Fire endurance and hose stream test in accordance with UL 10B on two single-leaf access panels.

Prepared for:
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Protecting People, Property and the Planet

Test in accordance with UL 10B on two Fireproofing Services Ltd access panels.

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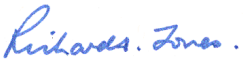
Signature 

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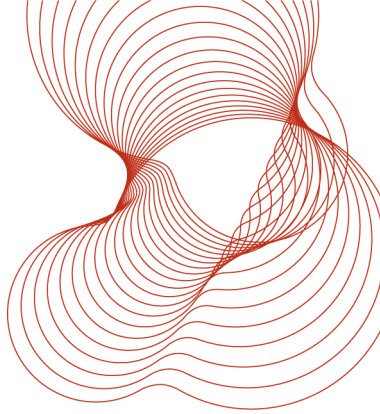


SUMMARY

Two single-leaf steel / plasterboard access panels (each mounted in a steel frame) fixed into a 210mm-thick brick wall, were subjected to a fire endurance and hose stream test, in accordance with UL 10B on 25th March 2008.

Both access panels were of the same construction, nominally 1935mm high x 835mm wide, comprising a single leaf constructed from polyester powder coated 1.0mm-thick Zintec steel skin on one side and 12.5mm-thick Megadeco plasterboard on the other side. There was no insulation within the panel leaves and the panel leaves were hung in a steel frame incorporating a smoke seal. The two access panels were mounted with one opening away and one opening towards the furnace.

For identification, the access panel opening away from the furnace is referred to as panel A and the panel opening towards the furnace as panel B.

The access panels performed as follows:

Access Panel A - Fire retardant properties

This access panel maintained its structural integrity throughout the 120 minute duration of the fire endurance test. The performance of the access type fire door assembly was within the “conditions of acceptance” specified in the standard for the 1½ hour period.

Access Panel A - Hose Stream properties

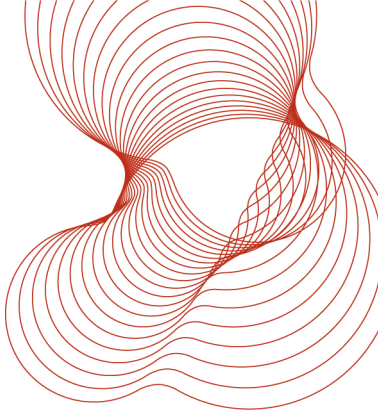
This access panel maintained its structural integrity throughout the hose stream test. The performance of the access type fire door assembly was within the “conditions of acceptance” specified in the standard.

Access Panel B - Fire retardant properties

This access panel maintained its structural integrity for the first 44 minute duration of the fire endurance test. During the 44th minute, flaming occurred on the unexposed face, meaning that performance of the access type fire door assembly was not within the “conditions of acceptance” specified in the standard after this time. The access panel was therefore within the ”conditions of acceptance” for the ½ hour period.

Access Panel B - Hose Stream properties

This access panel maintained its structural integrity throughout the hose stream test. The performance of the access type fire door assembly was within the “conditions of acceptance” specified in the standard.



1 OBJECTIVE

To determine, at the request of Fire Proofing Services Ltd., the performance of two access panels in accordance with the standard fire and hose stream exposure tests specified in UL 10B.

2 CONSTRUCTION

2.1 General

The test construction comprised two single-leaf hinged steel / plasterboard door and steel frame assemblies supplied by Fire Proofing Services Ltd, mounted into apertures 1995mm high x 895m wide, in a 210mm-thick brick wall. The access panels provided a clear openings, 1935mm high x 835mm wide, and was erected with one panel opening away from the furnace (panel A) and one opening towards the furnace (panel B).

BRE had no involvement in the selection of the test specimen

Details of the access panel constructions were supplied by the sponsor and are given in the attached Figures. As the doors were supplied fully constructed, the description of the construction is taken from written details supplied by the sponsor. These were verified where possible by a visual surface examination of the specimens.

The test construction before the test is shown in the attached Photographs.

2.2 Access panel doors

Each door tray consisted of a 1.0mm thick Zintec steel skin, strengthened with pre-formed 1.0mm thick vertical and horizontal stiffeners welded to the sides and top and bottom edges of each door tray.

A 12.5mm thick Lafarge Megadecco wallboard was screw-fixed to the rear of each door tray using 32mm drywall screws and washers. There was no insulation within the door cavity space between the Lafarge board and inner face of the door. The rear of the Megadeco wallboard was painted with one coat of Lafarge Dry Wall Sealer.

