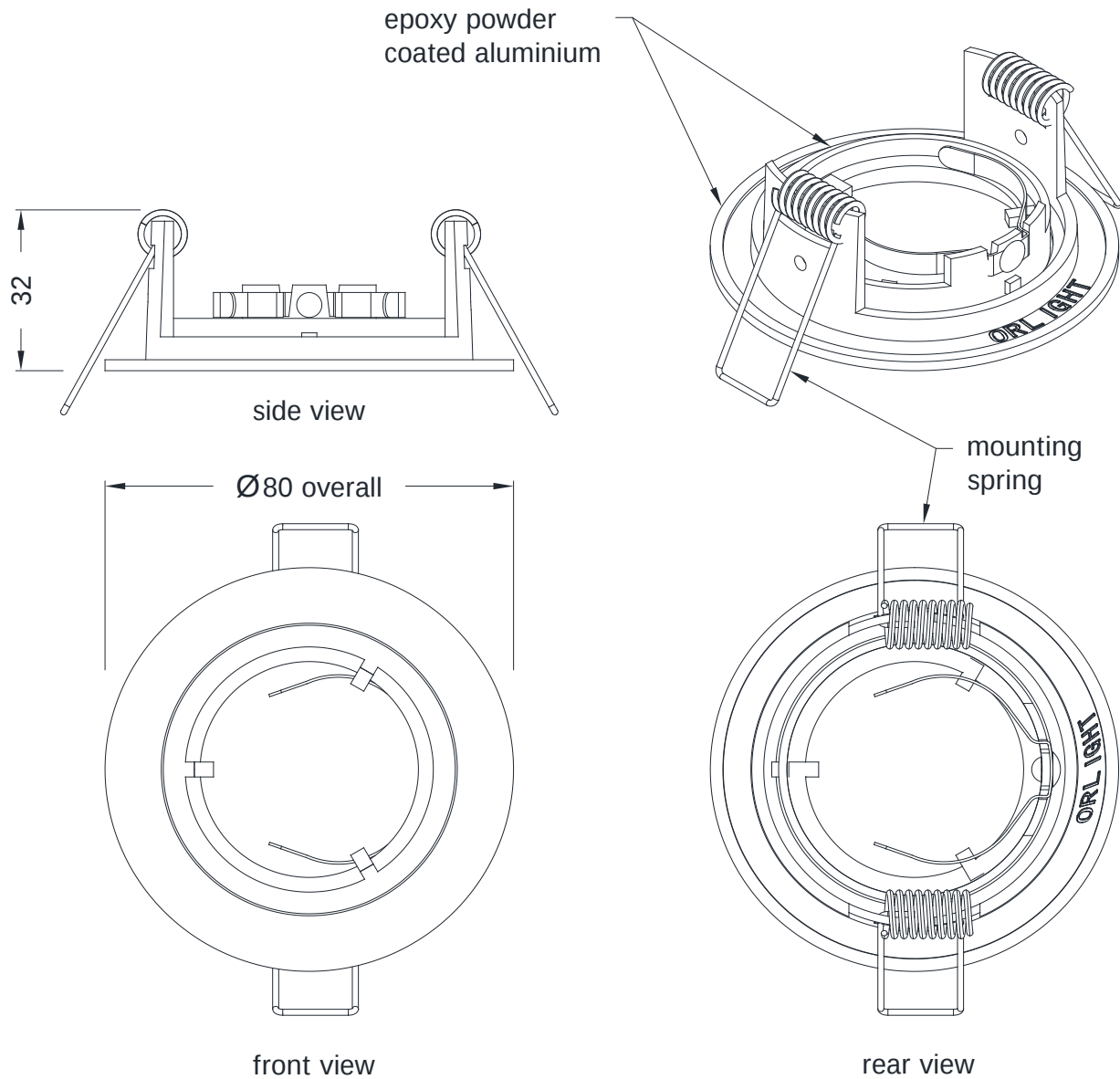
Do not scale. All dimensions are in mm

**Figure 8 – Details of Downlight F - STEAMSPOT****STEAMSPOT**

Do not scale. All dimensions are in mm

**Figure 9 – Details of Downlight G - SHOWERSPOT****SHOWERSPOT**

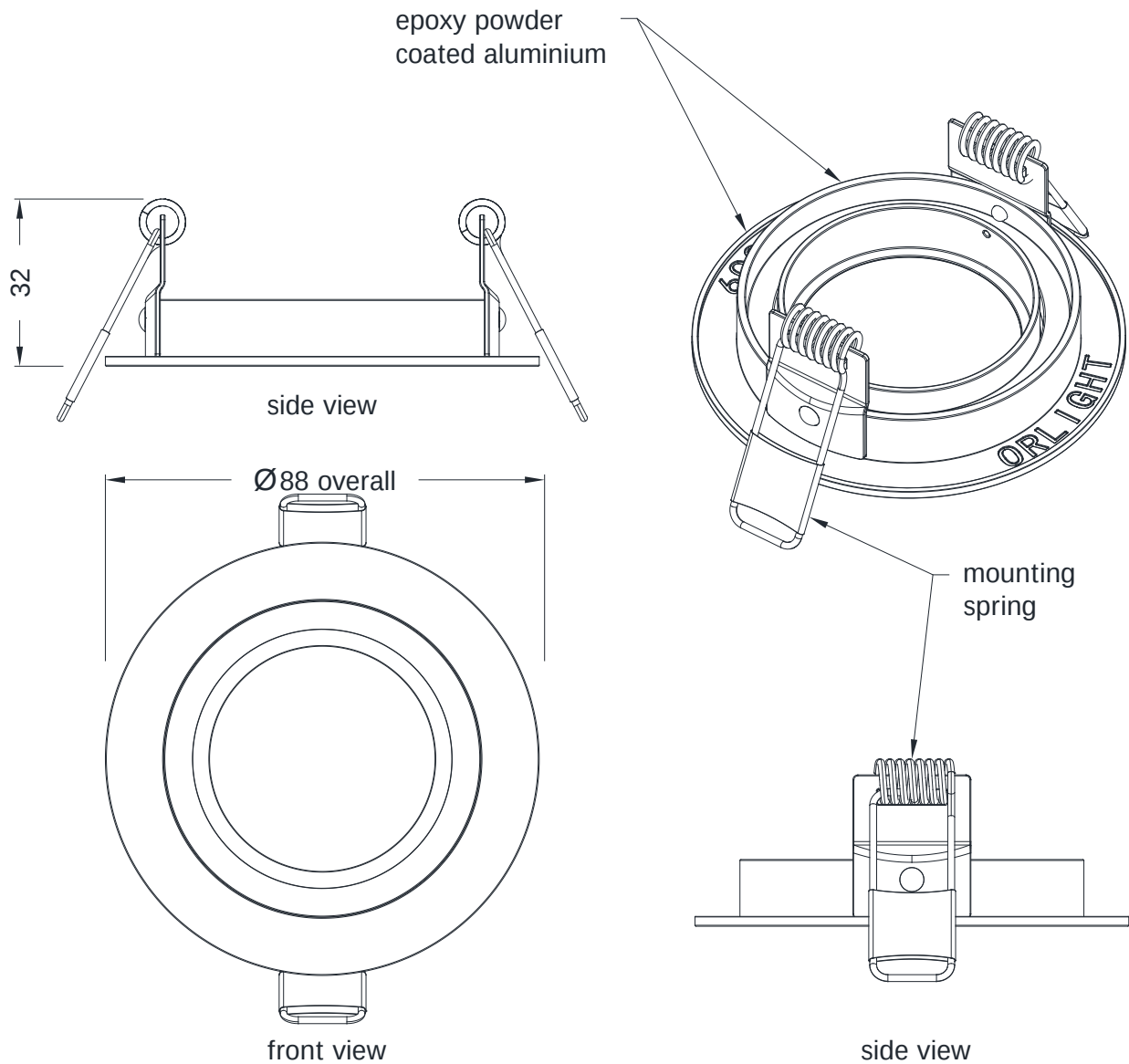
Do not scale. All dimensions are in mm

**Figure 10 – Details of Downlight H – ORL1005**

ORL1005

Do not scale. All dimensions are in mm

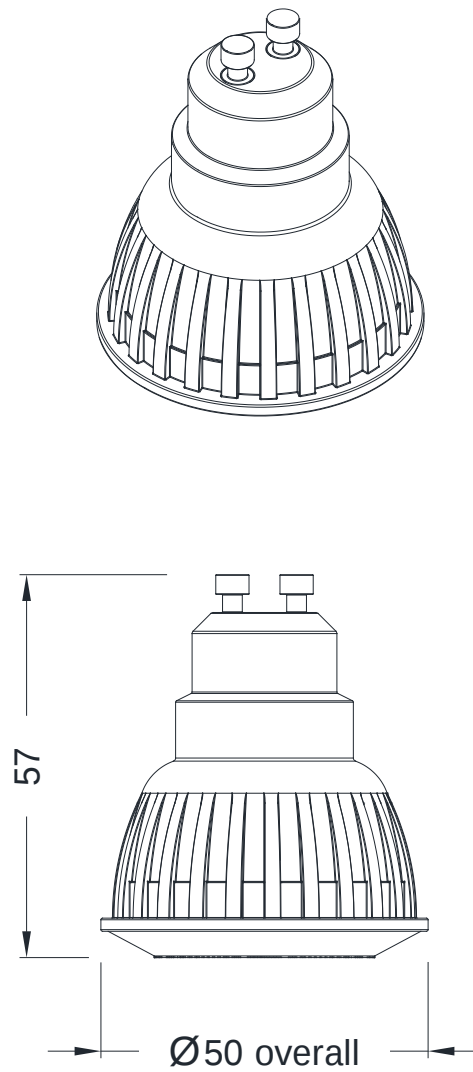
**Figure 11 – Details of Downlight I – ORL6009**



ORL6009

Do not scale. All dimensions are in mm

**Figure 12 – Details of LUMENPLUS 3 lamp**



**LUMENPLUS 3**

Do not scale. All dimensions are in mm

# Schedule of Components

(Refer to Figures 1 to 12)

(All values are nominal unless stated otherwise)

(All other details are as stated by the sponsor)

| <u>Item</u>                           | <u>Description</u>                                                                                                                                  |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1. End beams &amp; end noggins</b> |                                                                                                                                                     |
| Manufacturer                          | : Mitek                                                                                                                                             |
| Reference                             | : Glulam                                                                                                                                            |
| Material                              | : Glue laminated timber                                                                                                                             |
| Section size                          | : 44 mm wide x 253 mm deep                                                                                                                          |
| Density                               | : 491 kg/m <sup>3</sup> (measured)                                                                                                                  |
| Fixing method                         | : Through fixed to joists with two nails to top and bottom flanges at each joist joint and two nails to top and bottom flanges at each noggin joint |
| Fixings                               |                                                                                                                                                     |
| i. type                               | : Ring shank nails                                                                                                                                  |
| ii. size                              | : 100 mm long x 3.4 mm diameter                                                                                                                     |
| <b>2. Posi-Joists</b>                 |                                                                                                                                                     |
| Manufacturer                          | : Mitek                                                                                                                                             |
| Reference                             | : PS1                                                                                                                                               |
| Assembled joist size                  | : 72 mm wide x 253 mm deep x 4200 mm long                                                                                                           |
| Top and bottom chords                 |                                                                                                                                                     |
| i. material                           | : TR26 grade European whitewood                                                                                                                     |
| ii. density                           | : 450 kg/m <sup>3</sup> (stated)                                                                                                                    |
| iii. cross section                    | : 72 mm horizontal x 46 mm vertical x 4200 mm long                                                                                                  |
| End and Internal Blocks               |                                                                                                                                                     |
| i. material                           | : TR26 grade European whitewood                                                                                                                     |
