



United Kingdom  
Testing and  
Certification

# Test Report

The fire resistance performance of  
two fully insulated, timber, single  
acting single door assemblies when  
tested in accordance with BS EN  
1634-1:2014+A1:2018

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Prepared For Exitex  
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A91 HK29



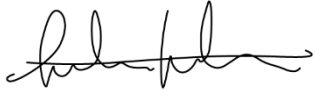
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## Change History

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|            |          |            |               |                       |
|            |          |            |               |                       |

## Signatories

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

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# 1 Executive Summary

## 1.1 Specimen Summary

Specimen A had overall nominal dimensions of 1008 mm wide by 2080 mm high, incorporating a single door leaf with overall dimensions of 932 mm wide by 2040 mm high by 54 mm thick. The door leaf was formed from graduated density chipboard with 8 mm thick hardwood lippings to all four edges. The leaf was hung in a hardwood frame on three steel hinges, such that it opened towards the heating conditions of the test. The doorset was unlatched for the duration of the test. The doors assembly incorporated the following hardware:

| Item No. | Description            | Reference         |
|----------|------------------------|-------------------|
| 13       | Surface mounted closer | AR8209            |
| 14       | Drop down seal         | 1.50008           |
| 16       | Letter plate           | 1.31.0907.0000.31 |

Specimen B had overall nominal dimensions of 1008 mm wide by 2080 mm high, incorporating a single door leaf with overall dimensions of 932 mm wide by 2040 mm high by 54 mm thick. The door leaf was formed from graduated density chipboard with 8 mm thick hardwood lippings to all four edges. The leaf was hung in a hardwood frame on three steel hinges, such that it opened towards the heating conditions of the test. The doorset was unlatched for the duration of the test. The doors assembly incorporated the following hardware:

| Item No. | Description            | Reference         |
|----------|------------------------|-------------------|
| 13       | Surface mounted closer | AR8209            |
| 15       | Drop down seal         | 1.50.0010.0930.31 |
| 16       | Letter plate           | 1.31.0907.0000.31 |

## 1.2 Specimen Verification

United Kingdom Testing and Certification carried out a comprehensive survey to verify the information provided by the Test Sponsor. This included verifying the materials, dimensions, and manufacturing methodologies of the test specimens, wherever possible. Refer to page 15 for full details of this survey.

## 1.3 Specimen Installation and Fixity

Specimen A was installed into the test construction by United Kingdom Testing and Certification. The specimen was installed such that the door leaf opened towards the heating conditions at the request of the Test Sponsor. The specimen was unlatched and unbolted prior to the commencement of the test at the request of the test sponsor.

Specimen B was installed into the test construction by United Kingdom Testing and Certification. The specimen was installed such that the door leaf opened towards the heating conditions at the request of the Test Sponsor. The specimen was unlatched and unbolted prior to the commencement of the test at the request of the test sponsor.

## 1.4 Sampling

United Kingdom Testing and Certification were not involved in the sampling or selection of the test specimen or any of the components. The results obtained during the test apply to the specimens as received and test by United Kingdom Testing and Certification.

## 1.5 Expression of Results

### 1.5.1 Specimen A

Specimen A satisfied the performance criterion specified in BS EN 1634-1:2014+A1:2018 § 11 for the following intervals:

|   |                     |                      |                      |                          |                      |
|---|---------------------|----------------------|----------------------|--------------------------|----------------------|
| Integrity (E) <sup>1</sup>                | Sustained Flaming   |                      | 68 minutes*          |                          |                      |
|   | Gap Gauge           |                      | 68 minutes           | No failure*              |                      |
|   | Cotton Pad          |                      | 67 minutes           |                          |                      |
| Insulation (I <sub>1</sub> ) <sup>2</sup> |                     |                      | 67 minutes           | Due to integrity failure |                      |
| Insulation (I <sub>2</sub> ) <sup>3</sup> |                     |                      | 67 minutes           | Due to integrity failure |                      |
| Radiation <sup>4</sup>                    | 5 kW/m <sup>2</sup> | 10 kW/m <sup>2</sup> | 15 kW/m <sup>2</sup> | 20 kW/m <sup>2</sup>     | 25 kW/m <sup>2</sup> |
|   | 68 minutes*         | 68 minutes*          | 68 minutes*          | 68 minutes*              | 68 minutes*          |

\*The test was discontinued after a period of 68 minutes.

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

<sup>2</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which increase at the locations specified in BS EN 1634-1:2014+A1:2018 § 9.1.2.2, 9.1.2.3, 9.1.2.4 and the roving thermocouple above the initial average temperature by more than 180°C.

<sup>3</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which: a) increase the average temperature above the initial average temperature by more than 140 °C; b) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180°C with the exception that the limit for temperature rise for any frame member or transom member adjacent to the leaf/leaves of the doorset or openable window shall be 360°C.

<sup>4</sup> BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m<sup>2</sup> is reported.

### 1.5.2 Specimen B

Specimen B satisfied the performance criterion specified in BS EN 1634-1:2014+A1:2018 § 11 for the following intervals:

|   |                     |                      |                      |                      |                      |
|---|---------------------|----------------------|----------------------|----------------------|----------------------|
| Integrity (E) <sup>5</sup>                | Sustained Flaming   |                      | 68 minutes           | No failure*          |                      |
|   | Gap Gauge           |                      | 68 minutes           | No failure*          |                      |
|   | Cotton Pad          |                      | 68 minutes           | No failure*          |                      |
| Insulation (I <sub>1</sub> ) <sup>6</sup> |                     |                      | 68 minutes           | No failure*          |                      |
|   | Specimen            |                      | 68 minutes           | No failure*          |                      |
| Radiation <sup>8</sup>                    | 5 kW/m <sup>2</sup> | 10 kW/m <sup>2</sup> | 15 kW/m <sup>2</sup> | 20 kW/m <sup>2</sup> | 25 kW/m <sup>2</sup> |
|   | 68 minutes*         | 68 minutes*          | 68 minutes*          | 68 minutes*          | 68 minutes*          |

\*The test was discontinued after a period of 68 minutes.

<sup>5</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without: a) causing ignition to the cotton pad applied in accordance with BS EN 1363-1:2020 § 10.4.5.2 b) permitting the penetration of a gap gauge as specified in EN 1363-1:2020 § 10.4.5.3 c) resulting in sustained flaming.

<sup>6</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which increase at the locations specified in BS EN 1634-1:2014+A1:2018 § 9.1.2.2, 9.1.2.3, 9.1.2.4 and the roving thermocouple above the initial average temperature by more than 180°C.

<sup>7</sup> The time(s) in completed minutes for which the test specimen(s) continues to maintain its separating function without developing temperatures on its unexposed surface which: a) increase the average temperature above the initial average temperature by more than 140 °C; b) increase at any location (including the roving thermocouple) above the initial average temperature by more than 180°C with the exception that the limit for temperature rise for any frame member or transom member adjacent to the leaf/leaves of the doorset or openable window shall be 360°C.

<sup>8</sup> BS EN 1363-2: 1999 requires that the time for the measured radiation to exceed 5, 10, 15, 20 and 25 kW/m<sup>2</sup> is reported.

## 2 Pre-test Examination

### 2.1 Closing Force Measurement

The door closing forces were measured and recorded three times. The results are presented below:

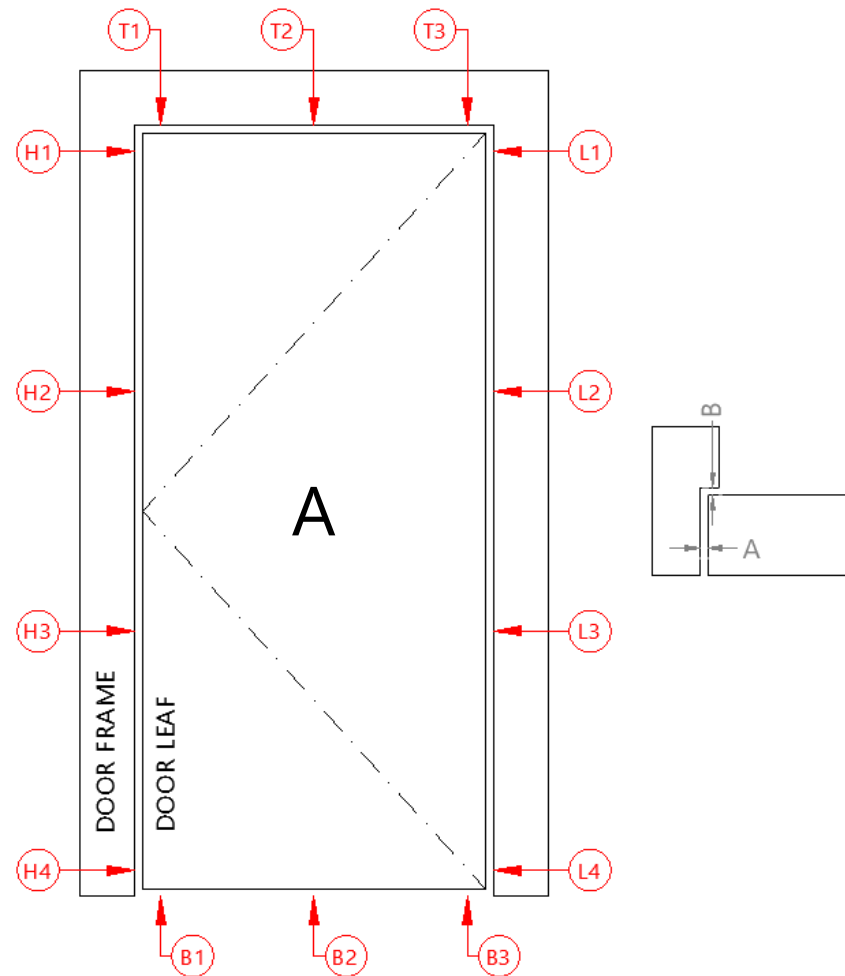
| Measurement              | Maximum Recorded Force (N) | Distance from Pivot to Measurement Location (m) | Moment (Nm) |
|--------------------------|----------------------------|---|-------------|
| Closing Force Specimen A | 26.6                       | 0.750   | 19.9        |
| Opening Force Specimen A | 72.0                       | 0.750   | 54.0        |
| Closing Force Specimen B | 24.2                       | 0.750   | 18.5        |
| Opening Force Specimen B | 67.2                       | 0.750   | 67.9        |

### 2.2 Specimen Conditioning

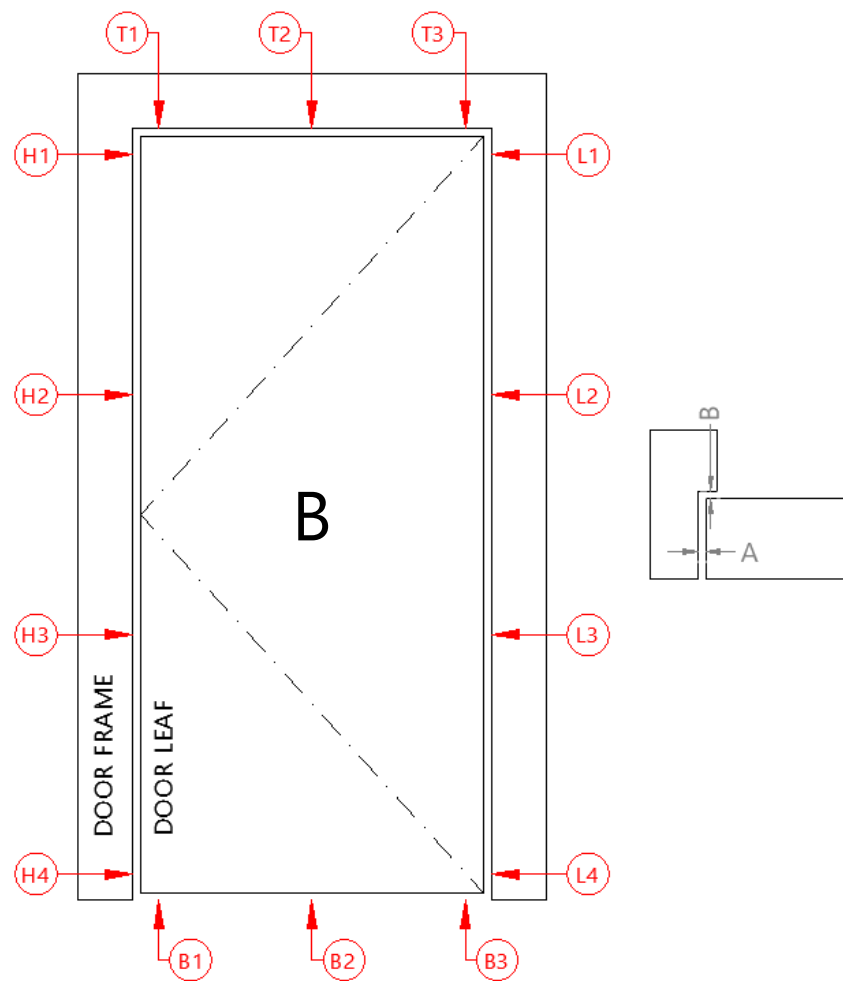
The specimen's storage, construction, and test preparation took place in the test laboratory over a total, combined time of six days. Throughout this period, both the temperature and the humidity of the laboratory were measured and recorded as being within a range of from 13.3 °C to 18.1 °C and 59.0 % to 59.0 % respectively.