Each door hinge consisted of a 1.5mm thick mild steel continuous hinge welded to the inside face of the door tray, which was fitted to the panel frame using M6 bolts and nuts with washers.

The main locking device was a 3-point locking system using 8mm-diameter rods locking into the frame top and bottom, with a central lock on the locking side. A tamper proof lock insert was fitted to the central lock hole.

White plastic dome plug spacers (16mm diameter) were inserted into the two holes top and bottom of each door tray edge, the holes positioned approximately 100mm in from the door sides.

Polypropylene smoke seals were fitted to the inside of the rear flanges on the door frame.

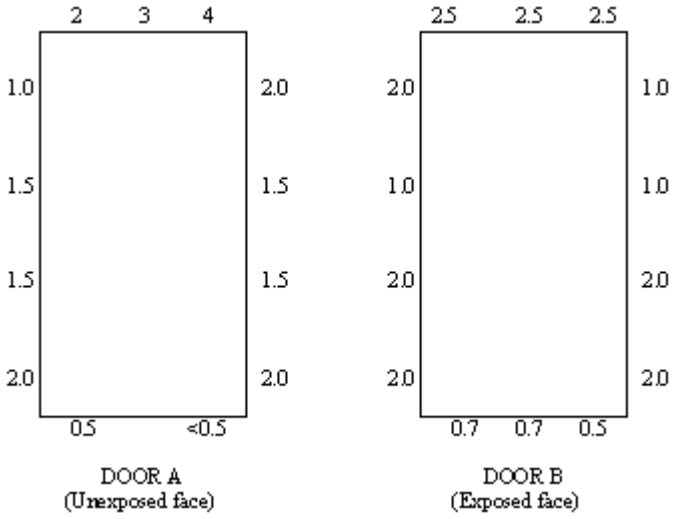
2.3 Access panel frame

This consisted of a 1.2mm thick Zintec steel section with M6 bolts welded to the hinge side 50mm in from each edge and then at 470mm centres. The 25mm wide front flange was mitred in each corner.

The panel frame had a polypropylene continuous smoke seal around the inside rear flange.

2.4 Dimensions between door leaves and frame and between leaves

The gap between the door leaf edges and the frame was measured at the top, bottom and both edges of both the access panels. The measurements (in mm) and their respective positions are given in the sketch below.



3 TEST PROCEDURE

3.1 General

Both the fire endurance and hose stream tests were carried out on 25th March 2008 in accordance with UL 10B (Fire Tests of Door assemblies). The tests were witnessed by Mr T. Beasley, representing the sponsor. The ambient temperature at the start of the test was 11°C.

3.2 Fire Endurance Test

3.2.1 General

Throughout the fire test, observations were made on the condition of the unexposed surfaces and all developments pertinent to the performance of the door assemblies, including reference to stability, movement of operable components, development of through openings and flame passage.

3.2.2 Furnace control

The furnace temperature was controlled using bi-metal thermocouples (each contained within a wrought-iron pipe) arranged evenly within the furnace so that the mean temperature recorded followed the time/temperature relationship specified in UL 10B.

A pressure sensing head 2.4m above the base of the furnace monitored the pressure in the furnace. The pressure conditions within the furnace were maintained so that a neutral pressure (with the laboratory) existed at the top of the door leaves.

3.2.3 Specimen temperature measurements

The temperature of the unexposed face of each access panel leaf was monitored at three locations using surface thermocouples of the type specified in the standard. The position of the thermocouples is given in the attached photographs.

3.3 Hose Stream Test

3.3.1 General

Immediately after the 120 minute fire exposure test, the test assembly was withdrawn from the furnace and subjected to the impact and cooling effects of the 30psi hose stream for 16 seconds per m^2 area of door leaf, as specified in Table 10.1 of the standard ANSI/UL 10B.

4 RESULTS

4.1 Fire Endurance test

4.1.1 Observations

Observations made during the test are given in the following table.

Time minutes	Observation
0	Fire endurance test started.
4	The surface coating of door B is blistering and smoking.
7	Some smoke is coming from the top of door A and from the interface between the Megadecco board and steel surround of the door leaf of door B.
27	The surface of door leaf B is darkening as it heats up. Some slight distortion on the surface of leaf A. Some smoke is still coming from the leaf / frame interface of access panel B, near the top.
35	The surface of door leaf A is darkening.
40	A small glow was observed from the surface of the Megadecco board on door B from the location where one of the surface thermocouples as become detached. The surface of this door leaf is also continuing to darken as it heats up.
44½	Flaming from the surface of door leaf B for approximately 8 seconds. The flaming was not adjacent to the edge of the door leaf.
47	Further flaming (for approximately 4 seconds) occurred on the surface of door leaf B.
56	The perimeter of access panel B is not darkening as it heats up. A red glow is visible at the corners of the leaf, at locations where the Megadecco board has cracked.
62	Flaming for approximately 10 seconds was observed from the surface (near the bottom) of door leaf B.
64	Flaming for approximately 5 seconds was observed from the surface of door leaf B.
73	Door leaf B has distorted (relative to its frame) by a maximum of approximately 20mm at approximately ⅔ height of the specimen.
120	Fire endurance test stopped.