| ii. density                           | : 450 kg/m <sup>3</sup> (stated)                                                                                                                    |
| iii. cross section                    | : 72 mm horizontal x 46 mm vertical x 159 mm long                                                                                                   |
| Metal Webs                            |                                                                                                                                                     |
| i. reference                          | : Mitek PS10 webs                                                                                                                                   |
| ii. material                          | : Galvanised mild steel                                                                                                                             |
| iii. section size                     | : 232 mm high x 302.5 mm long x 1.0 mm thick, 12 off each side of joist                                                                             |
| iv. fixing method                     | : Fitted between top and bottom chords and fixed via integral nailplate                                                                             |
| Centres                               | : 600 mm                                                                                                                                            |
| <b>3. Strongback</b>                  |                                                                                                                                                     |
| Material                              | : Softwood (Grade TR26)                                                                                                                             |
| Section size                          | : 34 mm deep x 120 mm wide.                                                                                                                         |
| Density                               | : 481 kg/m <sup>3</sup> (measured)                                                                                                                  |
| Fixing method                         | : Fitted at 90° to joists and nailed into internal blocks near midspan                                                                              |
| Fixings                               |                                                                                                                                                     |
| i. type                               | : Ring shank nails                                                                                                                                  |
| ii. size                              | : 100 mm long x 3.4 mm diameter                                                                                                                     |

**Item****Description****4. Floorboards**

|               |   |                                                           |
|---------------|---|-----------------------------------------------------------|
| Manufacturer  | : | Egger                                                     |
| Reference     | : | Egger P5                                                  |
| Material      | : | Chipboard (tongue & groove)                               |
| Thickness     | : | 22 mm                                                     |
| Density       | : | 679 kg/m <sup>3</sup> (measured)                          |
| Fixing method | : | Through fixed to timber framework with nails and adhesive |
| Fixings       |   |                                                           |
| i. type       | : | Ring shank nails                                          |
| ii. size      | : | 65 mm long x 3.25 mm diameter                             |
| iii. centres  | : | 600 mm (in centre of each board on each joist)            |
| Adhesive      |   |                                                           |
| i. reference  | : | Harmony Timber Solutions Limited                          |
| ii. type      | : | D4 PU Adhesive                                            |

**5. Insulation**

|               |   |                                                               |
|---------------|---|---------------------------------------------------------------|
| Manufacturer  | : | Knauf                                                         |
| Reference     | : | SK Loft Roll 44 CC                                            |
| Material      | : | Glass mineral wool                                            |
| Thickness     | : | 100 mm (uncompressed)                                         |
| Density       | : | 6 kg/m <sup>3</sup> (measured)                                |
| Fixing method | : | Cut to size and fitted between the joists to the exposed face |