## 2.3 Gap Measurements



| Hanging Stile | A   | B   | Closing Stile | A   | B   |
|---------------|-----|-----|---------------|-----|-----|
| H1            | 3.2 | 0.3 | L1            | 3.7 | 0.6 |
| H2            | 3.6 | 0.3 | L2            | 3.0 | 0.5 |
| H3            | 3.5 | 0.3 | L3            | 3.3 | 0.4 |
| H4            | 2.5 | 0.3 | L4            | 4.1 | 0.3 |
| Mean          | 3.2 |     | Mean          | 3.5 |     |
| Max           | 3.6 |     | Max           | 4.1 |     |
| Min           | 2.5 |     | Min           | 3.0 |     |
| Max Permitted | 5.4 |     | Max Permitted | 5.8 |     |
| Top Edge      | A   | B   | Bottom Edge   | A   |     |
| T1            | 3.0 | 0.6 | B1            | 3.4 |     |
| T2            | 2.3 | 0.5 | B2            | 3.6 |     |
| T3            | 2.6 | 0.5 | B3            | 6.1 |     |
| Mean          | 2.6 |     | Mean          | 4.4 |     |
| Max           | 3.0 |     | Max           | 6.1 |     |
| Min           | 2.3 |     | Min           | 3.4 |     |
| Max Permitted | 4.8 |     | Max Permitted | 7.2 |     |



| Hanging Stile | A   | B   | Closing Stile | A   | B   |
|---------------|-----|-----|---------------|-----|-----|
| H1            | 3.7 | 0.2 | L1            | 2.8 | 0.2 |
| H2            | 3.1 | 0.2 | L2            | 2.9 | 0.3 |
| H3            | 3.2 | 0.2 | L3            | 3.2 | 0.3 |
| H4            | 3.0 | 0.3 | L4            | 2.9 | 0.3 |
| Mean          | 3.3 |     | Mean          | 3.0 |     |
| Max           | 3.7 |     | Max           | 3.2 |     |
| Min           | 3.0 |     | Min           | 2.8 |     |
| Max Permitted | 5.5 |     | Max Permitted | 5.1 |     |
| Top Edge      | A   | B   | Bottom Edge   | A   |     |
| T1            | 2.4 | 0.2 | B1            | 5.5 |     |
| T2            | 2.5 | 0.2 | B2            | 5.3 |     |
| T3            | 2.5 | 0.2 | B3            | 4.9 |     |
| Mean          | 2.5 |     | Mean          | 5.2 |     |
| Max           | 2.5 |     | Max           | 5.5 |     |
| Min           | 2.4 |     | Min           | 4.9 |     |
| Max Permitted | 4.5 |     | Max Permitted | 7.4 |     |

### 3 Test Specimen Drawings

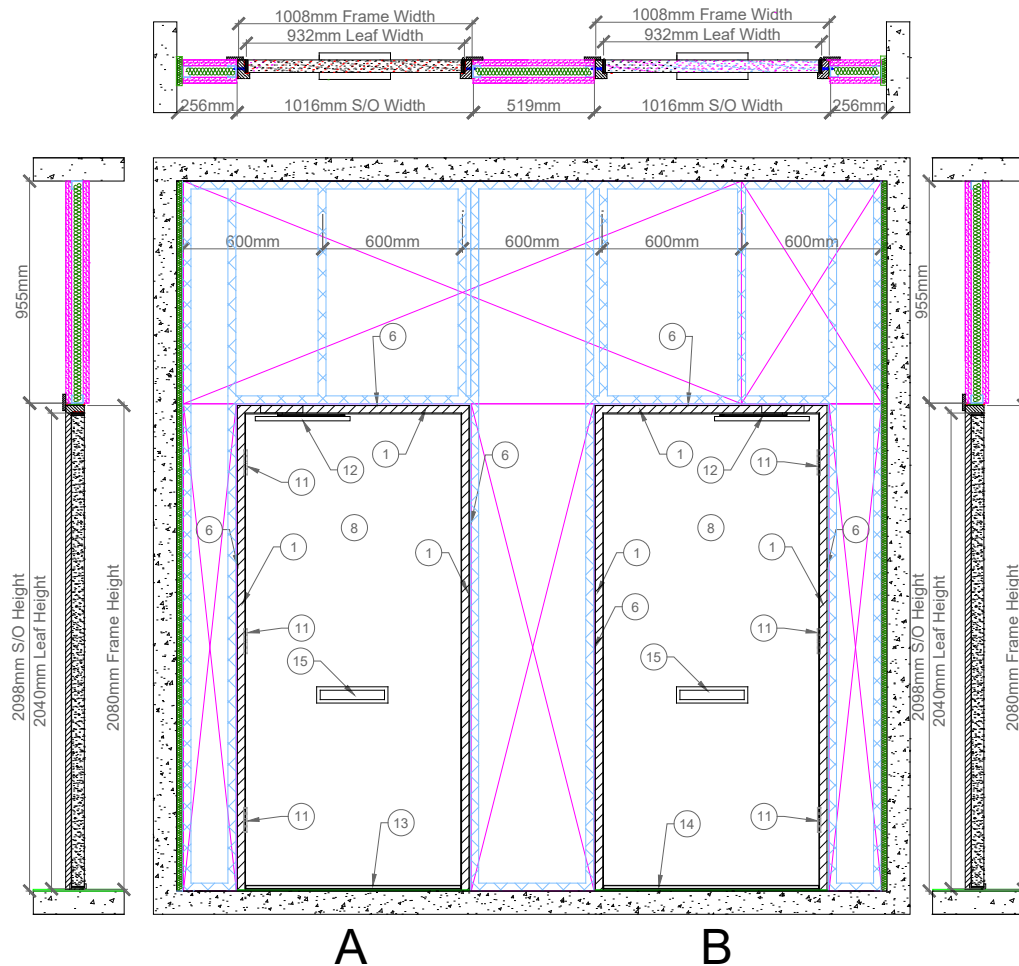


Figure 1 - General arrangement of test construction viewed from the unexposed surface

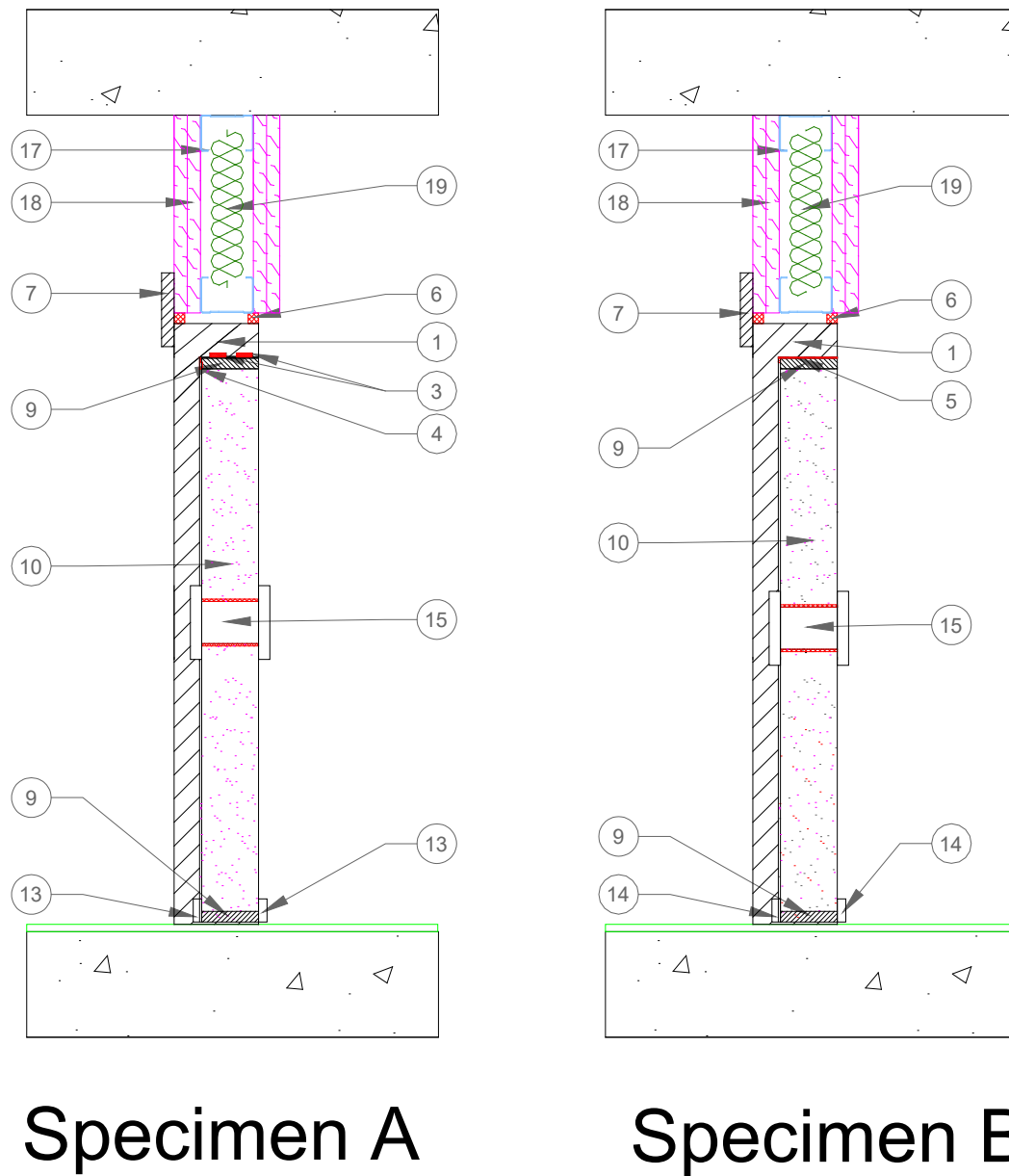
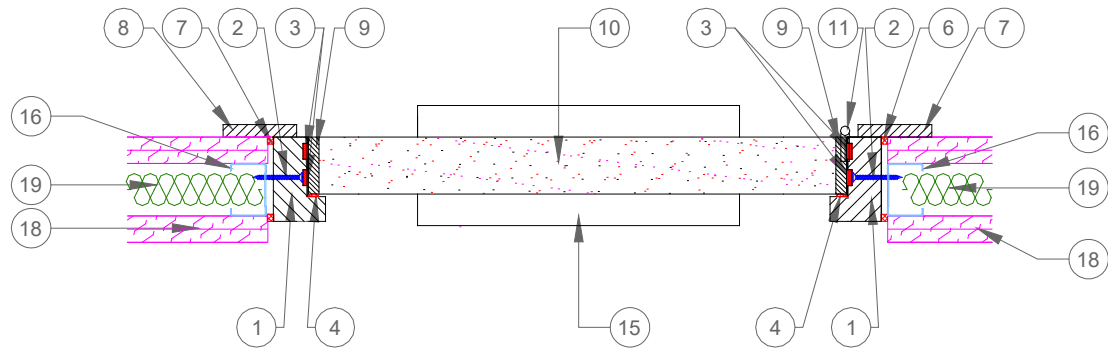