No flaming occurred on the unexposed face of access panel A during the classification period.

The hardware held the doors closed in accordance with the conditions of acceptance for an exposure period of 2 hours. The latch bolts were engaged after the test.

Each test assembly withstood the fire endurance test, without developing openings through the assembly.

Each door remained in the opening during the fire endurance test.

The separation of all of the door edges from their frames was less than 0.5 inches at the latch locations.

The door frames remained securely fastened to the wall on all sides and did not permit through openings between the door or between frame and adjacent wall.

4.1.2 Temperatures recorded

The mean furnace temperature recorded during the test is given together with the specified curve in the attached graphs. Surface temperatures recorded on the unexposed face of both access panels are also given in the graphs.

4.2 Hose Stream Test

Both access type fire door assemblies remained in the opening during the hose stream test.

The hardware held the doors closed in accordance with the conditions of acceptance for an exposure period of 2 hours. The latch bolts were engaged after the test. The hardware was not operable after the test.

5 PERFORMANCE CRITERIA

A door assembly shall be considered as meeting the requirements for intended performance when it remains in the opening during the fire endurance test and hose stream test within the following limitations.

Openings:

> The test assembly shall withstand the Fire Endurance Test and Hose Stream Test without developing openings anywhere through the assembly.

Flaming:

> No flaming shall occur on the unexposed surface of the assembly during the first 30 minutes of the classification period.
>
> After 30 minutes, intermittent light flaming (152mm long) for periods not exceeding 5 minute intervals is capable of occurring along the edges of doors.

Light flaming is capable of occurring during the last 15 minutes of the classification period on the unexposed surface area of the door, when it is contained within a distance of 38.1mm from a vertical door edge and within 76.2mm from the top edge of the door.

Door movement:

The movement of swinging doors shall not result in any portion of the edges adjacent to the door frame moving from the original position in a direction perpendicular to the plane of the door more than the thickness of the door during the first half of the classification period, nor more than 1.5 times the door thickness during the entire classification period or as a result of the hose stream test.

An assembly consisting of a swinging door shall not separate more than 12.7mm at the latch location

Door frames to be evaluated with doors shall remain securely fastened to the wall on all sides and shall not reveal through-openings between frame and doors or between frame and adjacent wall.

6 CONCLUSION

The following conclusions represent the judgment of BRE Global, based upon the results of the examination and the test presented in this report as they relate to established principles and previously recorded data.

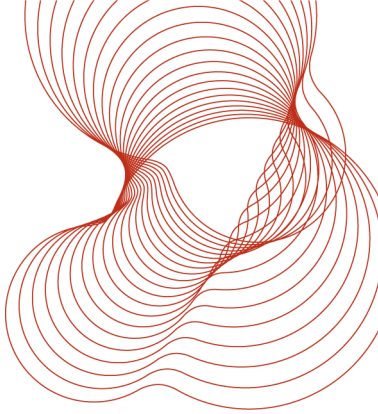
6.1 Fire retardant properties

Access panel type fire door assembly A (opening away from the furnace) as described in this report, maintained its structural integrity throughout the 120 minute fire endurance test. The performance of this access type fire door assembly was within the “conditions of acceptance” specified in the standard for the 1½ hour period.

Access panel type fire door assembly B (opening towards the furnace) as described in this report, maintained its structural integrity for the first 44 minutes of the fire endurance test, when flaming occurred in a non-permissable area of the door leaf. The performance of this access type fire door assembly was not within the “conditions of acceptance” specified in the standard after 44 minutes. The access panel was therefore within the ”conditions of acceptance” for the ½ hour period.