**6. Resilient bar**

|                 |   |                                                                                 |
|-----------------|---|---------------------------------------------------------------------------------|
| Manufacturer    | : | British Gypsum                                                                  |
| Reference       | : | RB1 Resilient bar                                                               |
| Material        | : | Galvanised steel                                                                |
| Thickness       | : | 0.75 mm                                                                         |
| Section size    | : | 69 mm wide x 16 mm deep                                                         |
| Fixing method   | : | Through fixed to timber framework to exposed face with a single screw per joint |
| Fixings         |   |                                                                                 |
| i. manufacturer | : | British Gypsum                                                                  |
| ii. reference   | : | 35 mm Drywall Screws                                                            |
| iii. type       | : | Black phosphate coated steel                                                    |
| iv. size        | : | 35 mm long x 3.5 mm diameter                                                    |
| v. centres      | : | 400 mm                                                                          |

| <b><u>Item</u></b>          | <b><u>Description</u></b>                                                                                                                                                    |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>7. Ceiling boards</b>    |                                                                                                                                                                              |
| Manufacturer                | : British Gypsum                                                                                                                                                             |
| Reference                   | : Gyproc FireLine SE                                                                                                                                                         |
| Material                    | : Gypsum plasterboard with glass fibre and additional additives                                                                                                              |
| Thickness                   | : 30 mm (2 layers of 15 mm)                                                                                                                                                  |
| Density                     | : 812 kg/m <sup>3</sup> (measured)                                                                                                                                           |
| Fixing method               | : Through fixed to resilient bars with screws. Board joints were staggered                                                                                                   |
| Fixings (inner layer)       |                                                                                                                                                                              |
| i. manufacturer             | : Siniat                                                                                                                                                                     |
| ii. reference               | : GTEC Self-Drilling Screws 25DSD1000                                                                                                                                        |
| iii. type                   | : Zinc plated steel screws                                                                                                                                                   |
| iv. size                    | : 25 mm long x 3.5 mm diameter                                                                                                                                               |
| v. centres                  | : 230 mm (edge), 230 mm (field)                                                                                                                                              |
| Fixings (outer layer)       |                                                                                                                                                                              |
| i. manufacturer             | : Siniat                                                                                                                                                                     |
| ii. reference               | : GTEC Self-Drilling Screws 42DSD1000                                                                                                                                        |
| iii. type                   | : Zinc plated steel screws                                                                                                                                                   |
| iv. size                    | : 42 mm long x 3.5 mm diameter                                                                                                                                               |
| v. centres                  | : 230 mm (edge), 230 mm (field)                                                                                                                                              |
| Tape                        |                                                                                                                                                                              |
| i. manufacturer             | : Siniat                                                                                                                                                                     |
| ii. reference               | : GTEC Joint Tape                                                                                                                                                            |
| Filler                      |                                                                                                                                                                              |
| i. manufacturer             | : British Gypsum                                                                                                                                                             |
| ii. reference               | : Gyproc Easyfill 60                                                                                                                                                         |
| <b>8. Downlight A</b>       |                                                                                                                                                                              |
| Manufacturer                | : Orlight Limited                                                                                                                                                            |
| Reference                   | : ORL1009                                                                                                                                                                    |
| Description                 | : Fixed downlight with anti-glare baffle and magnetic lamp change mechanism. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 3)                             |
| Material                    | : Aluminium                                                                                                                                                                  |
| Overall sizes               |                                                                                                                                                                              |
| i. height (excluding lamp)  | : 49 mm                                                                                                                                                                      |
| ii. height (including lamp) | : 103 mm                                                                                                                                                                     |
| iii. overall diameter       | : 89 mm                                                                                                                                                                      |
| iv. cut-out diameter        | : 78 mm                                                                                                                                                                      |
| <b>9. Downlight B</b>       |                                                                                                                                                                              |
| Manufacturer                | : Orlight Limited                                                                                                                                                            |
| Reference                   | : ORL1019                                                                                                                                                                    |
| Description                 | : Directional downlight with anti-glare baffle, magnetic lamp change and spring blade fitting mechanism. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 4) |
| Material                    | : Aluminium                                                                                                                                                                  |
| Overall sizes               |                                                                                                                                                                              |
| i. height (excluding lamp)  | : 49 mm                                                                                                                                                                      |
| ii. height (including lamp) | : 117 mm                                                                                                                                                                     |
| iii. overall diameter       | : 89 mm                                                                                                                                                                      |
| iv. cut-out diameter        | : 78 mm                                                                                                                                                                      |

**Item****Description****10. Downlight C**

|                             |   |                                                                                                             |
|-----------------------------|---|-------------------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                             |
| Reference                   | : | ORL009                                                                                                      |
| Description                 | : | Fixed downlight with anti-glare baffle. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 5) |
| Material                    | : | Aluminium                                                                                                   |
| Overall sizes               | : |                                                                                                             |
| i. height (excluding lamp)  | : | 45 mm                                                                                                       |
| ii. height (including lamp) | : | 103 mm                                                                                                      |
| iii. overall diameter       | : | 71.5 mm                                                                                                     |
| iv. cut-out diameter        | : | 64 mm                                                                                                       |

**11. Downlight D**

|                             |   |                                                                                                 |
|-----------------------------|---|-------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                 |
| Reference                   | : | ORLCL                                                                                           |
| Description                 | : | Fixed IP54-rated downlight. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 6) |
| Material                    | : | Aluminium                                                                                       |
| Overall sizes               | : |                                                                                                 |
| i. height (excluding lamp)  | : | 73 mm                                                                                           |
| ii. height (including lamp) | : | 113 mm                                                                                          |
| iii. overall diameter       | : | 84 mm                                                                                           |
| iv. cut-out diameter        | : | 78 mm                                                                                           |

**12. Downlights E1 & E2**

|                             |   |                                                                                                 |
|-----------------------------|---|-------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                 |
| Reference                   | : | AQUASPOT-FG                                                                                     |
| Description                 | : | Fixed IP65-rated downlight. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 7) |
| Material                    | : | Aluminium                                                                                       |
| Overall sizes               | : |                                                                                                 |
| i. height (excluding lamp)  | : | 32 mm                                                                                           |
| ii. height (including lamp) | : | 95 mm                                                                                           |
| iii. overall diameter       | : | 80 mm                                                                                           |
| iv. cut-out diameter        | : | 72 mm                                                                                           |

**13. Downlight F**

|                             |   |                                                                                                 |
|-----------------------------|---|-------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                 |
| Reference                   | : | STEAMSPOT-FG                                                                                    |
| Description                 | : | Fixed IP65-rated downlight. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 8) |
| Material                    | : | Aluminium                                                                                       |
| Overall sizes               | : |                                                                                                 |
| i. height (excluding lamp)  | : | 29 mm                                                                                           |
| ii. height (including lamp) | : | 75 mm                                                                                           |
| iii. overall diameter       | : | 72 mm                                                                                           |
| iv. cut-out diameter        | : | 68 mm                                                                                           |

**Item****Description****14. Downlight G**

|                             |   |                                                                                                 |
|-----------------------------|---|-------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                 |
| Reference                   | : | SHOWERSPOT                                                                                      |
| Description                 | : | Fixed IP65-rated downlight. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (see Figure 9) |
| Material                    | : | Aluminium                                                                                       |
| Overall sizes               | : |                                                                                                 |
| i. height (excluding lamp)  | : | 42 mm                                                                                           |
| ii. height (including lamp) | : | 78 mm                                                                                           |
| iii. overall diameter       | : | 85 mm                                                                                           |
| iv. cut-out diameter        | : | 72 mm                                                                                           |

**15. Downlight H**

|                             |   |                                                                                                  |
|-----------------------------|---|--------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                  |
| Reference                   | : | ORL1005                                                                                          |
| Description                 | : | Fixed IP20-rated downlight. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 10) |
| Material                    | : | Aluminium                                                                                        |
| Overall sizes               | : |                                                                                                  |
| i. height (excluding lamp)  | : | 32 mm                                                                                            |
| ii. height (including lamp) | : | 66 mm                                                                                            |
| iii. overall diameter       | : | 80 mm                                                                                            |
| iv. cut-out diameter        | : | 70 mm                                                                                            |