Figure 2 - Typical vertical section through the specimens

## Specimen A



## Specimen B

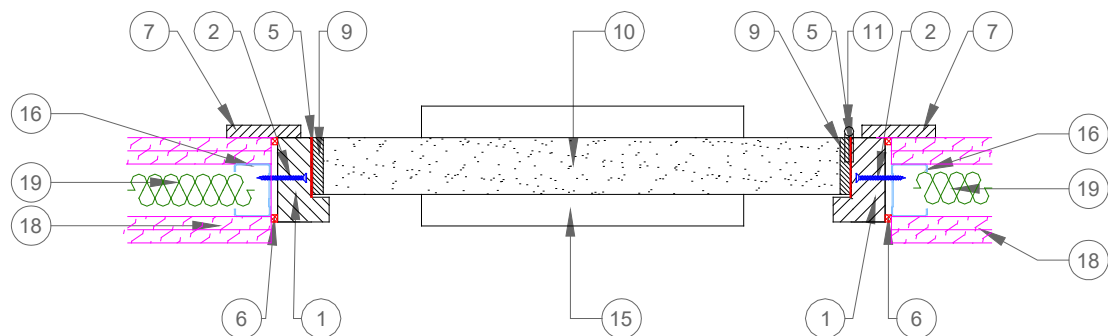


Figure 3 - Typical horizontal section through the specimens

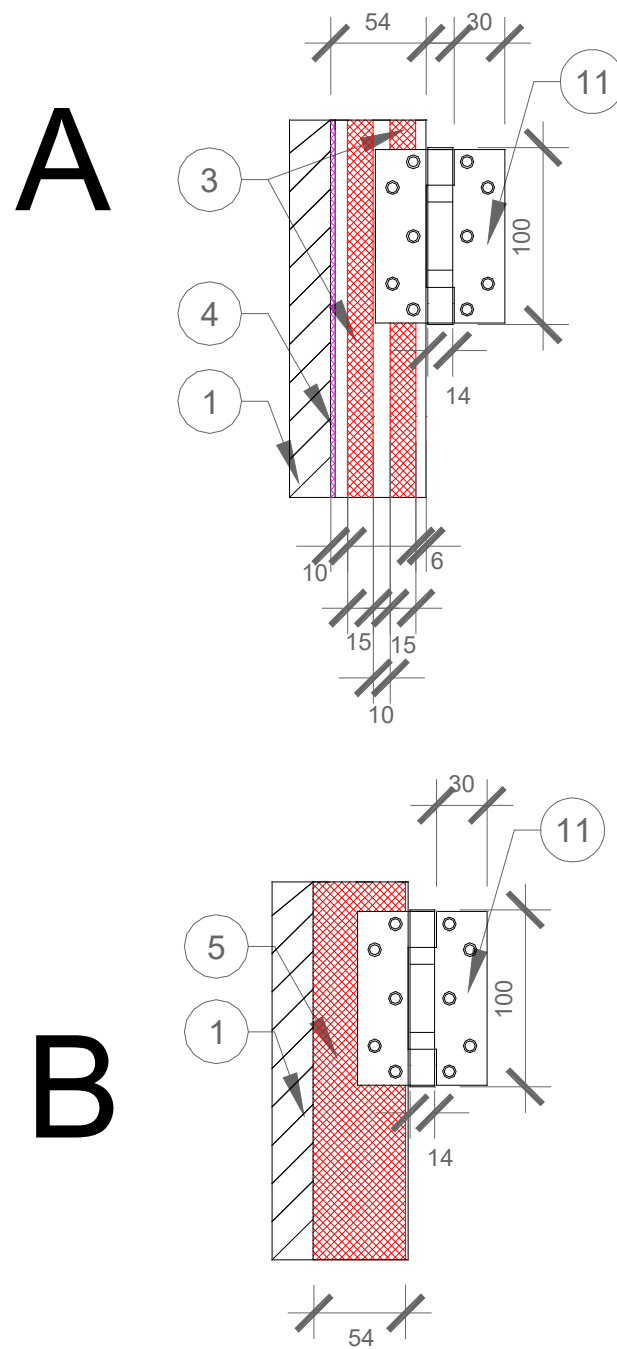


Figure 4 - Hardware intumescent interruptions

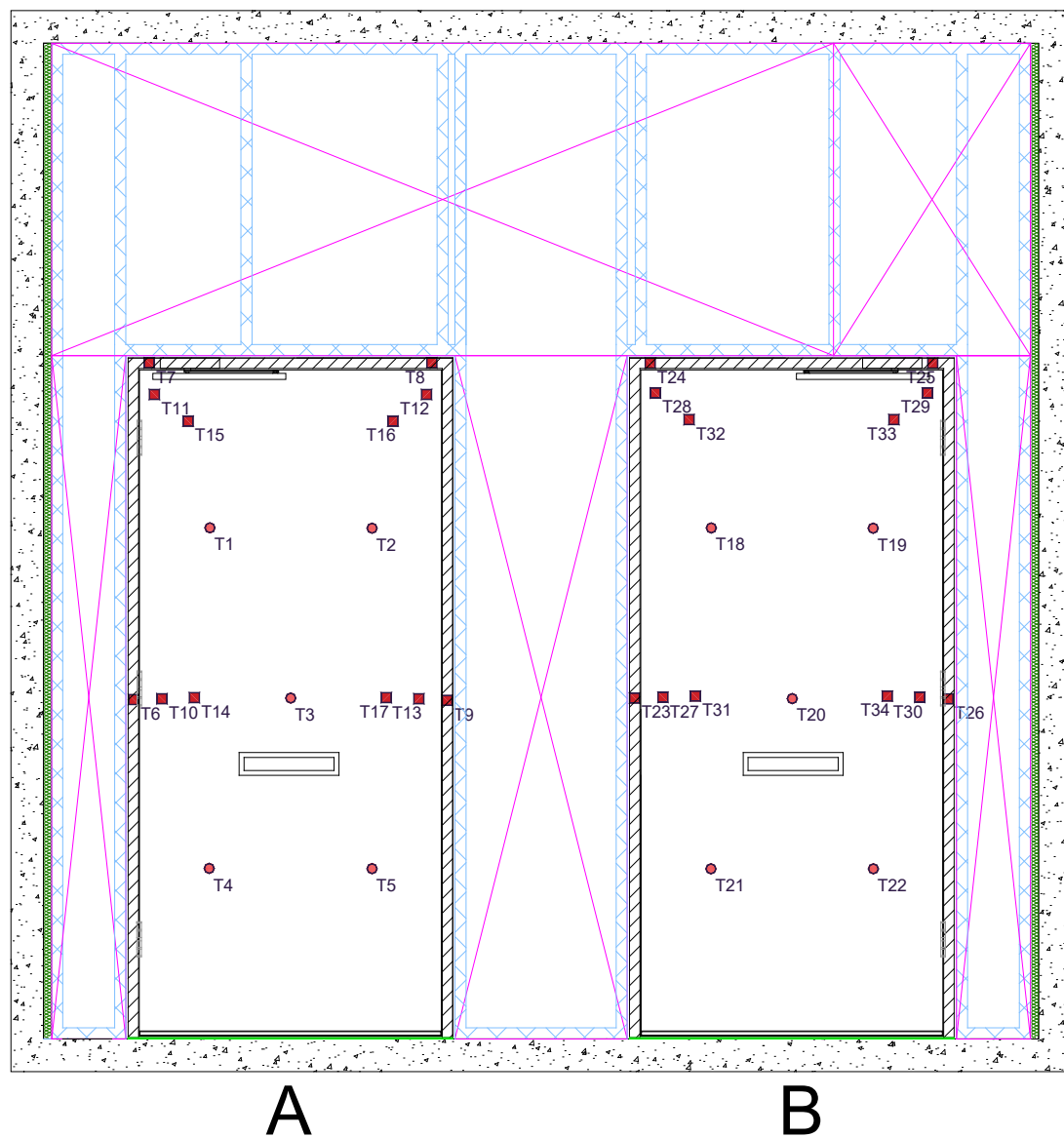


Figure 5 - Layout of instrumentation viewed from the unexposed surface of the test construction

## 4 Technical Schedule

All dimensions are in millimetres (mm) unless otherwise stated.

\* Information provided by the Test Sponsor. Not verified by United Kingdom Testing and Certification.

\*\* Nominal value.

\*\*\* Information is commercial in confidence. Full details are retained on file by United Kingdom Testing and Certification.

### 4.1 Specimen A & B

| 1. Frame   |  |
|--|--|
| Manufacturer   | SA Joinery   |
| Reference  | Exitex Frame   |
| Material   | Sapele Head and Sapele Jambs                                     |
| Density  | 640 kg/m <sup>3</sup>  |
| Moisture content   | 6 - 8 % (for laboratory use only)                                |
| a. Overall size  | 1008 mm wide x 2080 mm high x 95 mm deep                         |
| i. Frame (Head)  | 95 mm wide x 32 mm thick with a 25 mm wide and 15 mm deep rebate |
| ii. Frame (Jambs)  | 95 mm wide x 32mm thick with a 25 mm wide and 15 mm deep rebate  |
| Jamb to Head jointing method, fixing detail and location       | Butt Joint   |
| Adhesive(s)  | N/a  |
| 2. Frame Fixing Method to Supporting Construction              |  |
| Manufacturer   | Turbo Outdoor  |
| Reference  | 3208X  |
| Type & material  | Steel Double countersunk screws                                  |
| Overall size   | Ø 5 mm x 80 mm   |
| Spacing  | 150 mm top and bottom, 600 centres                               |
| Does the fixing penetrate intumescent seal within frame reveal | No, the fixing was placed underneath the intumescent seal        |
| Packing Material   | Blue 60 Fire rated Packers                                       |
| Packing Material Dimension                                     | 100mm long, 15mm wide, 1/3/5mm thick                             |
| Packing Material Location                                      | Being done at Test facility                                      |



|  |  |
|--|--|
| <b>3. Intumescent to frame reveal on specimen A</b>      |  |
| Quantity   | 2  |
| Manufacturer   | Exitex Ltd   |
| Reference  | 1.31.0330.2100.35                                  |
| Material   | PVC encapsulated Graphite                          |
| Overall section size                                     | 15 mm wide x 4 mm thick                            |
| Application method                                       | Self-Adhesive                                      |
| Location (relative to the opening face of the door leaf) | 10 mm space in-between, and 6 mm in from the edge. |
| Adhesive(s)  | N/a (Self-adhesive backing)                        |
| <b>4. Smoke seal to frame reveal on specimen A</b>       |  |
| Manufacturer   | Exitex Ltd   |
| Reference  | 1.10.0500.2100.35                                  |
| Material   | PVC  |
| Overall section size                                     | 11 mm wide x 5 mm high                             |
| Application method                                       | Self-Adhesive                                      |
| Location   | Face fixed to stop.                                |
| Adhesive(s)  | N/a (Self-adhesive backing)                        |
| <b>5. Intumescent to frame reveal on specimen B</b>      |  |
| Quantity   | 1  |
| Manufacturer   | Exitex Ltd   |
| Reference  | 1.31.0932  |
| Material   | Flexible PVC skinned Graphite                      |
| Overall section size                                     | 44 mm wide x 1.5 mm thick                          |
| Application method                                       | Self-Adhesive                                      |
| Location (relative to the opening face of the door leaf) | Placed in the rebated edge                         |
| Adhesive(s)  | N/a (Self-adhesive backing)                        |
| <b>6. Sealant to fire stopping detail</b>                |  |
| Manufacturer   | Exitex Ltd   |
| Reference  | 1.18.0500.0310.35                                  |

|   |  |
|---|--|
| Material  | Acrylic  |
| Overall section size                                      | 4 mm – 10 mm   |
| Application method  | Cartridge gunned   |
| Location  | Between the wall construction & door frame                                   |
| Location (relative to the opening face of the door leaf)  | Placed in the rebated edge   |
| Adhesive(s)   | N/a (Self-adhesive backing)  |
| <b>7. Architrave</b>                                      |  |
| Manufacturer  | SA Joinery   |
| Reference   | Architraves  |
| Material  | Sapele   |
| Density   | 640 kg/m <sup>3</sup>  |
| Overall section size                                      | 18 mm x 70 mm  |
| Location  | On fireside only   |
| Application method, fixings and fixing frequency required | Ø 1.6 mm x 30 mm ga Paslode nails, fitted 10 mm offset from inner frame edge |
| <b>8. Door Leaf</b>                                       |  |
| Manufacturer  | SA Joinery   |
| Reference   | Halspan Prima  |
| Quantity of leaves on doorset                             | 1  |
| Glazing location relative to the head and closing edge    | N/A  |
| Overall leaf size supplied for testing                    | 932 mm wide x 2040 mm high x 54 mm thick                                     |
| <b>9. Lippings / Edge banding</b>                         |  |
| Manufacturer  | SA Joinery   |
| Reference   | Halspan Prima  |
| Material  | Graduated Density Chipboard  |
| Location  | N/a  |
| Density   | 630 kg/m <sup>3</sup> (+/-10%)   |
| Overall thickness   | 54 mm thick  |
| Application method  | N/a  |
| Adhesives   | N/a  |

|                                   |  |
|-----------------------------------|--|
| Presence of Mechanical Fixings    | N/a  |
| <b>10. Core element</b>           |  |
| Manufacturer                      | SA Joinery                                 |
| Reference                         | Halspan Prima                              |
| Material                          | Sapele                                     |
| Density                           | 640 kg/m <sup>3</sup> (+/-10%)             |
| Overall size                      | 54 mm wide x 8 mm thick                    |
| Fixing method                     | Glued                                      |
| Location                          | All 4 sides of Core                        |
| a. Adhesives                      |  |
| i. Manufacturer                   | ARO-BOND                                   |
| ii. Type                          | MCPU                                       |
| iii. Reference                    | 947  |
| iv. Curing method                 | Flush Trim                                 |
| v. Application method             | Damp cloth over area apply PU with Spatula |
| b. Presence of Mechanical Fixings | N/a  |
| <b>11. Hinges</b>                 |  |
| Supplier                          | Royde & Tucker                             |
| Reference                         | H102                                       |
| Quantity                          | 3  |
| Primary material                  | Steel                                      |
| Type                              | HI Load 102                                |
| a. Size                           |  |
| i. Knuckle                        | Ø 14 mm x 102 mm high                      |
| ii. Blades                        | 100 mm high x 30 mm wide x 3 mm thick      |
| iii. Security pin                 | N/a  |
| b. Fixings                        |  |
| i. Type                           | Screws                                     |
| ii. Material                      | Stainless Steel                            |

