

Title:

The Fire Resistance
Performance
Of Doorsets When Fitted With
'Perko Powermatic R100' Jamb
Mounted Concealed Door
Closers

Report No:

WF 151270 – issue 3

Prepared for:

Samuel Heath and Sons Plc

Leopard Street
Birmingham
B12 0UJ

Date:

13th December 2005

TABLE OF CONTENTS

SECTION	PAGE
Executive Summary	3
Introduction.....	4
Assumptions	4
Proposals	5
Basic Test Evidence.....	5
Assessed Performance	6
Conclusions.....	12
Validity.....	13
Summary of Primary Supporting Data	14
Declaration by Samuel Heath And Sons Plc	17
Signatories.....	18

Executive Summary

Objective This report presents an appraisal of the fire resistance performance of single-acting timber/mineral-based doorsets and steel-based doorsets when fitted with a 'Perko Powermatic R100' jamb mounted concealed door closer if tested in accordance with BS EN 1634-1. In addition, this report will provide regarding the provision to offset the installation position within the leaf edge and/or frame rebate.

Report Sponsor **Samuel Heath And Sons Plc**

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Summary of Conclusions Should the recommendations given in this report be followed, it can be concluded that the 'Perko Powermatic R100' jamb mounted concealed door closers may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated timber/mineral-based doorsets, to provide 30 or 60 minutes integrity and insulation performance if tested in accordance with BS EN 1634-1. The closer shall be installed centrally within the leaf edge or, for 60 minute applications that incorporate non-combustible facings only, may be offset by up to 6 mm from the centre line.

Additionally should the recommendations given in this report be followed, it can be concluded that the 'Perko Powermatic R100' jamb mounted concealed door closers may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated or uninsulated steel-based doorsets, to provide up to 240 minutes integrity performance if tested in accordance with BS EN 1634-1.

This assessment represents our opinion as to the performance likely to be demonstrated on a test in accordance with EN1634-1, on the basis of the evidence referred to herein. We express no opinion as to whether that evidence, and/or this assessment, would be regarded by any Building Control authority as sufficient for that or any other purpose. This assessment is provided to the client for its own purposes and we cannot opine on whether it will be accepted by Building Control authorities or any other third parties for any purpose.

Valid until 1st December 2020

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Introduction

This report presents an appraisal of the fire resistance performance of single-acting insulated (timber or mineral-based) doorsets and steel-based doorsets, when fitted with a 'Perko Powermatic R100' jamb mounted concealed door closer. The doorset, onto which the closer is to be fitted, may be of single-leaf or double-leaf configuration. In addition, this report will provide regarding the provision to offset the installation position within the leaf.

The proposed timber/mineral-based doorsets are required to provide a fire resistance performance of 30 or 60 minutes integrity and insulation, and the steel-based doorsets up to 240 minutes integrity, with respect to BS EN 1634-1.

FTSG

The data referred to in the supporting data section has been considered for the purpose of this appraisal which has been prepared in accordance with the Fire Test Study Group Resolution No. 82: 2001.

Assumptions

It is assumed that the 'Perko Powermatic R100' jamb mounted concealed door closers will be fitted to an insulated timber/mineral-based doorset, or steel-based doorsets, which has been previously shown to be capable of providing the required fire resistance performance when tested in accordance with BS EN 1634-1 in the proposed configuration i.e. single-leaf or double-leaf.

The closer units shall not be fitted higher than 800 mm from the centre-line of the closer to the base of the door.

It is assumed that the doorset will be in the fully closed position. It is also assumed that the door closer will return the doorset to the fully closed position, overcoming the latch mechanism (if fitted) from any angle.

Insulated steel-based doorsets must have been proven with an edge mounted device of at least the same rebate and body size.

Supporting wall

It is also assumed that the construction of the wall, which supports the proposed doorsets, will have been the subject of a separate test and the performance of the wall is such that it will not influence the performance of the doorset for the required period.

Clearance gaps

Door leaf to frame clearance gaps can have a significant effect on the overall fire performance of a doorset. It is therefore assumed that the leaf to leaf and leaf to frame clearance gaps will not exceed 3 mm. In addition, it is assumed that the door leaves will be in the closed position.

Proposals

It is proposed that 'Perko Powermatic R100' jamb mounted concealed door closers may be fitted onto a previously tested (in accordance with BS EN 1634-1) insulated timber or mineral-based doorset which has been shown to be capable of providing 30 or 60 minutes integrity and insulation in the same configuration as that proposed i.e. single-leaf or double-leaf.