**16. Downlight I**

|                             |   |                                                                                                                                       |
|-----------------------------|---|---------------------------------------------------------------------------------------------------------------------------------------|
| Manufacturer                | : | Orlight Limited                                                                                                                       |
| Reference                   | : | ORL6009                                                                                                                               |
| Description                 | : | Fixed downlight with anti-glare baffle and magnetic lamp change. Fitted with Lumenplus 3 (LP3) 7W LED lamp (item 17). (See Figure 11) |
| Material                    | : | Steel / Magnetic Suspension                                                                                                           |
| Overall sizes               | : |                                                                                                                                       |
| i. height (excluding lamp)  | : | 32 mm                                                                                                                                 |
| ii. height (including lamp) | : | 68 mm                                                                                                                                 |
| iii. overall diameter       | : | 88 mm                                                                                                                                 |
| iv. cut-out diameter        | : | 80 mm                                                                                                                                 |

**17. Lamp**

|              |   |                                             |
|--------------|---|---------------------------------------------|
| Manufacturer | : | Orlight Limited                             |
| Reference    | : | Lumenplus 3 (LP3) 7W LED lamp               |
| Overall size | : | 57 mm high x 50 mm diameter (See Figure 12) |

# Test Observations

| Time |      | All observations are from the exposed face unless noted otherwise.                                                      |
|------|------|-------------------------------------------------------------------------------------------------------------------------|
| mins | secs |                                                                                                                         |
| -60  | 00   | <b>Load applied.</b>                                                                                                    |
| 00   | 00   | <b>The test commences.</b>                                                                                              |
| 04   | 30   | The tape and jointing work is burning/falling away.                                                                     |
| 06   | 00   | Light fitting E1 is hanging from the ceiling. The paper face of the plasterboard is glowing/burning away.               |
| 07   | 00   | Light fitting G is hanging from the ceiling and flaming.                                                                |
| 15   | 00   | Flaming and distortion at light fitting B.                                                                              |
| 17   | 00   | The plasterboard ceiling is glowing red.                                                                                |
| 24   | 30   | Flaming and distortion at light fitting D.                                                                              |
| 25   | 00   | Flaming and distortion at light fittings E2 and C.                                                                      |
| 27   | 00   | Gaps between the long edges of the first layer of plasterboard have opened to around 5 mm.                              |
| 29   | 00   | Distortion at light fitting I.                                                                                          |
| 33   | 00   | Gaps between the long edges of the first layer of plasterboard have opened to around 10 mm.                             |
| 35   | 00   | Distortion and flaming continue at light fitting C.                                                                     |
| 36   | 00   | Heavy flaming at light fitting E2 as the specimen hangs from the ceiling.                                               |
| 37   | 00   | The long edges of the first layer of plasterboard begin to ripple, flames come through the gaps at the joist positions. |
| 38   | 00   | Light fitting E2 falls from the ceiling.                                                                                |
| 44   | 00   | Light fittings E1 and F have fallen from the ceiling.                                                                   |
| 65   | 00   | Gaps between the long edges of the first layer of plasterboard have opened to around 30 mm, as the boards begin to sag. |
| 69   | 00   | The central section of the first layer of plasterboard is coming away in one corner.                                    |
| 72   | 00   | Flaming coming through the hole left by light fitting E2.                                                               |

**Time****mins    secs**

|           |           |                                                                                                                                            |
|-----------|-----------|--------------------------------------------------------------------------------------------------------------------------------------------|
| <b>73</b> | <b>00</b> | Sections of the first layer of plasterboard begin to fall.                                                                                 |
| <b>76</b> | <b>00</b> | More of the first layer of plasterboard falls. Flaming in the centre of the ceiling, cracks appearing in the second layer of plasterboard. |
| <b>80</b> | <b>00</b> | 20 mm gaps between the plasterboard joints in the second layer, heavy flaming at joist positions.                                          |
| <b>82</b> | <b>00</b> | Floor beginning to creak.                                                                                                                  |
| <b>86</b> | <b>00</b> | Smoke release from the floorboard joints when viewed from the unexposed face, creaking increases.                                          |
| <b>87</b> | <b>00</b> | Intense flaming in the furnace as the second layer of plasterboard begins to fall away in places.                                          |
| <b>90</b> | <b>00</b> | <b>Test discontinued at sponsors request.</b>                                                                                              |

## Test Photographs

The exposed face of the floor assembly prior to test



The unexposed face of the floor assembly prior to test



The unexposed face of the floor assembly after 30 minutes of testing



The unexposed face of the floor assembly after 60 minutes of testing



The unexposed  
face of the floor  
assembly after 90  
minutes of testing



## Temperature, Pressure and Deflection Data

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

| Time<br>Mins | Specified<br>Furnace<br>Temperature<br>Deg. C | Actual<br>Furnace<br>Temperature<br>Deg. C |
|--------------|-----------------------------------------------|--------------------------------------------|
| 0            | 20                                            | 43                                         |
| 3            | 502                                           | 505                                        |
| 6            | 603                                           | 596                                        |
| 9            | 663                                           | 660                                        |
| 12           | 706                                           | 704                                        |
| 15           | 739                                           | 745                                        |
| 18           | 766                                           | 766                                        |
| 21           | 789                                           | 785                                        |
| 24           | 809                                           | 811                                        |
| 27           | 826                                           | 828                                        |
| 30           | 842                                           | 845                                        |
| 33           | 856                                           | 860                                        |
| 36           | 869                                           | 875                                        |
| 39           | 881                                           | 888                                        |
| 42           | 892                                           | 899                                        |
| 45           | 902                                           | 909                                        |
| 48           | 912                                           | 916                                        |
| 51           | 921                                           | 924                                        |
| 54           | 930                                           | 932                                        |
| 57           | 938                                           | 941                                        |
| 60           | 945                                           | 949                                        |
| 63           | 953                                           | 958                                        |
| 66           | 960                                           | 965                                        |
| 69           | 966                                           | 970                                        |
| 72           | 973                                           | 975                                        |
| 75           | 979                                           | 982                                        |
| 78           | 985                                           | 990                                        |
| 81           | 990                                           | 996                                        |
| 84           | 996                                           | 1007                                       |
| 87           | 1001                                          | 1031                                       |
| 90           | 1006                                          | 1027                                       |

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

| Time<br>Mins | T/C<br>Number<br>211<br>Deg. C | T/C<br>Number<br>212<br>Deg. C | T/C<br>Number<br>213<br>Deg. C | T/C<br>Number<br>214<br>Deg. C | T/C<br>Number<br>215<br>Deg. C | Mean<br>Temp<br>Deg. C |
|--------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|------------------------|
| 0            | 25                             | 25                             | 26                             | 26                             | 25                             | 25                     |
| 3            | 25                             | 25                             | 26                             | 26                             | 25                             | 25                     |
| 6            | 25                             | 25                             | 26                             | 26                             | 25                             | 25                     |
| 9            | 25                             | 25                             | 26                             | 26                             | 25                             | 25                     |
| 12           | 26                             | 26                             | 26                             | 27                             | 25                             | 26                     |
| 15           | 28                             | 26                             | 26                             | 27                             | 26                             | 27                     |
| 18           | 33                             | 28                             | 27                             | 29                             | 28                             | 29                     |
| 21           | 40                             | 30                             | 29                             | 31                             | 31                             | 32                     |
| 24           | 49                             | 32                             | 31                             | 33                             | 33                             | 36                     |
| 27           | 58                             | 34                             | 33                             | 35                             | 35                             | 39                     |
| 30           | 66                             | 36                             | 34                             | 37                             | 37                             | 42                     |
| 33           | 74                             | 38                             | 36                             | 39                             | 39                             | 45                     |
| 36           | 78                             | 40                             | 37                             | 41                             | 41                             | 47                     |
| 39           | 80                             | 42                             | 39                             | 43                             | 42                             | 49                     |
| 42           | 82                             | 43                             | 40                             | 44                             | 44                             | 51                     |
| 45           | 82                             | 44                             | 41                             | 46                             | 45                             | 52                     |
| 48           | 83                             | 45                             | 42                             | 49                             | 46                             | 53                     |
| 51           | 84                             | 46                             | 42                             | 51                             | 47                             | 54                     |
| 54           | 85                             | 46                             | 43                             | 54                             | 47                             | 55                     |
| 57           | 86                             | 47                             | 43                             | 57                             | 48                             | 56                     |
| 60           | 87                             | 48                             | 44                             | 62                             | 48                             | 58                     |
| 63           | 89                             | 48                             | 44                             | 66                             | 49                             | 59                     |
| 66           | 90                             | 49                             | 44                             | 72                             | 49                             | 61                     |
| 69           | 92                             | 49                             | 44                             | 78                             | 49                             | 62                     |
| 72           | 93                             | 49                             | 44                             | 82                             | 49                             | 63                     |
| 75           | 95                             | 49                             | 45                             | 83                             | 49                             | 64                     |
| 78           | 97                             | 49                             | 45                             | 84                             | 49                             | 65                     |
| 81           | 99                             | 49                             | 45                             | 86                             | 50                             | 66                     |
| 84           | 100                            | 49                             | 46                             | 88                             | 50                             | 67                     |
| 87           | 101                            | 50                             | 48                             | 91                             | 51                             | 68                     |
| 90           | 102                            | 52                             | 54                             | 95                             | 53                             | 71                     |