|   |  |
|---|--|
| iii. Size   | Ø 10 mm x 32 mm long   |
| iv. Number off per blade                                | 5  |
| Position of each hinge relative to the head of the leaf | From top to Centre of hinge (1) 200 mm (2) 970 mm (3) 1740 mm                                    |
| Details of intumescent protection                       | Exitex Graphite Hinge pads – 1.31.0826.0031.00   |
| Interruptions to Intumescent within the frame reveal    | Fully interrupted on one on specimen A and fully interrupted on specimen B                       |
| <b>12. Door Closer</b>                                  |  |
| Manufacturer  | Arrone   |
| Reference   | AR8209   |
| a. Material   |  |
| i. Body   | Stainless Steel  |
| ii. Closer arm  | Stainless Steel  |
| iii. Cover  | Stainless Steel  |
| Configuration   | Track Arm Closer. CF770  |
| b. Overall size   |  |
| i. Body   | 60 mm high x 275 mm wide x 48 mm deep  |
| ii. Arm   | 23 mm high x 428 mm wide x 53 mm deep  |
| iii. Cover  | N/a slip on  |
| Fixing method   | No.4 at Ø 4.8 mm x 30 mm in the body and in the arm<br>No.2 at Ø 4.8 mm x 30 mm in the track arm |
| <b>13. Drop Down Seal (1)</b>                           |  |
| Manufacturer  | Exitex Ltd   |
| Reference   | 1.50.0008  |
| Location  | Specimen A only  |
| a. Material   |  |
| i. Body   | Aluminium  |
| ii. Seal  | Self-extinguishing Co-Extruded Thermoplastic   |
| iii. Face plate   | Aluminium  |
| b. Overall size   |  |
| i. Body   | 32 mm high x 930 mm wide x 12 mm thick   |

|                                   |  |
|-----------------------------------|--|
| ii. Face plate                    | 40 mm high x 930 mm wide x 13 mm thick         |
| Fixing method, type and locations | Wood screws No 3. M3 x 25mm                    |
| Location within leaf              | Faced fitted at the bottom of the leaf         |
| Maximum operating drop            | 15 mm  |
| <b>14. Drop Down Seal (2)</b>     |  |
| Manufacturer                      | Exitex Ltd                                     |
| Reference                         | 1.50.0010.0930.31                              |
| Location                          | Specimen B only                                |
| a. Material                       |  |
| i. Body                           | Aluminium                                      |
| ii. Seal                          | Self-extinguishing Co-Extruded Thermoplastic   |
| iii. Face plate                   | Aluminium                                      |
| b. Overall size                   |  |
| i. Body                           | 32 mm high x 930 mm wide x 12 mm thick         |
| ii. Face plate                    | 40 mm high x 930 mm wide x 13 mm thick         |
| Fixing method, type and locations | Wood screws No 3 M3 x 25 mm                    |
| Location within leaf              | Faced fitted at the bottom of the leaf         |
| Maximum operating drop            | 14 mm  |
| <b>15. Letter plate</b>           |  |
| Manufacturer                      | Exitex Ltd                                     |
| Reference                         | 1.31.0907.0000.31                              |
| Location                          | 314 mm from meeting stile & 798 mm from bottom |
| a. Material                       |  |
| i. Body                           | Aluminium                                      |
| ii. Face plate                    | Aluminium                                      |
| iii. Security cowl                | Aluminium                                      |
| b. Overall size                   |  |
| i. Body size                      | 70 mm high x 306 mm wide x 82 mm thick         |
| ii. Cut out size                  | 57 mm high x 274 mm wide                       |
| iii. Footprint                    | 70 mm high x 306 mm wide x 82 mm thick         |

|                                   |  |
|-----------------------------------|--|
| iv. Security cowl                 | 60 mm high x 290 mm wide x 2 mm thick x 60 mm projection |
| Fixing method                     | No. 8 wood at 4 Ø x 18 mm & No. 2 at 5 Ø mm x 65 mm      |
| Presence of sealants              | N/a  |
| Details of intumescent protection | Graphite strip wrapped around inner letterbox            |

## 4.2 Supporting Construction

|                              |   |
|------------------------------|---|
| <b>16. Studs</b>             |   |
| Supplier/ Manufacturer       | United Kingdom Testing and Certification  |
| a. Type & Material           | Rolled steel C-Stud   |
| i. Dimensions                | 50 mm deep x 34 mm wide x 3000 mm long x 0.5 mm thick                           |
| ii. Stud centres             | 400 mm - 625 mm   |
| iii. Fixing(s)               | Friction fitted to the head/ floor track  |
| <b>17. Head/ Floor Track</b> |   |
| Supplier/ Manufacturer       | United Kingdom Testing and Certification  |
| Type & Material              | Rolled steel U-Track  |
| Dimensions                   | 52 mm deep x 25 mm wide x 3000 mm long x 0.5 mm thick                           |
| Centres                      | 600 mm Centres 20 mm Space between testing frame and wall frame for insulation. |
| Fixing(s)                    | Ø 7.5 x 50 mm long self-tapping screws staggered at max 600 mm centres          |
| <b>18. Lining(s)</b>         |   |
| Supplier/ Manufacturer       | United Kingdom Testing and Certification  |
| Type & Material              | Paper faced, gypsum plasterboard type F   |
| Layer Quantity               | 2   |
| Dimensions                   | 12.5 mm thick x 1200 mm wide x 2400 mm high                                     |
| Fixings                      | Plasterboard Screw Fixings Ø 5 mm x 25 mm                                       |
| Joints Filled & Taped With   | No-nonsense   |
| <b>19. Wall Insulation</b>   |   |

|                     |  |
|---------------------|--|
| Supplier            | United Kingdom Testing and Certification |
| Type & Material     | Mineral Wool                             |
| Installation Method | Compression Fitted                       |
| Thickness           | 50 mm                                    |
| Density             | 24 kg/m <sup>3</sup>                     |

## 5 Specimen Photographs



Figure 6 - Item 12

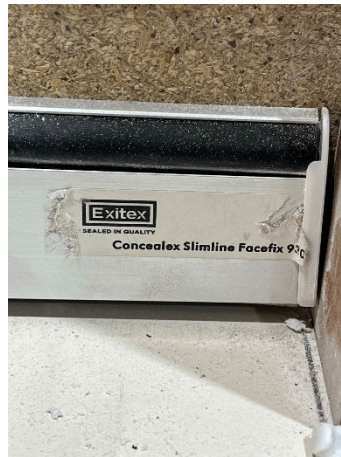


Figure 7 - Item 14



Figure 8 - Item 3 &amp; 4

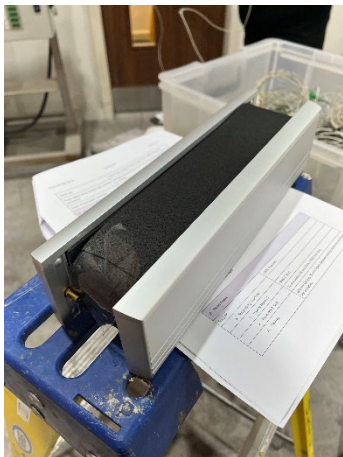


Figure 9 - Item 16

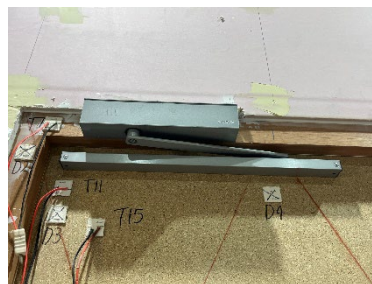


Figure 10 - Item 13



Figure 11 - Item 16



Figure 12 - Item 8



Figure 13 - Item 5



Figure 14 - Item 3



## 6 Test Procedure

### 6.1 Heating Conditions

The specimens were subject to heating conditions in accordance with BS EN 1363-1:2020 § 5.1. This was monitored and controlled for the duration of the test using type K thermocouples which were distributed across a vertical plane  $100 \pm 50$  mm from the exposed surface of the test construction. The resulting Time-Temperature distribution is presented in Figure 26.

Due to a momentary power surge the test was recommenced after a period of 8 minutes. This resulted in a deviation from the specified heating conditions which is greater than the permissible tolerances specified in BS EN 1363-1:2020 § 5.1.2. This deviation lasted a duration of 10 minutes. The Time-Temperature percentage deviation distribution is presented in Figure 27. Figure 27 – Graph presenting the Time-Temperature percentage deviation of the furnace

### 6.2 Pressure Conditions

The specimens were subject to a pressure regime in accordance with BS EN 1363-1:2020 § 5.2. The calculated pressure differential relative to the laboratory atmospheric pressure at a height of 365, 1612 and 2850 mm from the furnace floor level was -1.1, 9.4 and 20.0 Pa respectively which equates to 0 Pa at a height of 500 mm from the furnace floor level. The furnace was maintained at these pressures within  $\pm 5$  Pa five minutes after the commencement of the test and  $\pm 3$  Pa ten minutes after the commencement of the test and for the remainder of the test duration. The pressure deviated from the specified conditions on two instances throughout the duration of the test. The Time-Pressure distribution is presented in Figure 28.

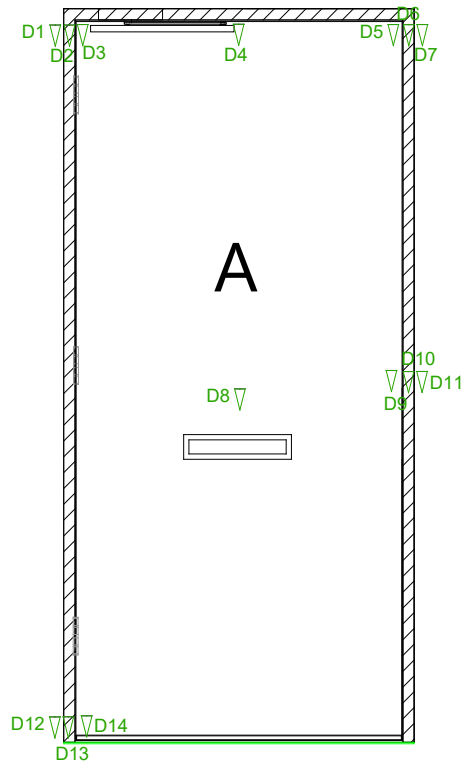
### 6.3 Unexposed Surface Temperature

A roving thermocouple was available for the evaluation of the maximum temperature rise of the unexposed surface of the specimens for the duration of the test. Any measurements using the roving thermocouple are presented on page 27.

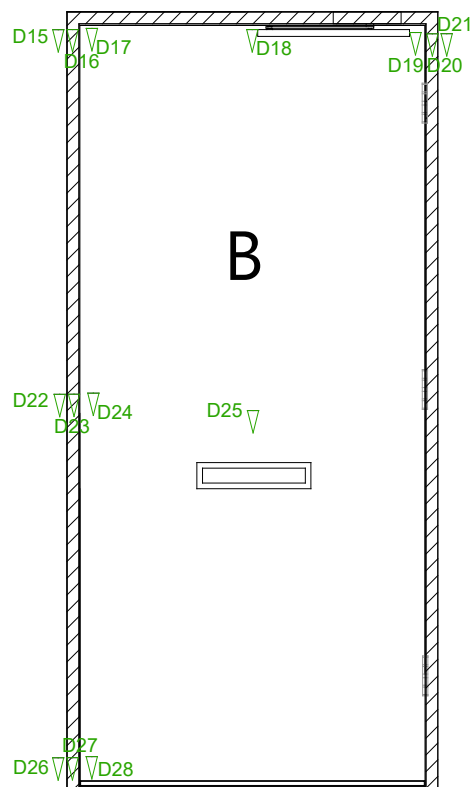
Disc thermocouples were affixed to the unexposed surface of the specimens in accordance with BS EN 1634-1:2014+A1:2018 § 9.1.2 to measure and monitor the maximum and the mean temperature rise of the unexposed surface of the specimens for the duration of the test. A summary of the measurements is presented in Figure 29 and Figure 30 and the locations of these thermocouples is illustrated in Figure 5.