It is additionally proposed that 'Perko Powermatic R100' jamb mounted concealed door closers may be fitted onto a previously tested (in accordance with BS EN 1634-1) insulated or uninsulated steel-based doorsets, which has been shown to be capable of providing up to 240 minutes integrity in the same configuration as that proposed i.e. single-leaf or double-leaf.

Closers are typically fitted such that the rebates provided in the leaf edge are located along the centre line of the door. It is proposed that the closers installation in 60 minute timber/mineral-based doorsets only may offset by up to 6 mm either side of the centre line of the door leaf.

Basic Test Evidence

WARRES No. 149150/A

The test referenced WARRES No. 149150/A included a fully insulated, single-acting, single-leaf, timber doorset which was fitted with a 'Perko Powermatic R100' jamb mounted concealed door closer.

The doorset was orientated such that the door leaf opened towards the heating conditions of the test and was rendered unlatched for the duration of the test.

Whilst integrity failure of the doorset occurred after a period of 52 minutes, there were no modes of integrity failure either co-incident with, or attributable to the 'Perko Powermatic R100' jamb mounted concealed door closer position for the 62 minute test duration.

WF Report No. 330214 issue 2

The test referenced WF Report No. 330214 issue 2 included a, single-acting, single-leaf, timber doorset which was fitted with a 'Perko Powermatic R100' jamb mounted concealed door closer.

The doorset was orientated such that the door leaf opened towards the heating conditions of the test and was rendered unlatched for the duration of the test.

Whilst integrity failure of the doorset occurred after a period of 46 minutes, there were no modes of integrity failure either co-incident with, or attributable to the 'Perko Powermatic R100' jamb mounted concealed door closer position for the 62 minute test duration.

WF Report No. 397894

The test report referenced WF Report No. 397894 and described briefly in the supporting data section of this report, relates to the fire resistance performance of two single-acting, single-leaf doorsets incorporating various items of hardware in accordance with BS EN 1634-1: 2014.

Doorset A, a typical 30 minute timber-based single-acting, single-leaf doorset which was unlatched, incorporated the R100 concealed closer. The door opened towards the heating conditions.

Doorset B, a typical 240 minute uninsulated steel-based single-acting, single-leaf doorset which was unlatched, incorporating an R100 concealed closer. The door opened away from the heating conditions.

The test demonstrated the ability of the doorsets to provide 42 minutes (Doorset A) and 243 minutes (Doorset B) integrity performance.

Assessed Performance

Timber/Mineral-based doorsets

It is proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) timber or mineral-based based insulated doorsets may be fitted with a 'Perko Powermatic R100' jamb mounted concealed door closer in order to provide 30 or 60 minutes integrity and insulation, without detracting from the performance of the doorset.

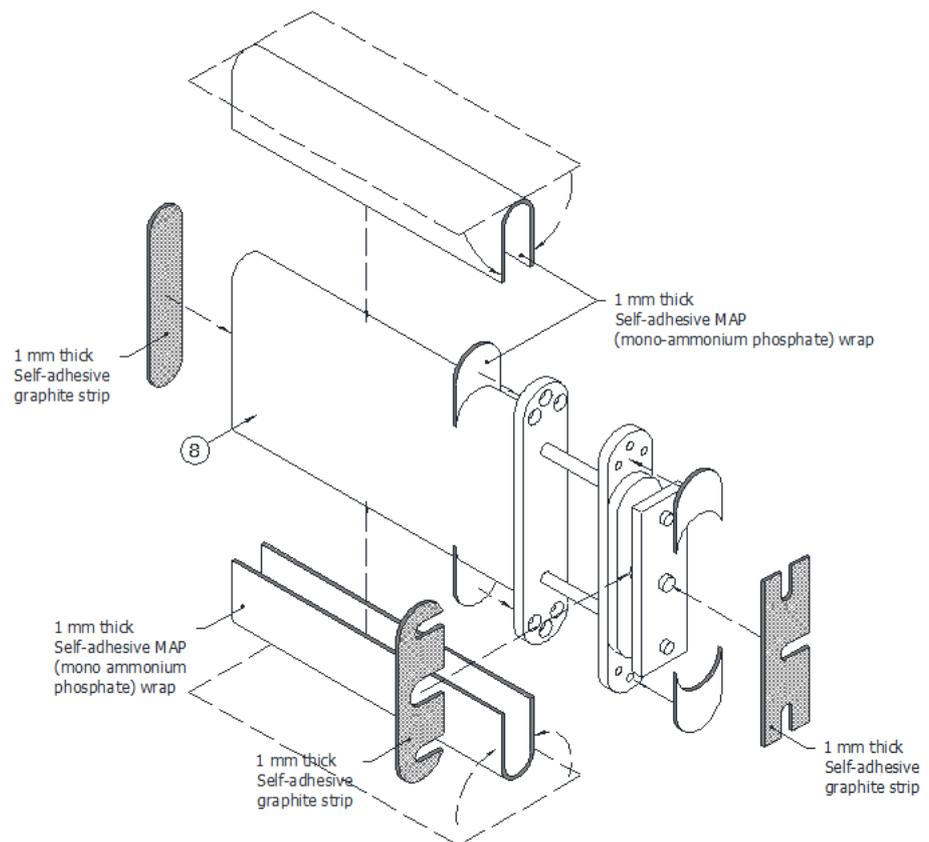
The critical aspect to the performance of a concealed closer within a doorset is the amount of leaf material which is required to be removed for fitment of both the closer body in the edge of the door and the element in the hanging jamb. The metal body and arm of the closer also has an effect on heat transfer which can affect charring and burn-through performance.