6.2 Hose stream properties

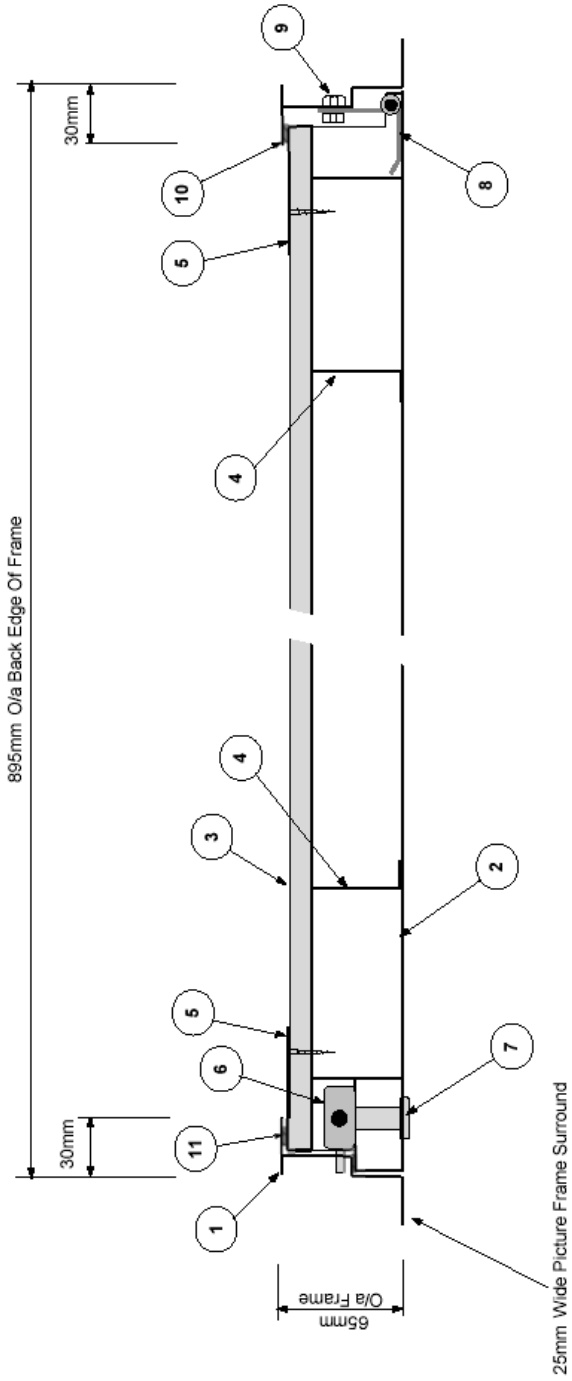
Both access panel type fire door assemblies, as described in this report, maintained their structural integrity throughout the hose stream test. The performance of this access type fire door assemblies were within the “conditions of acceptance” specified in the standard.