## 6.4 Deflection

All measurements are in millimeters (mm) unless stated otherwise. Positive values indicate movement towards the heating conditions.



| Time (mins) | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8  | D9 | D10 | D11 | D12 | D13 | D14 |
|-------------|----|----|----|----|----|----|----|-----|----|-----|-----|-----|-----|-----|
| 0           | 0  | 0  | 0  | 0  | 0  | 0  | 0  | 0   | 0  | 0   | 0   | 0   | 0   | 0   |
| 10          | 1  | 1  | 0  | 3  | 5  | 4  | 7  | -1  | 2  | 5   | 3   | 7   | 2   | 0   |
| 20          | 0  | -2 | -3 | 1  | 4  | 2  | 4  | -5  | -2 | 17  | 2   | 12  | 1   | 0   |
| 30          | -1 | -2 | -4 | -2 | 3  | 1  | 3  | -11 | -4 | 14  | -1  | 11  | 2   | -2  |
| 40          | 1  | -1 | -5 | -2 | 4  | 2  | 3  | -14 | -4 | 16  | 1   | 13  | 1   | -1  |
| 50          | 8  | 10 | 1  | 11 | 22 | 20 | 21 | -13 | 8  | 29  | 14  | 14  | 3   | 0   |
| 55          | 8  | 30 | 13 | 16 | 30 | 31 | 30 | -11 | 14 | 37  | 22  | 14  | 16  | -1  |



| Time | D15 | D16 | D17 | D18 | D19 | D20 | D21 | D22 | D23 | D24 | D25 | D26 | D27 | D28 |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0    | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   | 0   |
| 10   | 6   | 5   | 5   | 0   | 3   | 0   | 4   | 5   | 2   | 3   | 0   | 0   | 3   | 3   |
| 20   | 3   | 5   | 7   | 0   | 1   | -1  | 2   | 4   | 1   | 4   | -2  | -1  | 2   | 6   |
| 30   | 4   | 5   | 10  | 0   | 3   | 1   | 1   | 1   | 1   | 5   | 0   | 2   | 3   | 7   |
| 40   | 5   | 4   | 9   | -1  | 4   | 3   | 7   | 3   | 2   | 4   | -4  | 1   | 2   | 7   |
| 50   | 19  | 20  | 22  | 6   | 12  | 11  | 16  | 15  | 12  | 13  | -1  | 1   | 5   | 8   |
| 55   | 28  | 29  | 31  | 15  | 9   | *   | 20  | 22  | 18  | 17  | 0   | 0   | 5   | 8   |

\*Reading malfunction

## 6.5 Observations

| Specimen | HH | MM | SS | E <sup>9</sup> | U <sup>10</sup> | Observation  |
|----------|----|----|----|----------------|-----------------|--|
|          | 00 | 00 | 00 |                | X               | <b>The test commences.</b>   |
| A+B      | 00 | 01 | 26 |                | X               | Steam/smoke release issues from letterplates.                          |
| A        | 00 | 02 | 54 |                | X               | Steam/smoke release issues at head of doorset.                         |
| A+B      | 00 | 04 | 00 | X              |                 | Both Doorsets have ignited.  |
| A        | 00 | 06 | 01 |                | X               | Steam/smoke release issues down leading edge of door.                  |
| A+B      | 00 | 11 | 00 |                | X               | Steam/smoke release issues from the letterplates.                      |
| A+B      | 00 | 12 | 44 |                | X               | Steam/smoke release issues from head of both doors.                    |
| A+B      | 00 | 14 | 29 |                | X               | Black liquid dropping from letterplate.                                |
| A        | 00 | 16 | 50 |                | X               | Bottom corner of door leading edge is observed discolouring.           |
| A+B      | 00 | 23 | 00 | X              |                 | Backs of letterplate covers fallen away and intumescent has sealed up. |
| A+B      | 00 | 28 | 00 |                | X               | No significant visible changes are observed.                           |
| A+B      | 00 | 25 | 00 |                | X               | No significant visible changes are observed.                           |
| A+B      | 00 | 33 | 30 | X              |                 | Architrave is starting to fall away in to furnace chamber.             |
| A        | 00 | 36 | 30 |                | X               | Steam/smoke release issues from letterplates.                          |
| A        | 00 | 39 | 30 |                | X               | Black liquid is observed leaking from letterplate.                     |

<sup>9</sup> Viewed from exposed surface of the test construction.

<sup>10</sup> Viewed from unexposed surface of the test construction.

| Specimen | HH        | MM        | SS        | E <sup>11</sup> | U <sup>12</sup> | Observation  |
|----------|-----------|-----------|-----------|-----------------|-----------------|--|
| B        | 00        | 40        | 30        |                 | X               | Black liquid is observed leaking from letterplate.   |
|          | 00        | 44        | 00        |                 | X               | No significant visible changes are observed.   |
| A+B      | 00        | 46        | 12        | X               |                 | Graphite seal around letterplate is observed coming away.  |
| A        | 00        | 47        | 23        |                 | X               | Top hinge side corner of the leaf is observed discolouring.  |
| A        | 00        | 53        | 20        |                 | X               | Heavy discolouring to leading edge.  |
| A        | 00        | 54        | 35        |                 | X               | Hinge top corner going black further down.   |
| A+B      | 00        | 55        | 31        |                 | X               | Letterplate black along top.   |
| A        | 00        | 58        | 53        |                 | X               | Hinge side below middle hinge start to discolour black.  |
| A        | 00        | 61        | 00        |                 | X               | Steam/smoke release issues from the back of frame.   |
| A        | 00        | 64        | 10        |                 | X               | Cotton pad integrity test is performed at the top hinge corner of frame, the pad discoloured but didn't ignite.  |
| A        | 01        | 65        | 09        |                 |                 | Cotton pad integrity test is performed at the top corner of the leading edge, the pad did not discolour or ignite.   |
| B        | 01        | 07        | 10        |                 |                 | Cotton pad integrity test is performed above the letterplate, the pad did not discolour or ignite.   |
| <b>A</b> | <b>01</b> | <b>07</b> | <b>54</b> |                 | <b>X</b>        | <b>Cotton pad integrity test is performed over the firestopping at the top hinge corner of frame, the pad ignited. Cotton pad integrity and by virtue insulation failure is deemed to have occurred.</b> |
| <b>A</b> | <b>01</b> | <b>08</b> | <b>34</b> |                 | <b>X</b>        | <b>Sustained flames issues at bottom of leading edge. Sustained flame integrity failure is deemed to have occurred.</b>  |
|          | <b>01</b> | <b>08</b> | <b>40</b> |                 |                 | <b>The test is discontinued at the request of the Test Sponsor.</b>  |

<sup>11</sup> Viewed from exposed surface of the test construction.

<sup>12</sup> Viewed from unexposed surface of the test construction.

## 6.6 Test Images



Figure 15 – The exposed surface of the test construction prior to commencement of the test



Figure 16 - The unexposed surface of the test construction prior to the commencement of the test



Figure 17 - The unexposed surface of the test construction after a test duration of 6 minutes



Figure 18 - The unexposed surface of the test construction after a test duration of 10 minutes





Figure 19 - The unexposed surface of the test construction after a test duration of 20 minutes



Figure 20 - The unexposed surface of the test construction after a test duration of 30 minutes





Figure 21 - The unexposed surface of the test construction after a test duration of 40 minutes



Figure 22 - The unexposed surface of the test construction after a test duration of 50 minutes



Figure 23 - The unexposed surface of the test construction after a test duration of 55 minutes



Figure 24 - The unexposed surface of the test construction after a test duration of 68 minutes



Figure 25 - The exposed surface of the test construction after the test was discontinued

## 7 On-going Implications

### 7.1 Limitations

This report details the method of construction, the test conditions and the results obtained when the specific element of construction described herein was tested following the procedure outlined in BS EN 1363-1, and where appropriate BS EN 1363-2. Any significant deviation with respect to size, constructional details, loads, stresses, edge or end conditions other than those allowed under the field of direct application in the relevant test method is not covered by this report and should be the subject to design appraisal by a competent individual.

Guidance on the field of direct application of results is presented in Appendix A.

### 7.2 Accuracy of Results

Due to the nature of fire resistance testing and the consequent difficulty in quantifying the uncertainty of measurement of fire resistance, it is not possible to provide a stated degree of accuracy of the result.

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

### 7.3 European Group of Organisations for Fire Testing (EGOLF)

Certain aspects of some fire test specifications are open to different interpretations. EGOLF have identified several such areas and have agreed Resolutions which define common agreement of interpretations between fire test laboratories which are members of the Group. Where such Resolutions are applicable to this test then they have been followed.