30 minutes

The performances of Doorset A during the test referenced WF Report No. 397894 is cited to display the ability of the R100 concealed jamb-mounted closer referenced to contribute towards the required 30 minute fire resistance performance.

The doorset comprised 44 mm thick solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges and was hung within a softwood frame on three stainless steel hinges. The door leaf was unlatched and the doorset mounted such that it opened towards the heating conditions of the test.

The R100 main closer body was mounted within the door leaf, 782 mm from the bottom of the jamb to the centre-line of the closers body. The main body and frame armature were protected by an intumescent kit, incorporating both mono ammonium phosphate and graphite-based sheet material as shown below, referenced R97-XX:



The single 15 mm wide perimeter intumescent fire seal was full cut-through by the frame armature.

Doorset A achieved an integrity performance of 42 minutes at which time sustained flaming was reported at the top hanging edge. Doorsets was blanked of at 44 minutes without failure attributed to, or coincident with the R100 closers, to allow the testing of doorsets B to continue

The test observations do not record any instance during the 30 minute classification period that would indicate that the closer failed to maintain the door leaf in the closed position for the required period.

Based on the performance of the doorset included in the test, it is therefore reasonable to consider that the closer unit may be fitted to other, previously proven, timber/mineral-based doorsets required to provide 30 minute fire resistance performances.

60 minutes

WARRES No. 149150/A included a fully insulated, single-acting, single-leaf, timber doorset. The doorset included a 53 mm thick door leaf comprising of hardwood stiles and rails and a non-combustible sub-face, with 8 mm hardwood lippings to the vertical edges and was hung within a hardwood frame on three stainless steel hinges. The door leaf was unlatched and the doorset mounted such that it opened towards the heating conditions of the test.

The tested assembly included a 'Perko Powermatic R100' jamb mounted concealed door closer fitted within the door leaf edge/frame at approximately mid-height of the doorset.

No additional intumescent protection is recorded within the report however, 2No. 15 mm wide perimeter intumescent fire seals were incorporated within the frame, positioned 9 mm apart, consequently approximately 5 mm of perimeter seal by-passed the armature on each side.

Whilst integrity failure of the doorset occurred after a period of 52 minutes, there were no modes of integrity failure either co-incident with, or attributable to the 'Perko Powermatic R100' jamb mounted concealed door closer position for the 62 minute test duration.

The tested assembly restrained the doorset for the required period and did not incur any modes of integrity failure for the test duration of 62 minutes. This therefore provides direct test evidence relating to the ability of the proposed closer to contribute towards a fire performance in excess of 60 minutes.

The performances of the doorset during the test referenced WF Report No. 330214 issue 2 is cited to display the ability of the R100 concealed jamb-mounted closer referenced to contribute towards the required 60 minute fire resistance performance, where the door leaf does not incorporate non-combustible sub-facings.

The doorset comprised 54 mm thick solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges and was hung within a hardwood frame on three stainless steel hinges. The door leaf was unlatched and the doorset mounted such that it opened towards the heating conditions of the test.

The R100 main closer body was mounted within the door leaf, 815 mm from the bottom of the jamb to the centre-line of the closers body. The body and frame armature were bedded on intumescent paste. 2No. 15 mm wide perimeter intumescent fire seals were incorporated within the frame, positioned 9 mm apart, consequently approximately 5 mm of perimeter seal by-passed the armature on each side.