**Individual Temperatures Recorded On The Unexposed Surface Of The Specimen Adjacent to Joints**

| Time<br>Mins | T/C<br>Number<br>216<br>Deg. C | T/C<br>Number<br>217<br>Deg. C | T/C<br>Number<br>218<br>Deg. C | T/C<br>Number<br>219<br>Deg. C | T/C<br>Number<br>220<br>Deg. C | T/C<br>Number<br>221<br>Deg. C |
|--------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 0            | 25                             | 25                             | 25                             | 25                             | 26                             | 26                             |
| 3            | 25                             | 25                             | 25                             | 25                             | 26                             | 26                             |
| 6            | 25                             | 25                             | 25                             | 25                             | 26                             | 26                             |
| 9            | 25                             | 25                             | 25                             | 25                             | 26                             | 26                             |
| 12           | 26                             | 25                             | 25                             | 26                             | 26                             | 26                             |
| 15           | 27                             | 25                             | 26                             | 27                             | 26                             | 26                             |
| 18           | 29                             | 26                             | 27                             | 28                             | 26                             | 26                             |
| 21           | 31                             | 26                             | 28                             | 31                             | 26                             | 27                             |
| 24           | 33                             | 27                             | 30                             | 33                             | 27                             | 27                             |
| 27           | 36                             | 28                             | 31                             | 35                             | 28                             | 28                             |
| 30           | 38                             | 29                             | 32                             | 37                             | 29                             | 29                             |
| 33           | 41                             | 30                             | 34                             | 38                             | 30                             | 30                             |
| 36           | 44                             | 31                             | 35                             | 40                             | 31                             | 31                             |
| 39           | 47                             | 32                             | 37                             | 42                             | 32                             | 32                             |
| 42           | 50                             | 33                             | 38                             | 44                             | 33                             | 33                             |
| 45           | 53                             | 34                             | 40                             | 45                             | 34                             | 34                             |
| 48           | 56                             | 35                             | 41                             | 46                             | 35                             | 35                             |
| 51           | 58                             | 35                             | 43                             | 47                             | 36                             | 36                             |
| 54           | 60                             | 36                             | 44                             | 48                             | 37                             | 36                             |
| 57           | 62                             | 37                             | 46                             | 48                             | 37                             | 37                             |
| 60           | 65                             | 37                             | 48                             | 49                             | 38                             | 38                             |
| 63           | 69                             | 38                             | 52                             | 49                             | 39                             | 39                             |
| 66           | 72                             | 39                             | 59                             | 49                             | 40                             | 40                             |
| 69           | 75                             | 39                             | 66                             | 50                             | 41                             | 40                             |
| 72           | 76                             | 40                             | 71                             | 49                             | 41                             | 41                             |
| 75           | 77                             | 42                             | 73                             | 49                             | 42                             | 42                             |
| 78           | 77                             | 45                             | 75                             | 49                             | 42                             | 42                             |
| 81           | 78                             | 47                             | 75                             | 49                             | 42                             | 43                             |
| 84           | 79                             | 50                             | 76                             | 49                             | 43                             | 43                             |
| 87           | 80                             | 52                             | 77                             | 51                             | 44                             | 44                             |
| 90           | 80                             | 55                             | 79                             | 52                             | 44                             | 44                             |

**Individual Temperatures Recorded At Mid-Height Of The Cavity Coincidental With The Light Fittings**

| Time<br>Mins | T/C<br>Number<br>222<br>Deg. C | T/C<br>Number<br>223<br>Deg. C | T/C<br>Number<br>224<br>Deg. C | T/C<br>Number<br>225<br>Deg. C | T/C<br>Number<br>226<br>Deg. C |
|--------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 0            | 25                             | 26                             | 26                             | 26                             | 26                             |
| 3            | 27                             | 30                             | 27                             | 27                             | 27                             |
| 6            | 43                             | 41                             | 30                             | 29                             | 29                             |
| 9            | 58                             | 55                             | 51                             | 39                             | 40                             |
| 12           | 86                             | 69                             | 73                             | 58                             | 59                             |
| 15           | 90                             | 82                             | 92                             | 68                             | 72                             |
| 18           | 85                             | 80                             | 98                             | 73                             | 78                             |
| 21           | 85                             | 82                             | 104                            | 77                             | 82                             |
| 24           | 84                             | 83                             | 109                            | 80                             | 83                             |
| 27           | 83                             | 85                             | 113                            | 83                             | 90                             |
| 30           | 87                             | 88                             | 116                            | 87                             | 96                             |
| 33           | 89                             | 91                             | 122                            | 87                             | 100                            |
| 36           | 88                             | 91                             | 125                            | 91                             | 106                            |
| 39           | 88                             | 91                             | 128                            | 92                             | 112                            |
| 42           | 89                             | 92                             | 132                            | 93                             | 136                            |
| 45           | 89                             | 92                             | 137                            | 93                             | 171                            |
| 48           | 90                             | 93                             | 144                            | 93                             | 183                            |
| 51           | 90                             | 93                             | 149                            | 94                             | 190                            |
| 54           | 91                             | 93                             | 157                            | 94                             | 196                            |
| 57           | 91                             | 94                             | 166                            | 96                             | 202                            |
| 60           | 92                             | 95                             | 175                            | 98                             | 213                            |
| 63           | 93                             | 95                             | 186                            | 101                            | 226                            |
| 66           | 94                             | 100                            | 200                            | 108                            | 237                            |
| 69           | 96                             | 104                            | 214                            | 118                            | 246                            |
| 72           | 102                            | 113                            | 227                            | 127                            | 252                            |
| 75           | 108                            | 122                            | 242                            | 134                            | 260                            |
| 78           | 114                            | 131                            | 260                            | 141                            | 268                            |
| 81           | 117                            | 139                            | 274                            | 150                            | 269                            |
| 84           | 123                            | 144                            | 293                            | 180                            | 258                            |
| 87           | 132                            | 165                            | 309                            | 224                            | 278                            |
| 90           | 163                            | 191                            | 316                            | 311                            | 359                            |