## Figures

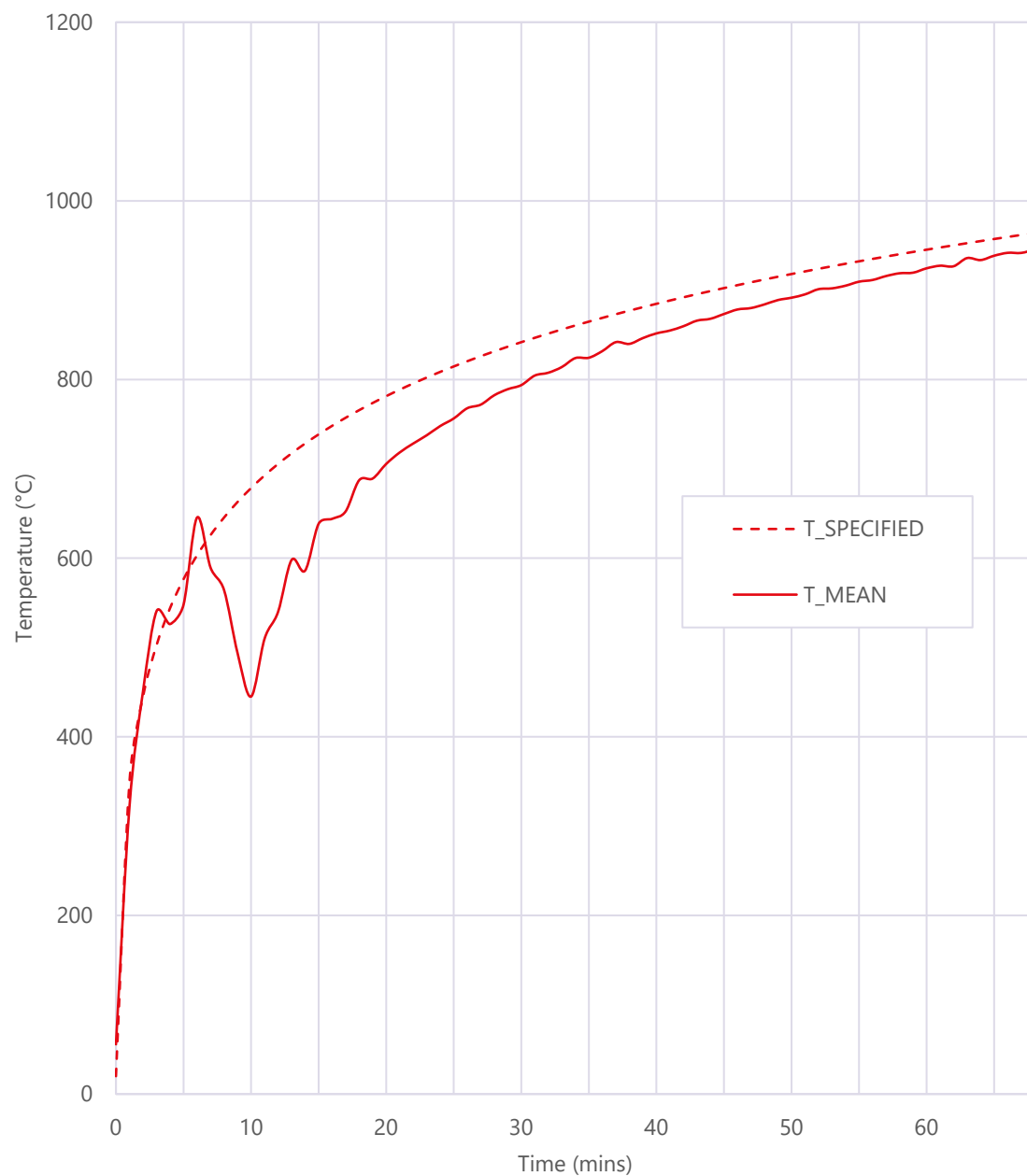


Figure 26 – Graph presenting the Time-Temperature distribution of the furnace

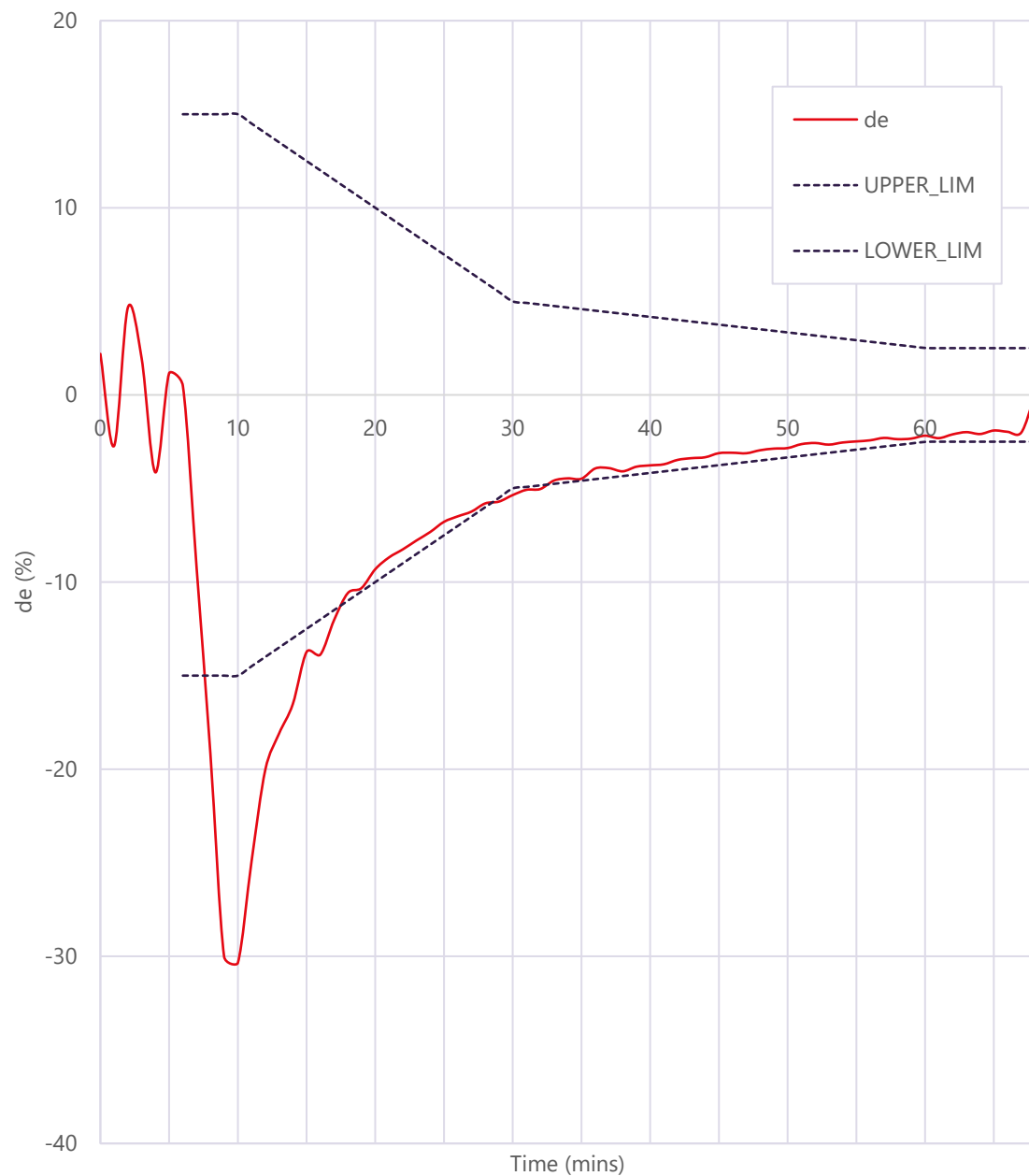


Figure 27 – Graph presenting the Time-Temperature percentage deviation of the furnace



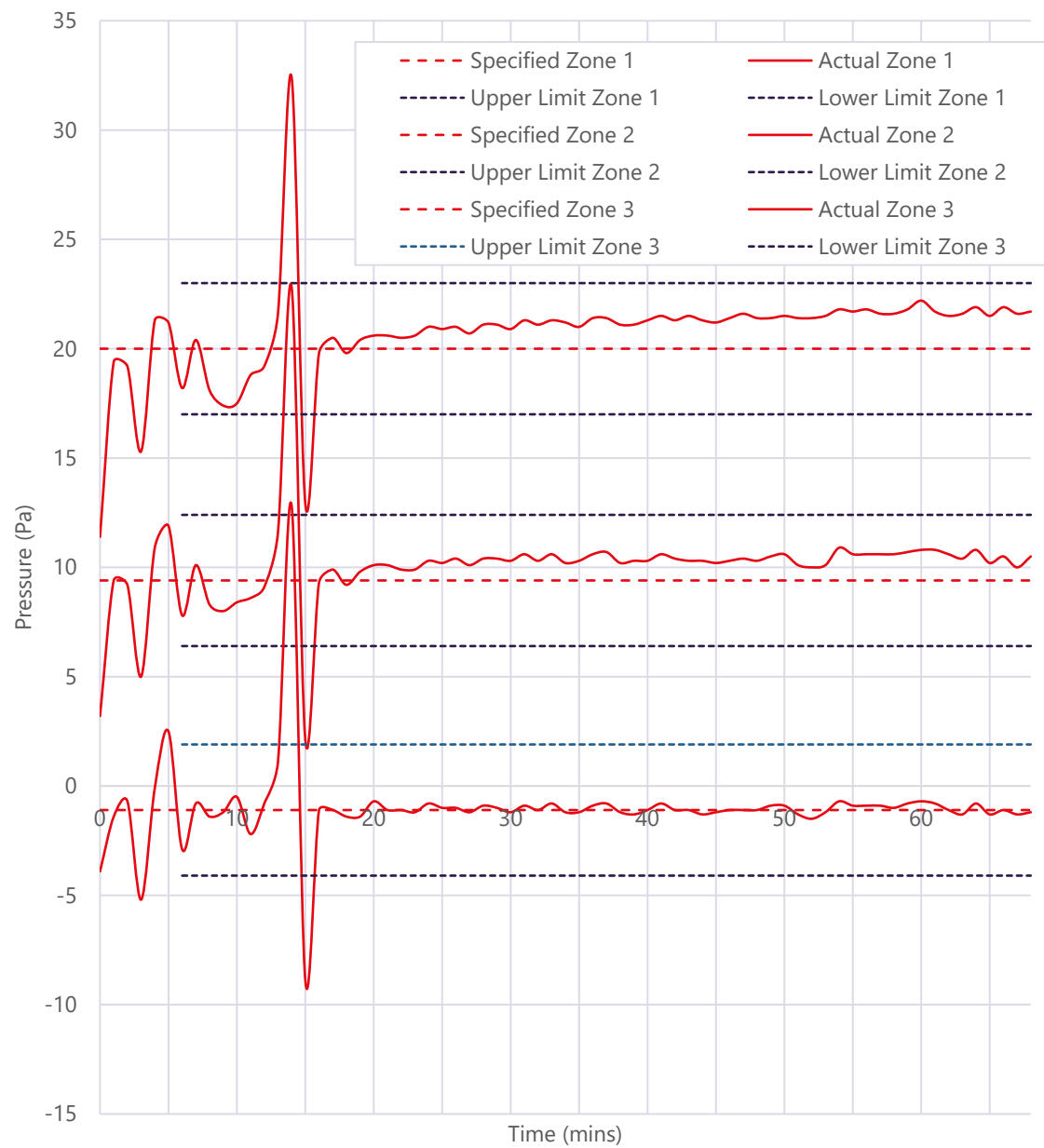


Figure 28 – Graph presenting the Time-Pressure distribution of the furnace

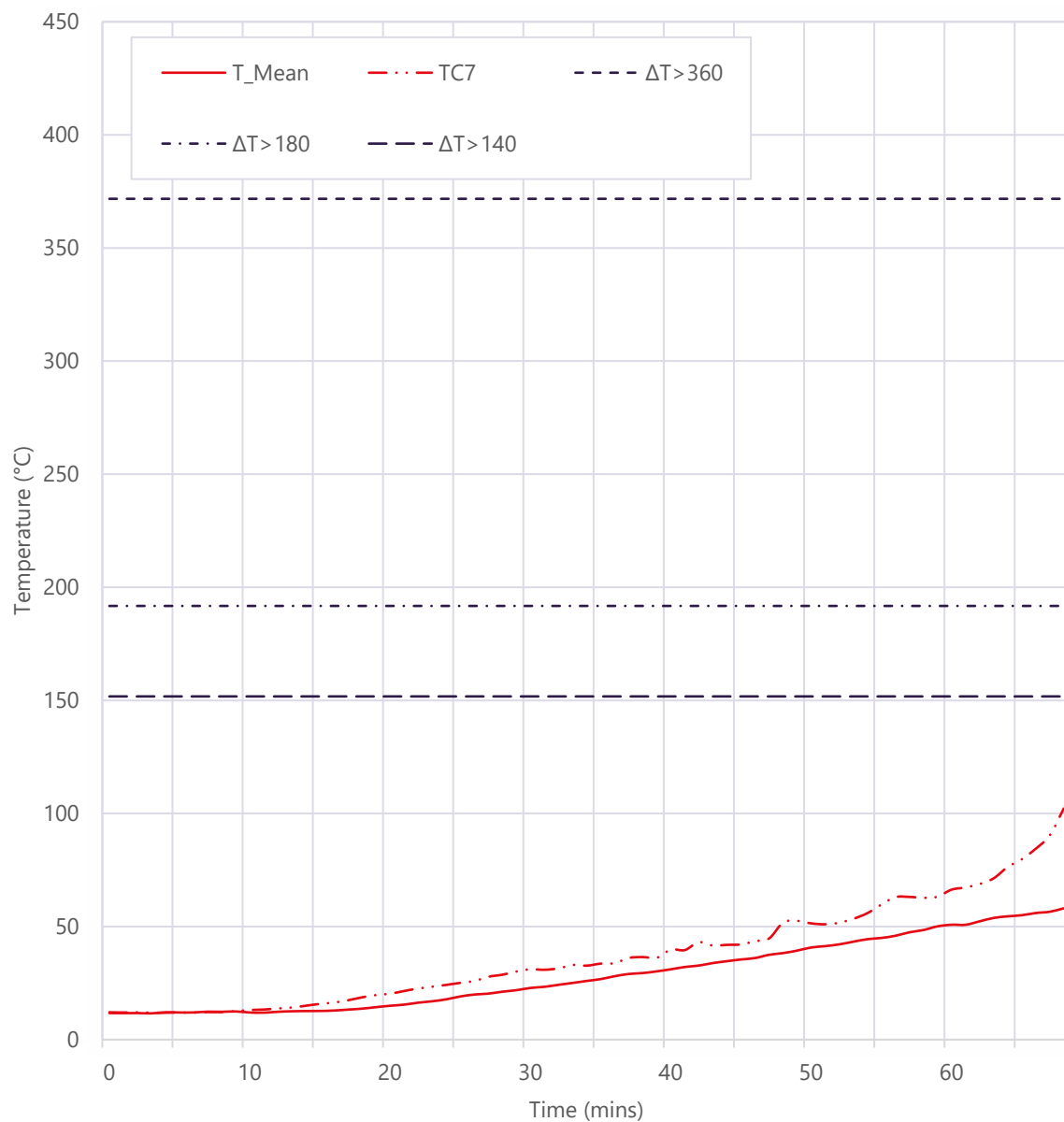


Figure 29 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen A



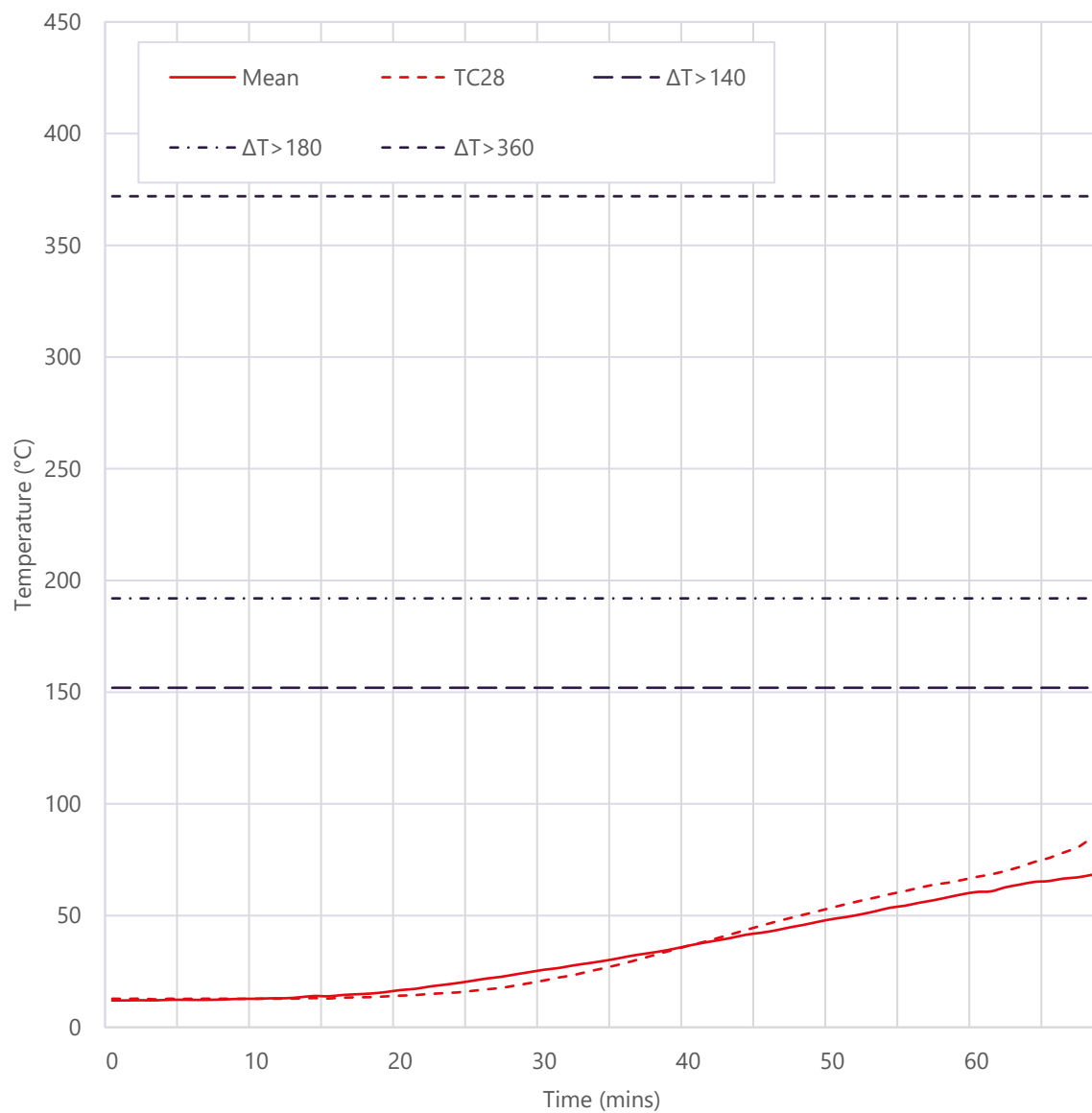


Figure 30 - Graph presenting the Time-Temperature distribution of the unexposed surface of Specimen B