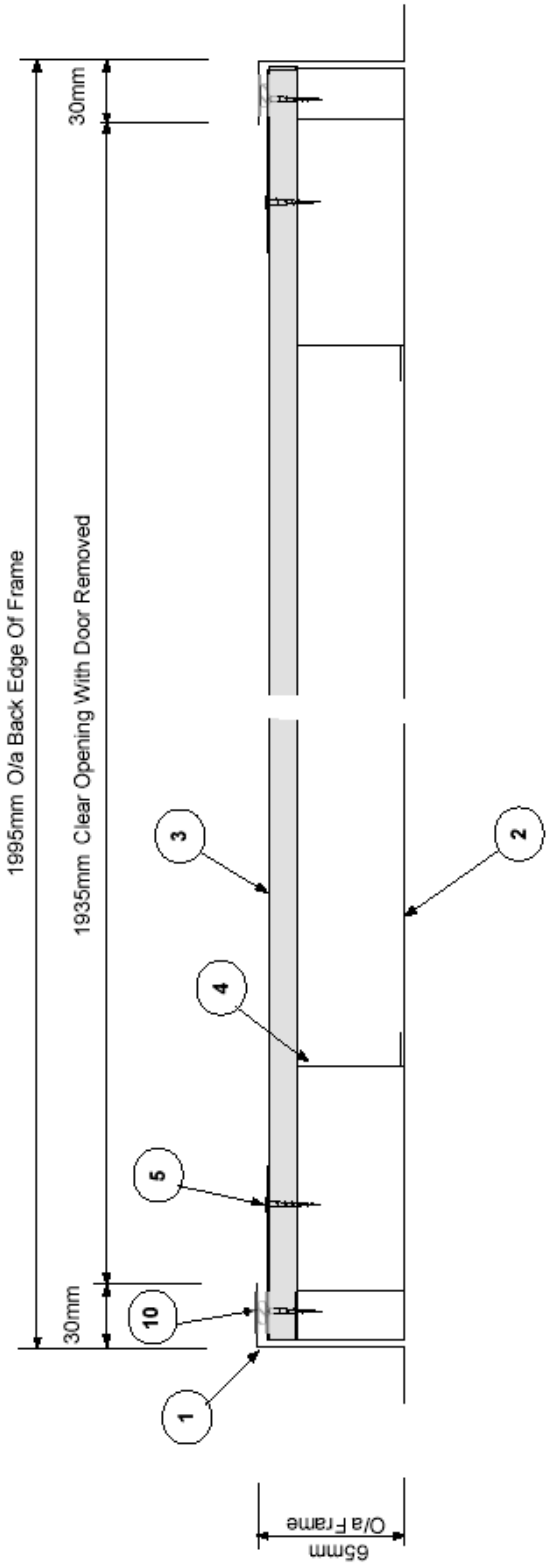
7 REFERENCE

- Fire Tests of Door Assemblies, ANSI/UL 10B (Ninth Edition, 1997).

8 FIGURES



Section showing hinge and locking systems (For Key, see page 14)

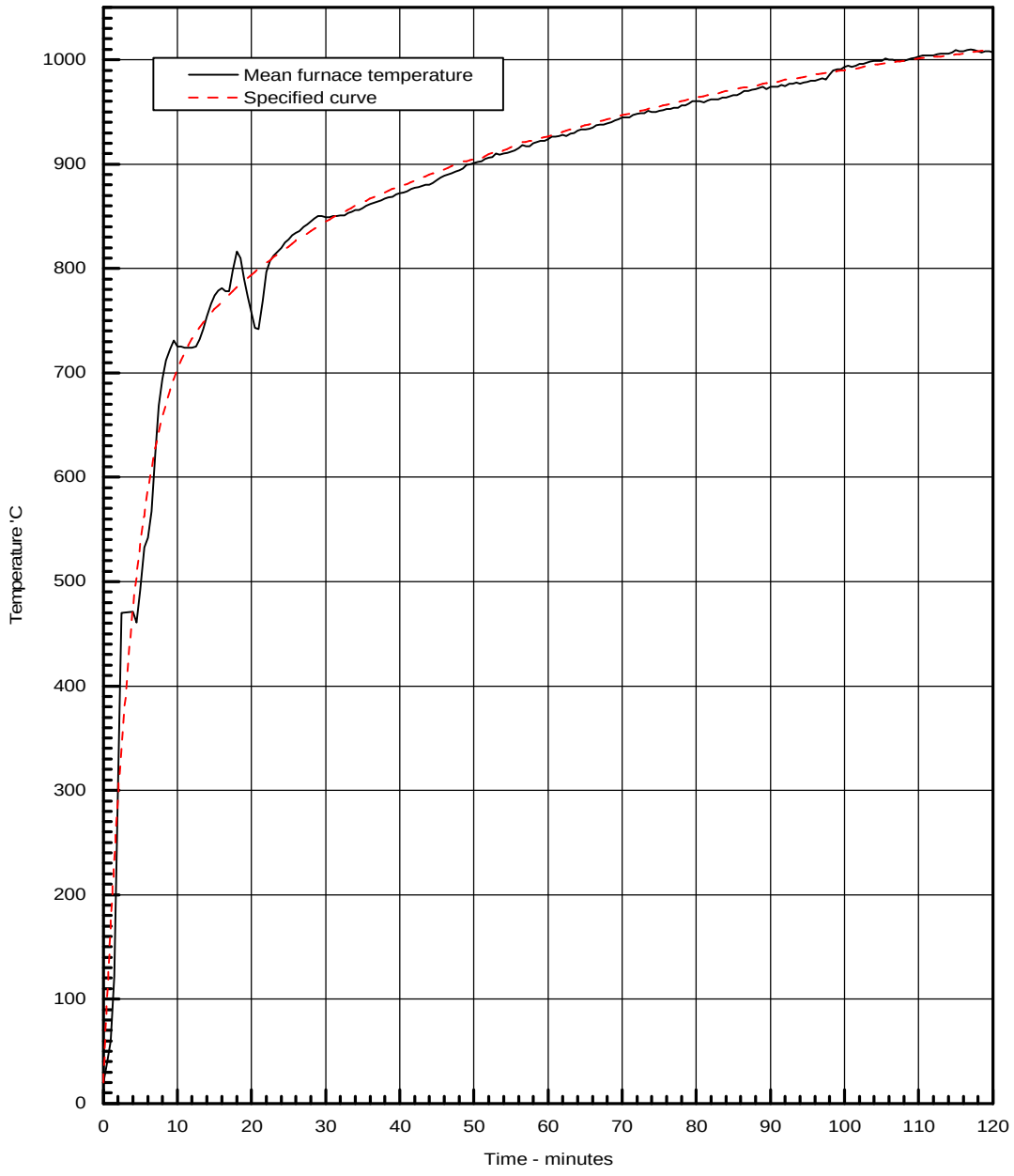


Longitudinal section through access panel (For Key, see page 14)