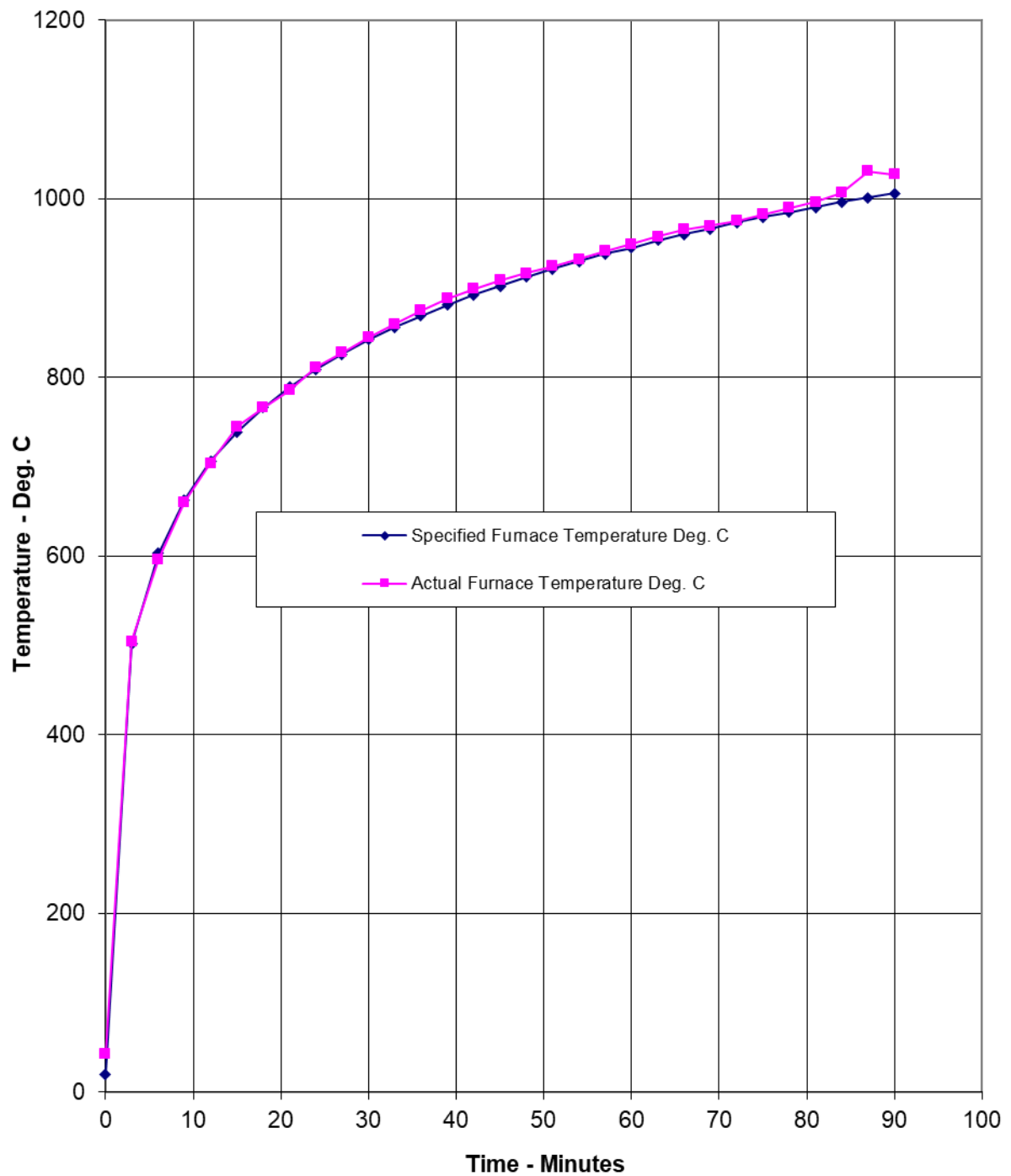
**Individual Temperatures Recorded At Mid-Height Of The Cavity Coincidental With The Light Fittings (continued)**

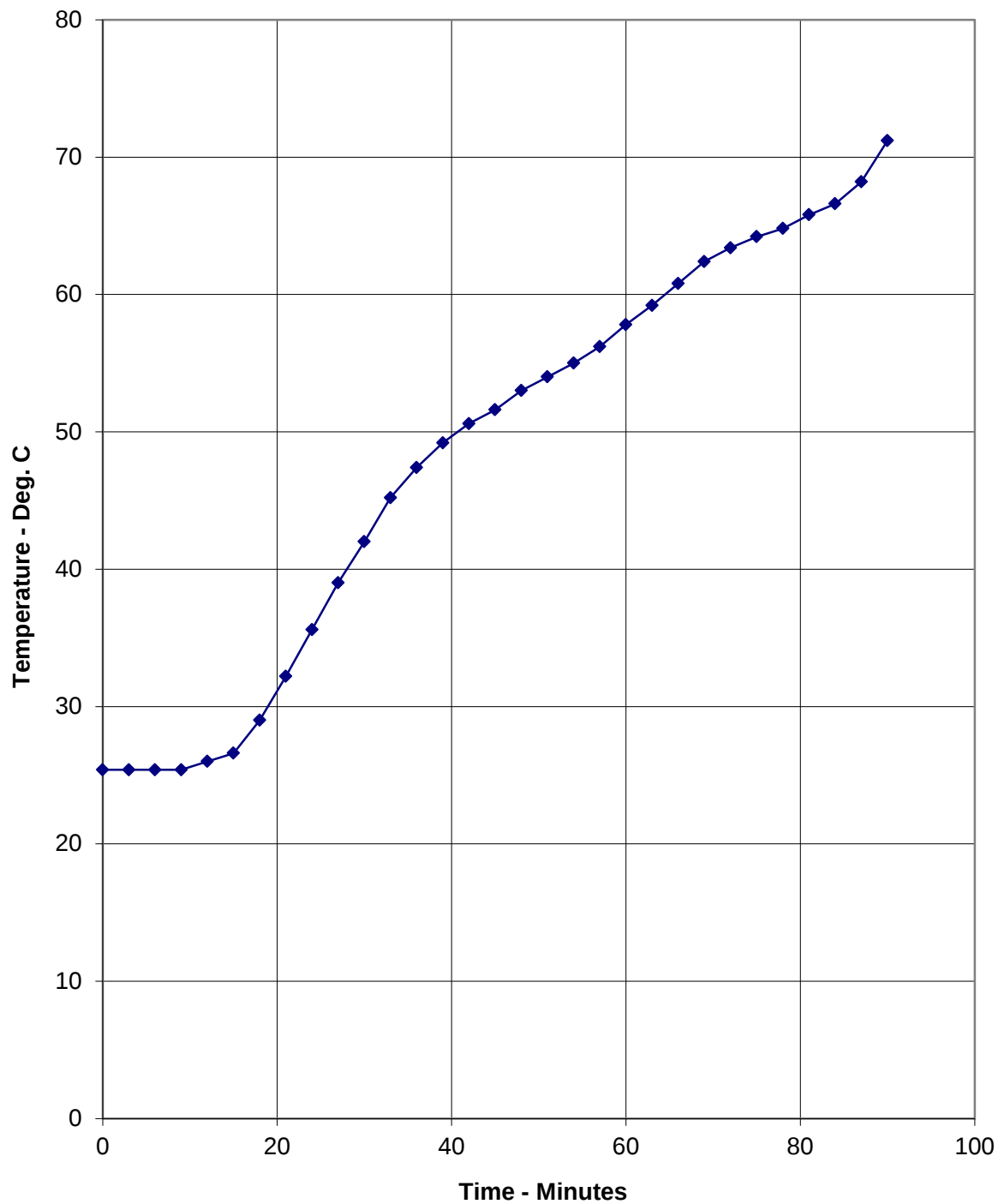
| Time<br>Mins | T/C<br>Number<br>227<br>Deg. C | T/C<br>Number<br>228<br>Deg. C | T/C<br>Number<br>229<br>Deg. C | T/C<br>Number<br>230<br>Deg. C | T/C<br>Number<br>231<br>Deg. C |
|--------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| 0            | 27                             | 27                             | 28                             | 28                             | 27                             |
| 3            | 28                             | 29                             | 31                             | 36                             | 30                             |
| 6            | 32                             | 39                             | 42                             | 38                             | 175                            |
| 9            | 46                             | 57                             | 52                             | 43                             | 259                            |
| 12           | 58                             | 71                             | 67                             | 57                             | 240                            |
| 15           | 72                             | 79                             | 75                             | 71                             | 254                            |
| 18           | 79                             | 82                             | 74                             | 78                             | 195                            |
| 21           | 82                             | 90                             | 76                             | 84                             | 189                            |
| 24           | 88                             | 101                            | 79                             | 95                             | 190                            |
| 27           | 91                             | 106                            | 81                             | 130                            | 185                            |
| 30           | 97                             | 112                            | 83                             | 145                            | 184                            |
| 33           | 87                             | 146                            | 85                             | 156                            | 186                            |
| 36           | 93                             | 181                            | 86                             | 163                            | 190                            |
| 39           | 97                             | 194                            | 88                             | 175                            | 195                            |
| 42           | 101                            | 202                            | 89                             | 174                            | 198                            |
| 45           | 103                            | 202                            | 92                             | 177                            | 201                            |
| 48           | 105                            | 207                            | 94                             | 181                            | 207                            |
| 51           | 107                            | 228                            | 95                             | 190                            | 213                            |
| 54           | 109                            | 259                            | 95                             | 196                            | 220                            |
| 57           | 110                            | 288                            | 95                             | 204                            | 228                            |
| 60           | 114                            | 322                            | 96                             | 210                            | 239                            |
| 63           | 120                            | 350                            | 99                             | 218                            | 255                            |
| 66           | 130                            | 382                            | 100                            | 234                            | 268                            |
| 69           | 140                            | 416                            | 103                            | 249                            | 278                            |
| 72           | 144                            | 424                            | 107                            | 265                            | 286                            |
| 75           | 140                            | 418                            | 113                            | 276                            | 295                            |
| 78           | 133                            | 309                            | 117                            | 283                            | 303                            |
| 81           | 138                            | 347                            | 121                            | 292                            | 309                            |
| 84           | 148                            | 385                            | 124                            | 332                            | 314                            |
| 87           | 178                            | 538                            | 130                            | 398                            | 316                            |
| 90           | 312                            | 666                            | 142                            | 493                            | 315                            |