## Tables

Table 1 – The temperatures recorded by the disc thermocouples used evaluate the mean and maximum temperature rise of the unexposed surface of Specimen A under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC1  | TC2  | TC3  | TC4  | TC5  |
|-------------|------|------|------|------|------|
| 0           | 11.2 | 12.5 | 11.7 | 11.6 | 11.7 |
| 4           | 11.1 | 12.5 | 13.4 | 11.5 | 11.9 |
| 8           | 11.1 | 12.6 | 13.9 | 11.5 | 12.4 |
| 12          | 10.9 | 12.9 | 13.8 | 12.0 | 12.0 |
| 16          | 11.0 | 13.7 | 13.0 | 13.0 | 13.6 |
| 20          | 11.2 | 15.8 | 16.7 | 15.5 | 15.7 |
| 24          | 11.7 | 18.9 | 20.7 | 19.0 | 18.8 |
| 28          | 12.4 | 22.4 | 25.3 | 23.4 | 22.5 |
| 32          | 13.1 | 26.4 | 28.9 | 26.9 | 25.9 |
| 36          | 14.5 | 30.7 | 33.8 | 31.2 | 30.0 |
| 40          | 15.0 | 35.0 | 36.7 | 34.9 | 33.9 |
| 44          | 15.9 | 39.5 | 41.3 | 38.6 | 38.1 |
| 48          | 16.5 | 44.1 | 44.9 | 43.1 | 42.7 |
| 52          | 17.6 | 49.0 | 49.2 | 47.1 | 47.7 |
| 56          | 18.8 | 53.7 | 52.8 | 51.7 | 52.6 |
| 60          | 21.1 | 59.0 | 58.6 | 57.3 | 58.0 |
| 64          | 22.7 | 63.5 | 62.4 | 61.5 | 62.5 |
| 68          | 24.0 | 67.5 | 66.2 | 66.0 | 66.6 |

Table 2 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the door leaf of Specimen A under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC14 | TC15 | TC16 | TC17 |
|-------------|------|------|------|------|
| 0           | 11.6 | 11.8 | 11.7 | 12.8 |
| 4           | 11.5 | 11.6 | 11.6 | 13.1 |
| 8           | 11.3 | 11.7 | 11.5 | 13.8 |
| 12          | 11.5 | 11.6 | 11.8 | 14.2 |
| 16          | 12.8 | 13.0 | 12.5 | 15.0 |
| 20          | 15.6 | 15.6 | 14.5 | 17.3 |
| 24          | 19.5 | 19.6 | 17.2 | 20.4 |
| 28          | 23.3 | 23.9 | 20.6 | 23.9 |
| 32          | 26.6 | 27.6 | 24.1 | 27.8 |
| 36          | 30.3 | 31.8 | 28.3 | 32.0 |
| 40          | 33.8 | 35.5 | 32.5 | 36.5 |
| 44          | 37.9 | 40.4 | 37.7 | 41.3 |
| 48          | 42.1 | 44.4 | 42.3 | 46.2 |
| 52          | 46.5 | 48.6 | 48.1 | 51.5 |
| 56          | 50.7 | 51.9 | 53.5 | 56.8 |
| 60          | 55.7 | 57.2 | 60.0 | 63.0 |
| 64          | 59.8 | 64.5 | 65.0 | 68.0 |
| 68          | 63.6 | 72.1 | 69.7 | 72.8 |

Table 3 – The temperatures recorded by the disc thermocouples used evaluate the maximum temperature rise of the door leaf of Specimen A under the supplementary procedure (I<sub>1</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC10  | TC11 | TC12 | TC13 |
|-------------|-------|------|------|------|
| 0           | 10.4  | 12.3 | 12.4 | 11.9 |
| 4           | 10.3  | 12.3 | 12.7 | 12.0 |
| 8           | 10.3  | 12.8 | 13.9 | 13.0 |
| 12          | 10.2  | 13.2 | 16.5 | 13.2 |
| 16          | 8.6   | 16.1 | 15.8 | 14.1 |
| 20          | 4.6   | 19.6 | 16.7 | 16.1 |
| 24          | -1.8  | 24.3 | 19.6 | 19.4 |
| 28          | -8.9  | 29.8 | 28.6 | 23.9 |
| 32          | -14.3 | 35.3 | 38.7 | 28.7 |
| 36          | -18.2 | 42.0 | 55.3 | 34.2 |
| 40          | -20.6 | 49.3 | 52.5 | 40.1 |
| 44          | -22.5 | 53.7 | 60.1 | 45.7 |
| 48          | -24.6 | 59.7 | 65.6 | 52.0 |
| 52          | -25.6 | 63.3 | 68.7 | 57.6 |
| 56          | -26.8 | 66.5 | 70.4 | 62.8 |
| 60          | -28.0 | 68.9 | 78.0 | 68.3 |
| 64          | -29.4 | 73.5 | 80.2 | 72.6 |
| 68          | -30.9 | 81.1 | 87.0 | 78.3 |

Table 4 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the frame/ transom members adjacent to the door leaf of Specimen A. Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC6  | TC7   | TC8  | TC9  |
|-------------|------|-------|------|------|
| 0           | 11.6 | 12.1  | 12.2 | 12.1 |
| 4           | 11.5 | 11.9  | 12.1 | 12.2 |
| 8           | 11.5 | 12.2  | 12.1 | 13.0 |
| 12          | 11.7 | 13.8  | 12.7 | 12.8 |
| 16          | 11.9 | 16.4  | 13.1 | 12.9 |
| 20          | 12.5 | 20.3  | 14.3 | 13.2 |
| 24          | 14.2 | 24.2  | 17.9 | 14.6 |
| 28          | 17.4 | 28.7  | 30.3 | 16.5 |
| 32          | 20.0 | 31.5  | 35.0 | 18.3 |
| 36          | 23.5 | 33.8  | 38.2 | 21.0 |
| 40          | 25.0 | 39.8  | 35.7 | 22.9 |
| 44          | 27.6 | 41.9  | 36.8 | 24.7 |
| 48          | 29.2 | 51.7  | 37.7 | 26.6 |
| 52          | 31.1 | 51.7  | 38.7 | 28.1 |
| 56          | 33.1 | 63.0  | 39.2 | 29.8 |
| 60          | 36.5 | 66.3  | 43.7 | 31.4 |
| 64          | 38.5 | 76.3  | 49.0 | 33.3 |
| 68          | 40.6 | 102.2 | 55.0 | 37.7 |

Table 5 – The temperatures recorded by the disc thermocouples used evaluate the mean and maximum temperature rise of the unexposed surface of Specimen B under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC18 | TC19 | TC20 | TC21 | TC22 |
|-------------|------|------|------|------|------|
| 0           | 12.6 | 12.4 | 12.2 | 11.1 | 11.6 |
| 4           | 12.5 | 12.5 | 13.7 | 11.2 | 11.6 |
| 8           | 12.5 | 12.4 | 14.2 | 11.6 | 11.9 |
| 12          | 12.7 | 12.7 | 16.5 | 11.4 | 11.7 |
| 16          | 13.8 | 14.2 | 18.0 | 12.7 | 13.6 |
| 20          | 16.1 | 16.9 | 19.9 | 14.5 | 15.9 |
| 24          | 19.4 | 20.6 | 22.6 | 16.8 | 19.8 |
| 28          | 23.4 | 24.7 | 26.7 | 19.8 | 23.9 |
| 32          | 27.5 | 29.4 | 30.8 | 23.1 | 27.7 |
| 36          | 31.8 | 33.4 | 35.8 | 27.0 | 31.8 |
| 40          | 36.1 | 38.1 | 41.8 | 30.8 | 35.8 |
| 44          | 40.8 | 42.7 | 49.3 | 34.9 | 39.5 |
| 48          | 45.6 | 47.2 | 53.4 | 39.4 | 43.7 |
| 52          | 50.5 | 52.3 | 57.9 | 44.0 | 48.3 |
| 56          | 55.4 | 57.3 | 63.4 | 49.4 | 53.1 |
| 60          | 60.6 | 62.3 | 67.7 | 54.4 | 57.8 |
| 64          | 64.8 | 66.9 | 73.2 | 58.5 | 61.9 |
| 68          | 68.1 | 70.5 | 74.9 | 62.0 | 65.7 |

Table 6 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the door leaf of Specimen B under the normal procedure (I<sub>2</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC31 | TC32 | TC33 | TC34 |
|-------------|------|------|------|------|
| 0           | 11.6 | 11.7 | 11.0 | 10.9 |
| 4           | 11.5 | 11.7 | 10.9 | 10.9 |
| 8           | 11.9 | 11.7 | 10.9 | 11.1 |
| 12          | 11.9 | 11.7 | 11.2 | 11.4 |
| 16          | 13.4 | 12.5 | 12.6 | 12.9 |
| 20          | 15.6 | 13.9 | 15.6 | 16.0 |
| 24          | 18.8 | 16.0 | 20.0 | 20.6 |
| 28          | 22.2 | 18.9 | 24.6 | 24.8 |
| 32          | 25.9 | 22.3 | 28.7 | 28.7 |
| 36          | 30.0 | 26.4 | 32.6 | 32.5 |
| 40          | 34.3 | 30.7 | 36.8 | 36.8 |
| 44          | 38.9 | 35.2 | 41.3 | 41.2 |
| 48          | 44.1 | 40.1 | 45.6 | 45.5 |
| 52          | 49.3 | 45.1 | 50.4 | 50.4 |
| 56          | 54.7 | 50.3 | 55.1 | 54.9 |
| 60          | 60.5 | 55.3 | 59.5 | 59.5 |
| 64          | 65.1 | 59.5 | 63.5 | 63.6 |
| 68          | 69.2 | 64.2 | 67.1 | 67.8 |

Table 7 – The temperatures recorded by the disc thermocouples used evaluate the maximum temperature rise of the door leaf of Specimen B under the supplementary procedure (I<sub>1</sub>). Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC27 | TC28 | TC29 | TC30 |
|-------------|------|------|------|------|
| 0           | 12.0 | 12.8 | 12.5 | 11.9 |
| 4           | 12.1 | 12.8 | 12.4 | 12.0 |
| 8           | 12.9 | 12.8 | 12.5 | 12.1 |
| 12          | 12.6 | 12.8 | 12.6 | 12.2 |
| 16          | 14.3 | 13.3 | 13.6 | 13.4 |
| 20          | 15.2 | 14.2 | 16.0 | 17.1 |
| 24          | 17.1 | 15.6 | 19.8 | 23.1 |
| 28          | 20.0 | 18.7 | 24.8 | 30.0 |
| 32          | 23.3 | 23.3 | 30.1 | 36.2 |
| 36          | 27.5 | 29.4 | 35.5 | 41.1 |
| 40          | 32.0 | 36.5 | 41.3 | 45.3 |
| 44          | 36.8 | 43.6 | 47.2 | 49.3 |
| 48          | 42.1 | 50.4 | 52.4 | 52.4 |
| 52          | 46.9 | 56.7 | 56.6 | 55.8 |
| 56          | 51.4 | 62.4 | 59.9 | 58.8 |
| 60          | 55.3 | 67.3 | 62.5 | 61.7 |
| 64          | 59.2 | 74.0 | 64.9 | 64.8 |
| 68          | 62.4 | 84.7 | 66.6 | 67.0 |



Table 8 – The temperatures recorded by the disc thermocouples used to evaluate the maximum temperature rise of the frame/ transom members adjacent to the door leaf of Specimen B. Values are in Degrees Celsius (°C) unless otherwise stated.

| Time (mins) | TC23 | TC24 | TC25 | TC26 |
|-------------|------|------|------|------|
| 0           | 11.6 | 12.1 | 13.6 | 12.4 |
| 4           | 11.6 | 11.9 | 13.5 | 12.0 |
| 8           | 11.8 | 11.8 | 12.9 | 12.0 |
| 12          | 11.7 | 11.9 | 13.5 | 11.8 |
| 16          | 12.1 | 12.2 | 13.6 | 12.2 |
| 20          | 12.7 | 12.6 | 14.6 | 12.4 |
| 24          | 14.2 | 13.6 | 16.9 | 13.0 |
| 28          | 15.5 | 14.8 | 19.1 | 14.2 |
| 32          | 17.5 | 16.5 | 21.2 | 16.9 |
| 36          | 18.8 | 18.7 | 23.4 | 19.9 |
| 40          | 20.8 | 21.1 | 26.7 | 22.6 |
| 44          | 22.0 | 23.5 | 29.6 | 25.2 |
| 48          | 23.6 | 25.3 | 32.4 | 27.5 |
| 52          | 25.3 | 27.5 | 34.6 | 29.3 |
| 56          | 26.3 | 29.6 | 37.1 | 31.6 |
| 60          | 27.6 | 31.7 | 39.2 | 33.5 |
| 64          | 28.9 | 34.7 | 42.2 | 35.3 |
| 68          | 30.7 | 43.4 | 45.0 | 37.0 |

## Appendix A Field of Direct Application of Results

### A.1 General

The field of direct application defines the allowable changes to the test specimen following a successful fire resistance test. These variations can be applied automatically without the need for the sponsor to seek additional evaluation, calculation or approval.