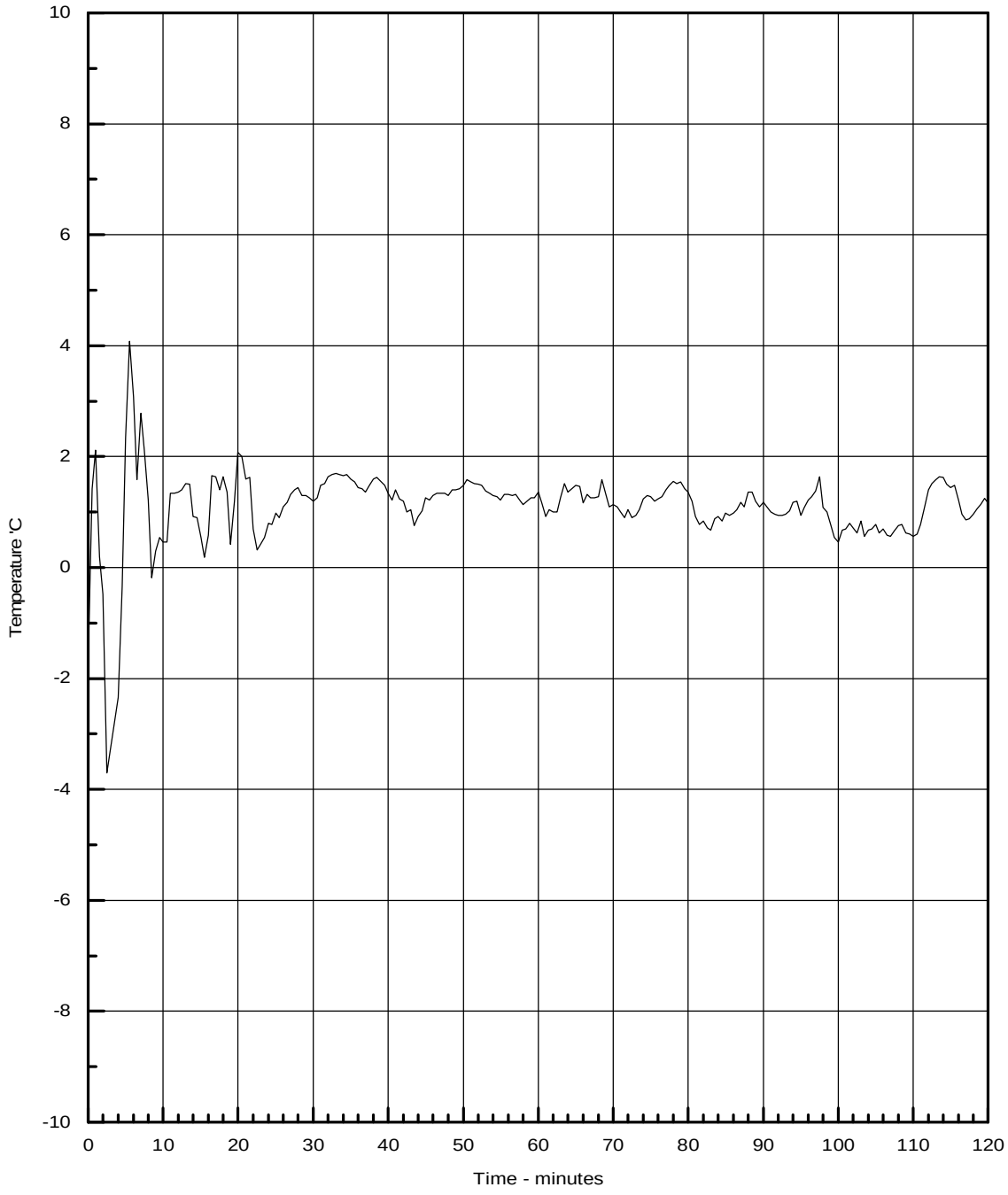
Key To Drawings :