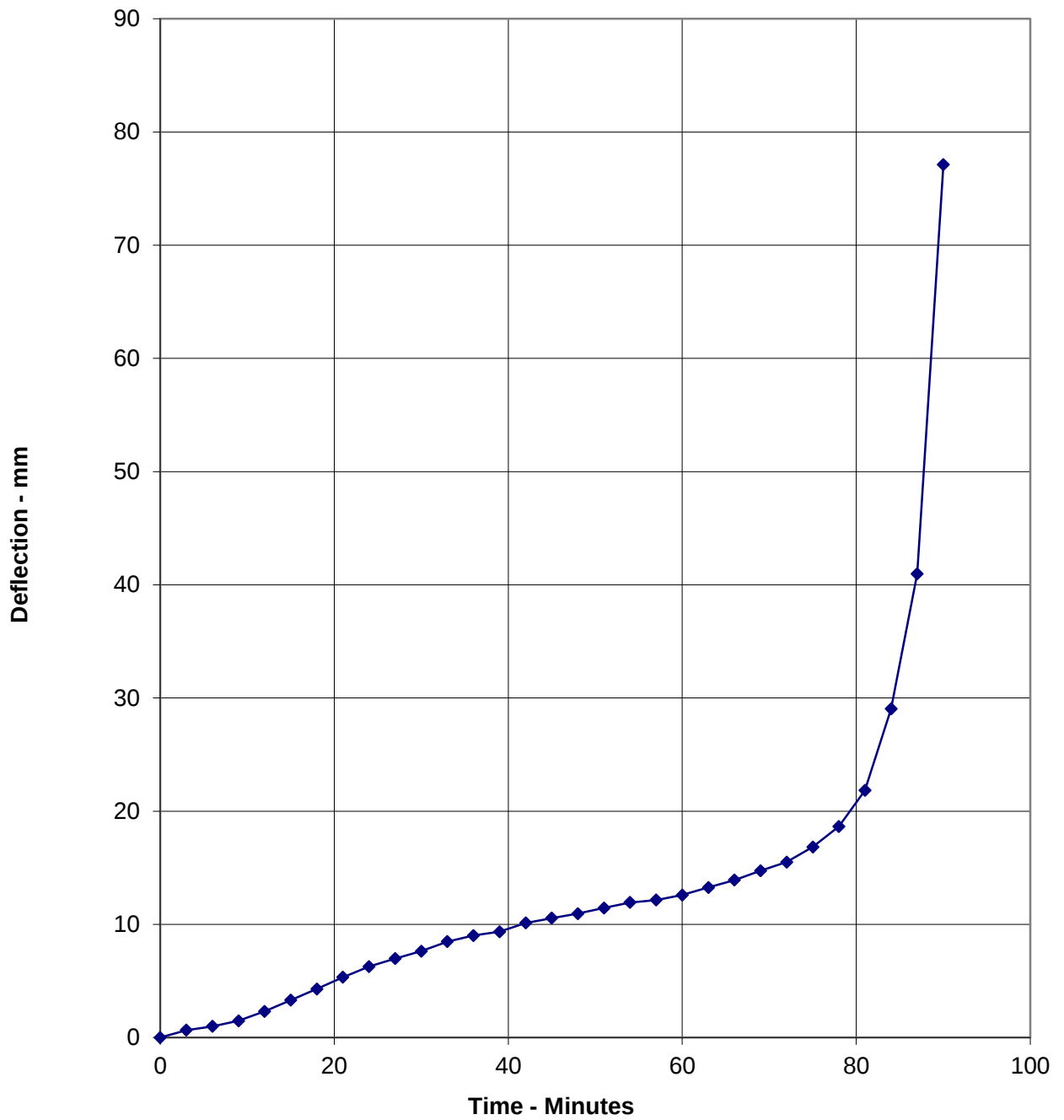
**Central Vertical Deflection Of The Specimen**