### A.2 Materials And Construction

#### A.2.1 General

Unless otherwise stated in the following text, the materials and construction of the doorset or openable window shall be the same as that tested. The number of leaves and the mode of operation (e.g. sliding, single action or double action) shall not be changed.

##### A.2.1.1 Specific Restrictions on Materials and Construction (Timber Constructions)

The thickness of the door panel(s) shall not be reduced but may be increased.

The door panel thickness and/or density may be increased provided the total increase in weight is not greater than 25%.

For timber-based board products (e.g. particle board, blockboard, etc), the composition (e.g. type of resin) shall not change from that tested. The density shall not be reduced but may be increased.

The cross-sectional dimensions and/or the density of the timber frames (including rebates) shall not be reduced but may be increased.

#### A.2.2 Decorative Finishes

##### A.2.2.1 Paint

Where the paint finish is not expected to contribute to the fire resistance of the door, alternative paints are acceptable and may be added to door leaves or frames for which unfinished test specimens were tested. Where the paint finish contributes to the fire resistance of the door (e.g. intumescent paints) then no change shall be permitted.

##### A.2.2.2 Decorative Laminates

Decorative laminates and timber veneers up to 1,5 mm thickness may be added to the faces (but not the edges) of doors that satisfy the insulation criteria (normal or supplementary procedure).

Decorative laminates and timber veneers applied to door leaves that do not satisfy the insulation criteria (normal or supplementary procedure) and/or those in excess of 1,5 mm thickness shall be tested as part of the test specimen. For all doorsets tested with decorative laminate faces, the only variations possible shall be within similar types and thicknesses of material (e.g. for colour, pattern, supplier).

#### A.2.3 Fixings

The number of fixings per unit length used to attach doorsets to supporting constructions may be increased, but shall not be decreased and the distance between fixings may be reduced but shall not be increased.

#### A.2.4 Building Hardware

The number of hinges and dog bolts may be increased but shall not be decreased.

NOTE 1 The number of movement restrictors such as locks and latches is not covered by direct application.

Where a doorset has been tested with a door closing device fitted, but with the retention force released in accordance with 10.1.4, the doorset may be provided either with or without that closing device, i.e. where self closing characteristics are not required.

NOTE 2 Interchange of building hardware is not covered by the field of direct application.

### A.3 Permissible Size Variations

#### A.3.1 General

Doorsets of sizes different from those of tested specimens are permitted within certain limitations, but the variations are dependent on product type and the length of time that the performance criteria are fulfilled.

The increase and decrease of dimensions permitted by the field of direct application are applicable to the overall size and to each door leaf, each side panel and each over panel independently.

In accordance with 13.2.2.3, the dimensions (width and height) of any glass pane cannot be increased.

#### A.3.2 Test Periods

The amount of variation of size permitted is dependent on whether the classification time was just reached (Category 'A') or whether an extended time (Category 'B') in accordance with the values shown in Table 9 were fulfilled before the test was concluded.

Table 9 - Category B overrun requirements

| Classification time (min) | Performance criteria fulfilled for at least (min) |
|---------------------------|---|
| 15                        | 18  |
| 20                        | 24  |
| 30                        | 36  |
| 45                        | 52  |
| 60                        | 68  |
| 90                        | 100   |
| 120                       | 132   |
| 180                       | 196   |
| 240                       | 260   |

#### A.3.3 Size variation related to product type

##### A.3.3.1 General

The rules to cover increase or decrease of size without additional considerations are applicable only to six main product groups:

- hinged and pivoted doorsets and openable windows;
- horizontally sliding and vertically sliding doorsets including sectional doorsets;

- c) steel single skin folding shutters doorsets (uninsulated);
- d) other sliding and folding doorsets (insulated);
- e) rolling shutter doorsets;
- f) openable fabric curtains.

No increases in size are permitted for doorsets which are required to satisfy radiation control levels unless the insulation criteria are also satisfied. This is because any increase in size will increase the radiation received at a fixed distance away from the door. There are calculation methods which can be used to determine acceptable size increases for such doors; however, these are beyond the scope of direct application. Doors that satisfy both the radiation control levels and insulation criteria may have their sizes increased as outlined in Annex B. This is accepted because the increase in radiation resulting from a size increase allowed under this section, for an insulated door, will be such that it will still satisfy the required radiation control levels. Size decreases are permitted for both doors which satisfy radiation control levels and those which satisfy insulation criteria and radiation control levels.

Permissible variations for each product group are detailed in Annex B which also contains some examples relating to hinged/pivoted doorsets.

Size increases for doorsets which do not fall into one of the six groups given above are the subject of extended application.

#### A.3.3.2 Hinged and pivoted doorsets and openable windows

For Category 'A' tests with no overrun of classification period, no increase is allowed. Unlimited reductions from the tested specimen are permitted with the exception of insulated metal doors where the size reduction is limited.

For Category 'B' tests (with specified overrun of classification period) all smaller sizes are permitted and increases in height and width are permitted as stated in Annex B.

#### A.3.3.3 Other Changes

For smaller doorset sizes the relative positioning of movement restrictors (e.g. hinges and latches) shall remain the same as tested or any change to the distances between them will be limited to the same percentage reduction as the decrease of test specimen size.

For larger doorset sizes the following shall also apply:

- a) the height of the latch above floor level shall be equal to or greater than the tested height, and such increase in height shall be at least proportional to the increase in door height;
- b) the distance of the top hinge from the top of door leaf shall be equal to or less than that tested;
- c) the distance of the bottom hinge from bottom of door leaf shall be equal to or less than that tested;
- d) where three hinges or distortion preventers are used, the distance between the bottom of the door leaf and centre restraint shall be equal to or greater than that tested.

#### A.3.3.4 Gaps

The maximum size of the primary gaps presented on page 8 is restricted to the following sizes in practice:

$$x = (a + b)/2 + 2 \text{ mm}$$

where

x is the maximum permitted gap size;

a is the maximum measured gap size;

b is the mean measured gap size.

The minimum size of the primary gaps may be reduced.

The permitted gap size may be different for different parts of the door or window.

## A.4 Asymmetrical Assemblies

### A.4.1 General

BS EN 1363-1 states that for separating elements required to be fire resisting from both sides, two test specimens shall be tested (one from each direction) unless the element is fully symmetrical, i.e. the construction of the doorset is identical on both sides of the centre line when viewed in plan (from above). However, in some cases it is possible to develop rules whereby the fire resistance of an asymmetrical door assembly tested in one direction can apply when the fire exposure is from the other direction. The possibility to develop such rules increases if the consideration is limited to certain types of door assembly and on the criteria being applicable (e.g. integrity only doors). The following rules represent the minimum level of common agreement which shall be followed. The rationale behind the rules is given in BS EN 1634-1:2014+A1:2018 § Annex C.

### A.4.2 Specific Rules

The rules governing the applicability of tests carried out in one direction to other directions are given in Table 10 and are based on the following premises:

- 1) that each of the door leaves are themselves of symmetrical construction with the exception of the edges (e.g. lock/leading edge and hinge edge or double rebated doors);
- 2) that any restraining/supporting elements of building hardware has been included in a test to BS EN 1634-1 when exposed in both directions so that they will retain their function when exposed to the heat of the test;
- 3) that there is no change in the number of leaves or the mode of operation (e.g. sliding, swinging, single action or double action);
- 4) that side, over and transom panels are excluded from Table 10 unless they are fully symmetrical.

Table 10 lists the type of door assembly for which rules can be generated and gives the direction in which it should be tested to cover the opposite direction. The separate columns for the integrity and insulation criteria reflect the different ability to make rules for integrity only doors as opposed to those which satisfy both criteria. A 'Yes' means that it is possible to identify the direction of test which covers the opposite direction. A 'No' indicates that it is not possible to identify the direction which will cover the opposite direction.

Table 10 - Type of doorset and direction to be tested to cover the opposite direction

| Type of doorset  | Direction to be tested to cover opposite direction  | Integrity | Insulation | Radiation |
|--|---|-----------|------------|-----------|
| Hinged or pivoted, timber leaf, timber frame   | Opening into the furnace  | yes       | yes        | yes       |
| Hinged or pivoted, timber leaf, metal frame (no transom)   | Opening into the furnace  | yes       | no         | yes       |
| Hinged, metal leaf, metal frame (not pivoted)  | Opening away from Furnace   | yes*      | no         | yes       |
| Rolling shutter  | Barrel and supporting components fixed on the face of the supporting wall on the fire side      | yes       | no         | no        |
| Sliding/folding  | Sliding/folding supporting components fixed on the face of the supporting wall on the fire side | yes       | no         | no        |
| Operable fabric curtains   | Not possible to define a scenario   |           |            |           |
| *This only applies to doors without insulation in the core and with a movement restrictor at approximately mid-height on the hinge side. |   |           |            |           |

## A.5 Supporting Constructions

### A.5.1 General

The fire resistance of a door assembly tested in one form of standard supporting construction may or may not apply when it is mounted in other types of construction. Generally, the rigid and flexible types are not interchangeable and rules governing the direct application within each group are given in 13.5.2 to 13.5.4. However, in some cases it is possible for the result of a test on a particular type of door assembly tested in one form of standard supporting construction to be applicable to that door assembly when mounted in a different type of standard supporting construction. Specific rules governing the situation for hinged and pivoted door assemblies are given in 13.5.4. The rationale behind the rules is given in BS EN 1634-1:2014+A1:2018 § Annex C.

### A.5.2 Flexible Standard Supporting Constructions

The fire resistance of a door tested in one of the flexible standard supporting constructions specified in BS EN 1363-1:2020 can be applied to a door mounted in the same manner in a wall or partition which is of the board covered type with studs made from metal or timber. The fire resistance of the door is only applicable to a door mounted in a partition with a fire resistance equal to or greater than the partition in which it was tested.

The fire resistance of the door is only applicable to a door mounted in a partition with a fire resistance equal to or greater than the partition in which it was tested.

The fire resistance of the partition shall have been established separately in a previous test.

### A.5.3 Specific Rules for Hinged or Pivoted Doorsets

- a) For timber door leaves hung in timber frames, the result of a test in a rigid standard supporting construction is applicable to that door assembly mounted in a flexible construction.
- b) For timber door leaves hung in timber frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction.
- c) For timber door leaves hung in metal frames, the result of a test in a flexible standard supporting construction is applicable to that door assembly mounted in a rigid construction but not vice versa.
- d) For insulated metal door leaves hung in metal frames, there is no applicability of results in rigid standard supporting construction to flexible constructions or vice versa; to cover rigid and flexible types, tests shall be undertaken in each type of standard supporting construction.
- e) For uninsulated metal doors, the result of a test in a rigid standard supporting construction is applicable to that door assembly mounted in a flexible construction, but not vice versa.

The rules above assume that the fixing methods used in each type of supporting construction are appropriate to that construction. Thus for example in a), the test on the timber door leaf in a timber frame will have been carried out with appropriate fixings for timber frames in rigid constructions. The result is applicable to a timber door leaf in a timber frame mounted into a flexible construction with appropriate fixings for timber frames in flexible constructions.