1. Access panel frame manufactured from 1.2mm thick Zintec steel sheet (BS EN 101522003). The 25mm wide picture frame surround was mitred at each corner.
2. Access panel door tray manufactured from 1.0mm thick Zintec steel sheet (BS EN 101522003), cut and folded to dimensions shown.
3. 12.5mm thick Lafarge Megadeco wallboard (BS EN 1363) factory screw fixed to the rear of the door tray using 32mm drywall screws.
4. 1.0mm thick Zintec steel stiffener (BS EN 101522003) welded to rear face of door tray. Size 20mm x 48mm x 100mm x 48mm
5. 1.0mm thick Zintec steel (BS EN 101522003) rear protection angle screw -fixed around edge of each door. 65mm wide x 12mm deep.
6. Emka 3-point locking system (see enclosed detail) with central lock operating 8mm diameter rods which lock into frame top and bottom. The rods are secured to the door tray with 4No. lock guides.
7. Tamper Proof Lock insert fitted within locking hole in 3-point locking system(see drawing).
8. Galvanized steel continuous hinge welded to door tray and bolted to frame using M6 bolts and nuts with washer.
9. M6 bolts welded to panel frame at 50mm in from edges and 470mm centres thereafter. Door tray secured to frame using M6 nuts and washers.
10. 10mm wide x 4mm deep self adhesive polypropolene (flexible foam grey) smoke seal strip along inside locking edge of frame.