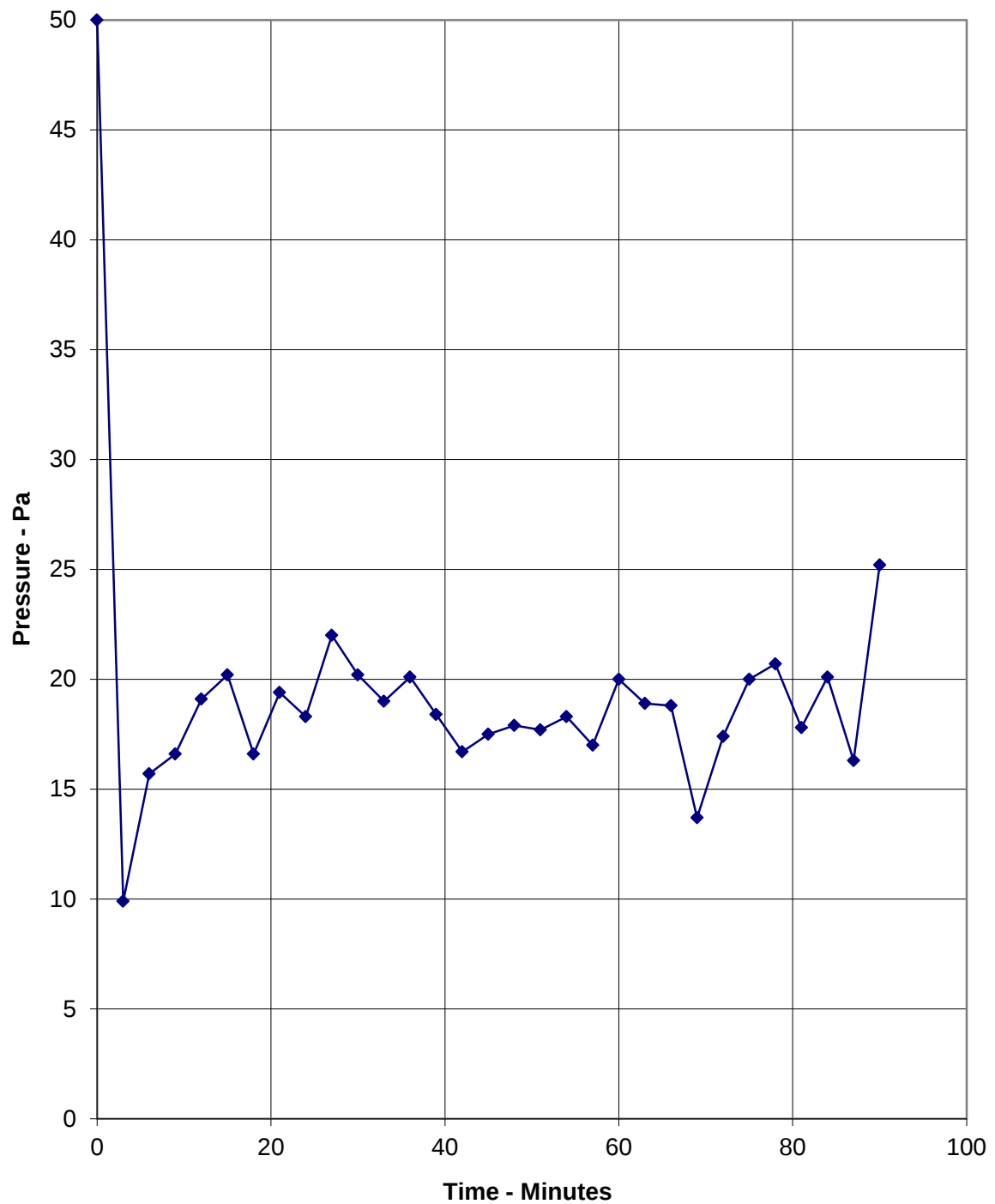
| Time<br>Mins | Central<br>Vertical<br>Deflection<br>mm | Rate<br>Of<br>Deflection<br>mm/min |
|--------------|-----------------------------------------|------------------------------------|
| 0            | 0.000                                   | 0.000                              |
| 3            | 0.655                                   | 0.101                              |
| 6            | 0.990                                   | 0.050                              |
| 9            | 1.477                                   | 0.369                              |
| 12           | 2.316                                   | 0.167                              |
| 15           | 3.307                                   | 0.235                              |
| 18           | 4.297                                   | 0.168                              |
| 21           | 5.338                                   | 0.504                              |
| 24           | 6.278                                   | 0.168                              |
| 27           | 6.983                                   | 0.487                              |
| 30           | 7.637                                   | 0.436                              |
| 33           | 8.476                                   | 0.453                              |
| 36           | 9.014                                   | 0.319                              |
| 39           | 9.349                                   | 0.117                              |
| 42           | 10.121                                  | 0.050                              |
| 45           | 10.558                                  | 0.051                              |
| 48           | 10.944                                  | 0.218                              |
| 51           | 11.447                                  | 0.386                              |
| 54           | 11.934                                  | 0.218                              |
| 57           | 12.152                                  | 0.100                              |
| 60           | 12.589                                  | 0.051                              |
| 63           | 13.260                                  | 0.117                              |
| 66           | 13.915                                  | 0.269                              |
| 69           | 14.737                                  | 0.386                              |
| 72           | 15.509                                  | 0.218                              |
| 75           | 16.835                                  | 0.335                              |
| 78           | 18.648                                  | 0.671                              |
| 81           | 21.837                                  | 1.494                              |
| 84           | 29.038                                  | 2.417                              |
| 87           | 40.972                                  | 6.328                              |
| 90           | 77.110                                  | 13.579                             |

**Graph Showing Mean Furnace Temperature, Together With The Temperature/Time Relationship Specified In The Standard**



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

**Graph Showing The Recorded Vertical Deflection Of The Specimen**

**Graph Showing Recorded Furnace Pressure 100 mm Below The Underside Of The Specimen**

## On-going Implications

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### 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

The results are directly applicable to a similar untested floor construction provided the following is true:

**a) With respect to the structural building member:**

The maximum moments and shear forces, which when calculated on the same basis as the test load, shall not be greater than those tested.

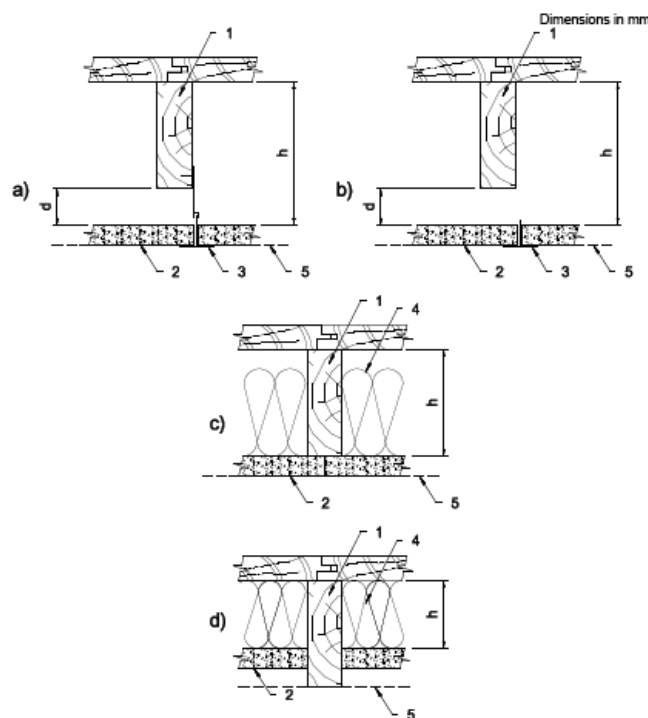
**b) With respect to the ceiling system:**

The size of panels of the ceiling lining may be increased by a maximum of 5 % but limited to a maximum of 50 mm. The length of the grid members can be increased accordingly.

The total area occupied by fixtures and fittings relative to the area of the ceiling lining is not increased and the maximum tested opening in the lining is not exceeded.

**c) With respect to the cavity:**

The height of the cavity 'h' and the minimum distance 'd' between the ceiling and the structural members (see Figure below) are equal to or greater than those tested.



## KEY

- |                                                          |                                                   |
|----------------------------------------------------------|---------------------------------------------------|
| a) suspended ceiling                                     | 4 insulation                                      |
| b) self-supported ceiling                                | 5 pressure reference line                         |
| c) and d) direct fixed ceiling with insulation in cavity | d distance between ceiling and structural members |
| 1 supporting construction (joist)                        | h height of cavity                                |
| 2 ceiling lining                                         |                                                   |
| 3 supporting frame                                       |                                                   |