The doorset achieved an integrity performance of 66 minutes at which time sustained flaming was reported at the glazing aperture. Further sustained flaming was recorded at the top edge of the door at 58 minutes. The test was discontinued at 62 minutes without failure attributed to, or coincident with the R100 closers.

The test observations do not record any instance during the 60 minute classification period that would indicate that the closer failed to maintain the door leaf in the closed position for the required period.

Based on the performance of the doorset included in the test, it is therefore reasonable to consider that the closer unit may be fitted to other, previously proven, timber/mineral-based doorsets required to provide 60 minute fire resistance performances.

Steel-based doorsets

It is proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) steel-based insulated or uninsulated doorsets may be fitted with a 'Perko Powermatic R100' jamb mounted concealed door closer in order to provide up to 240 minutes integrity, without detracting from the performance of the doorset.

In the case of an unlatched steel based doorset, the closer must maintain the door in the fully closed position until such time as the door expands sufficiently to jam within its door frame. Where a concealed closer is fitted to an uninsulated doorset it must additionally prove that it does not present an additional risk to the integrity performance of the doorset whereby the closer's components and hydraulic fluid must demonstrate that they are not ignited by the high levels of heat transfer through the metal doorset.

The performances of Doorset B during the test referenced WF Report No. 397894 is cited to display the ability of the R100 concealed jamb-mounted closer referenced to contribute towards the required 240 minute fire resistance performance.

Doorset B was a typical 240 minute uninsulated steel doorset construction including a 974 mm x 2051 mm x 45 mm thick hollow steel door leaf hung within a hollow steel frame. The doorset was unlatched and opened away from the heating conditions.

It was fitted with a concealed, edge-mounted, overhead door closer R100. The main body was located within the door leaf, at a height of 782 mm from the finished floor level to the centre-line of the closer, with the armature element fitted in the frame. The closer was active.

The doorset achieved an integrity rating performance of 243 minutes, and at no time did the doors shows signs of opening.

Based on the performance of the doorset included in the test, it is therefore reasonable to consider that the closer unit may be fitted to other, previously proven, uninsulated or insulated metal based doorsets required to provide up to 240 minute fire resistance performances.

Proposed Doorsets

As stated in this report, the doorset, in the required configuration, will be previously tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) and its performance is therefore not in doubt.

To enable the use of the door closers on a range of doorsets, it is necessary to address the available information on the proposed doorset. As this appraisal is intended to be used on a general basis and not restricted to any particular manufacturer of fire resisting doorsets, the following points are given to enable the closers to be used safely:

- a) The doorset shall carry valid certification or the doorset, including the door frame and associated ironmongery should have achieved the required integrity, and insulation where applicable, when tested by a UKAS approved laboratory (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) to BS EN 1634-1.
- b) Timber/mineral-based doorsets:
 - i. Door leaves shall be not less than 44 mm thick for up to 30 minute applications and not less than 53 mm thick for 60 minute applications.
 - ii. For 30 minute applications the door frame shall consist of timber with a minimum density of 450 kg/m³ for 30 minute applications
 - iii. For FD60, E60 and EI60 applications the door frame shall be hardwood with a minimum density of 550 kg/m³.
- c) Steel-based doorsets:
 - i. Door leaves shall be not less than 45 mm thick.
 - ii. The door frame shall consist of steel.
 - iii. Insulated steel-based doorsets must have been proven with an edge mounted device of at least the same rebate and body size.
- d) If the proposed doorset is to be used in double-leaf configuration the test or assessment evidence should be applicable to double-leaf configurations.

Intumescent Protection

It is a requirement of this appraisal that the concealed overhead closers must be installed within the doorsets such that the same lever of intumescent protection is provided.

For both 30 and 60 minute timber/mineral-based applications, the R100 closer unit shall either be bedded upon intumescent mastic (all elements, i.e. main body, forend and armature) which shall be provided by the manufacturer. Alternatively, the R100 may be fitted with the manufacturer's R97-XX intumescent protection kit which comprises pre-cut, self-adhesive intumescent sheet material, as identified on page 7.

Additionally, for 60 minute timber/mineral-based doorsets applications only, the perimeter intumescent within the frame/door edge shall by-pass the forend or armature by a minimum of 5 mm wide on each.

No additional intumescent protection is required with steel-based doorsets.

Offset Closers – 60 minutes

It is proposed that the closers installation within 60 minute timber/mineral-based doorsets that incorporate non-combustible sub-facings may offset by up to 6 mm either side of the centre line of the door.