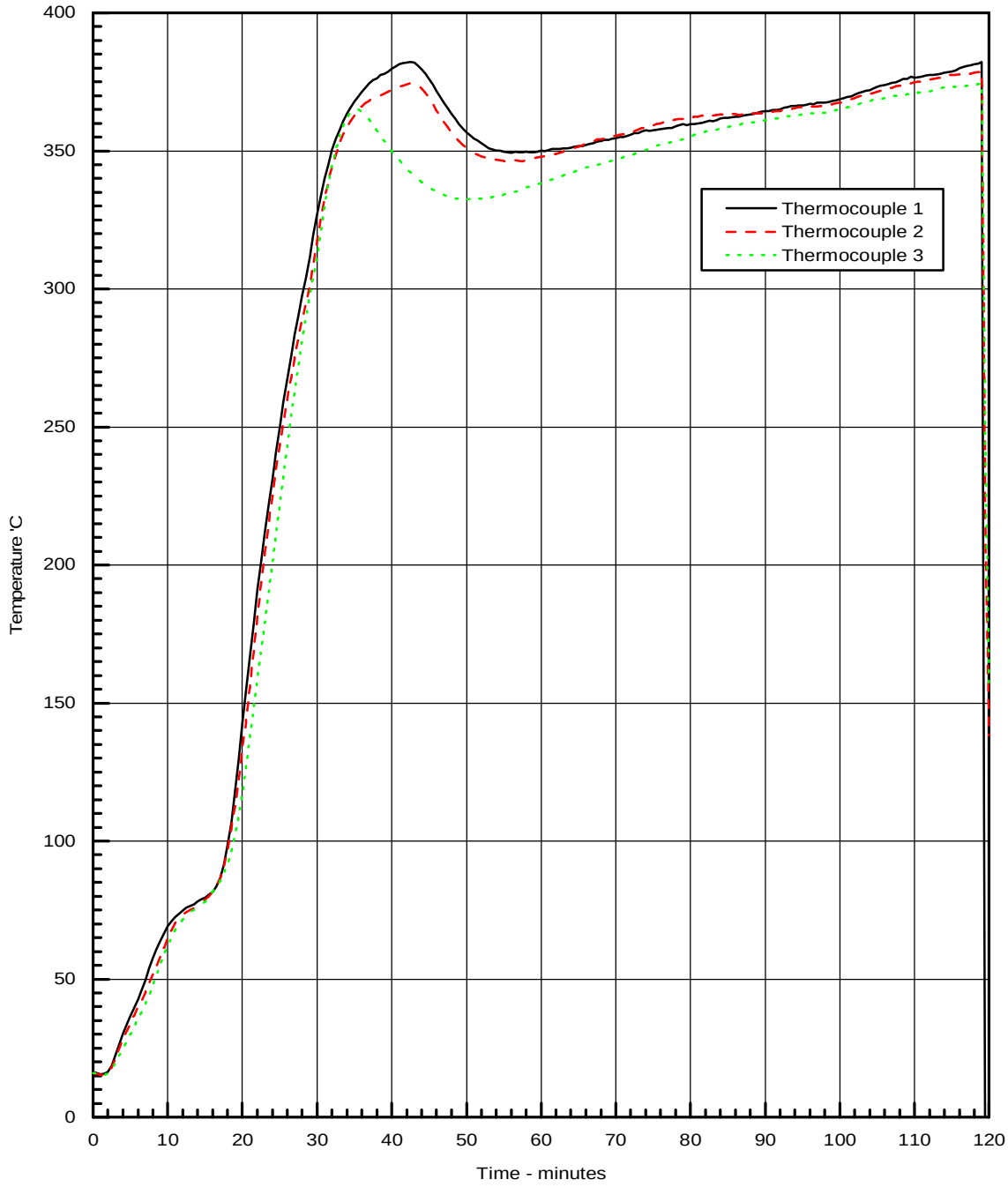
9 GRAPHS



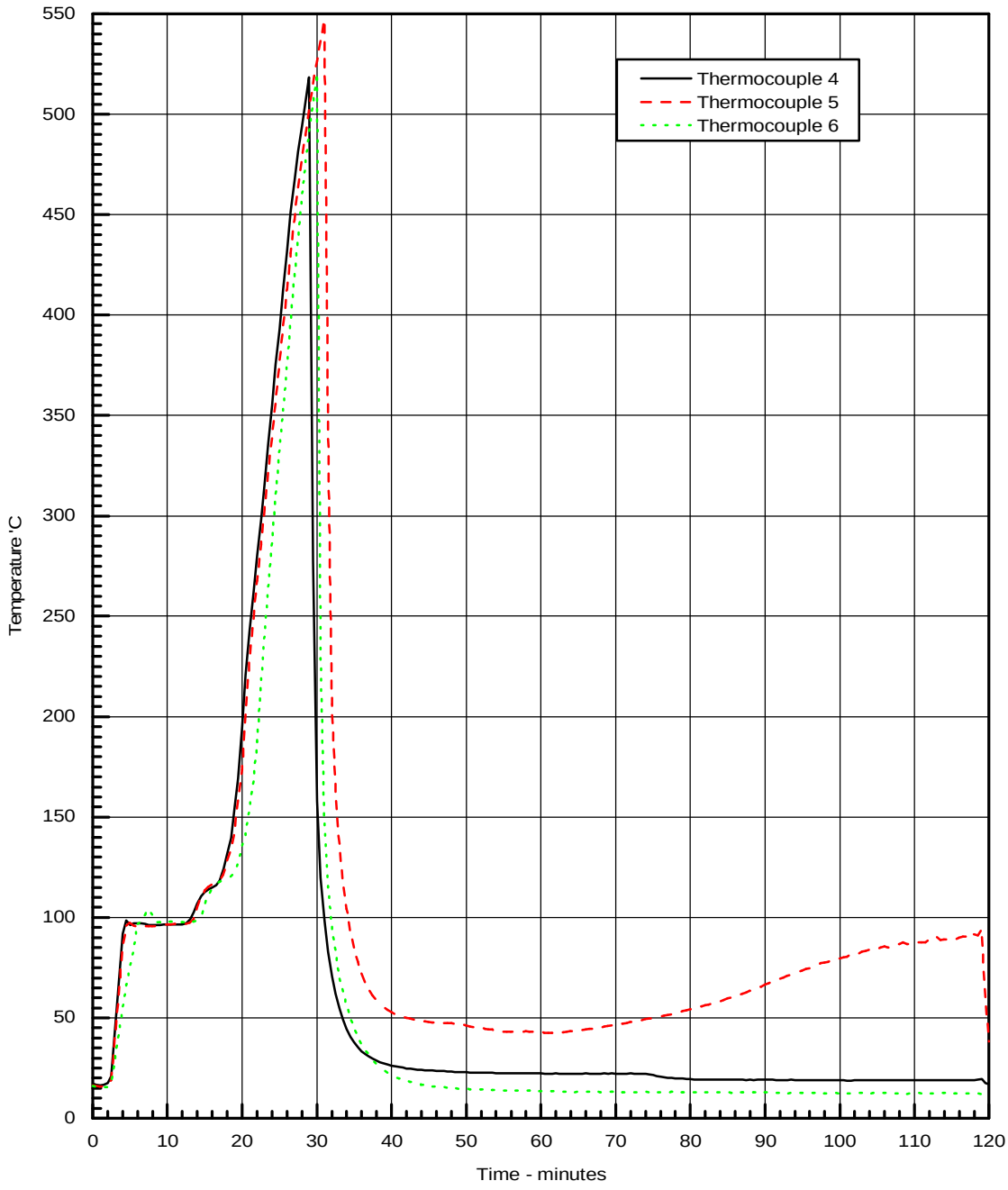
Mean furnace temperature with specified curve for comparison.



Furnace pressure recorded 120mm above the top of the doors.



Unexposed face temperatures recorded on access door leaf A.



Unexposed face temperatures recorded on access door leaf B.

Note: The thermocouples became detached from the specimen after approximately 30 minutes.

10 PHOTOGRAPHS

Exposed face of specimens before test.

Unexposed face of specimens before test.

Unexposed face of specimens at end of fire endurance test.

==========REPORT ENDS==========