This level of offset will ensure that the rebate is provided in the internal timber stiles of the door leaf and that the non-combustible facings are not compromised in any way. As the non-combustible facings are not removed, a significant level of protection will still be afforded to the rebate area and subsequently the likelihood of excessive charring and burn through at the position of the closer would not be expected to be increased.

Conclusions

Should the recommendations given in this report be followed, it can be concluded that the 'Perko Powermatic R100' jamb mounted concealed door closers may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated timber/mineral-based doorsets, to provide 30 or 60 minutes integrity and insulation performance if tested in accordance with BS EN 1634-1. The closer shall be installed centrally within the leaf edge or, for 60 minute applications that incorporate non-combustible facings only, may be offset by up to 6 mm from the centre line.

Additionally should the recommendations given in this report be followed, it can be concluded that the 'Perko Powermatic R100' jamb mounted concealed door closers may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated or uninsulated steel-based doorsets, to provide up to 240 minutes integrity performance if tested in accordance with BS EN 1634-1.

The fitting of the door closers into alternative doorsets, on the basis of compliance with the conditions given above, is therefore considered to be acceptable.

Validity

This assessment is issued on the basis of test data and information available at the time of issue. If contradictory evidence becomes available to warringtonfire the assessment will be unconditionally withdrawn and Samuel Heath And Sons Plc as will be notified in writing. Similarly the assessment is invalidated if the assessed construction is subsequently tested because actual test data is deemed to take precedence over an expressed opinion. The assessment is valid initially for a period of five years i.e. until 1st December 2020, after which time it is recommended that it be returned for re-appraisal.

This assessment represents our opinion as to the performance likely to be demonstrated on a test in accordance with EN1634-1, on the basis of the evidence referred to herein. We express no opinion as to whether that evidence, and/or this assessment, would be regarded by any Building Control authority as sufficient for that or any other purpose. This assessment is provided to the client for its own purposes and we cannot opine on whether it will be accepted by Building Control authorities or any other third parties for any purpose.

The appraisal is only valid provided that no other modifications are made to the tested construction other than those described in this report.

Summary of Primary Supporting Data

WARRES No. 149150/A

Test report relating to the performance of a fully insulated, single-acting, single-leaf, timber doorset incorporating a jamb mounted concealed door closer referenced 'Perko Powermatic R100', when subjected to a test in accordance with BS EN 1634-1: 2000 to determine its fire resistance performance.

The doorsets had overall dimensions of 2090 mm high by 1015 mm wide and incorporated door leaves of overall dimensions 2040 mm high by 926 mm and by 53 mm thick.

The doorset was retained via a 'Perko Powermatic R100' jamb mounted concealed door closer.

The doorset was orientated such that the doorset opened towards the heating conditions of the test and was rendered unlatched for the duration of the test.

The specimen satisfied the test requirements for the following periods:

		Doorset B
Integrity	Sustained Flames	52 minutes
	Gap Gauge	62 minutes*
	Cotton Pad	52 minutes
Insulation		52 minutes

* The test duration.

Test date : 30th September 2005

The closers were not independently sampled

Permission has been provided for this test report to be utilised for the purposes of this appraisal

**WF Report No.
330214 issue 2**

To determine the fire resistance performance of a timber based, single-acting single-leaf doorset incorporating a glazed vision panel and various items of building hardware, mounted within a low density rigid supporting construction, when tested in accordance with BS EN 1634-1: 2008.

The doorset had overall dimensions of 2085 mm high by 1013 mm wide and incorporated a door leaf of overall dimensions 2040 mm high by 930 mm wide by 54 mm thick. The door leaf was hung within a hardwood door frame on three steel hinges. The door leaf comprised a three layer particle board Halspan core with hardwood lippings to the vertical edges.

The doorset incorporated a concealed door closer referenced 'R100 Perko-Powermatic controlled door closer' which was fitted within the trailing edge of the door leaf with approximately 10 mm clearance between the door closer and the glazed aperture.

The door leaf incorporated an aperture of overall cut out dimensions 216 mm wide by 1016 mm high. The aperture was glazed with a pane of 6 mm thick 'Pyran® S' glass of overall nominal dimensions 200 mm wide by 1000 mm high. The glazed pane was protected via a CF291 glazing system and retained in place via screw fixed hardwood glazing beads.

The doorset was orientated such that the doorset opened towards the heating conditions of the test and was rendered unlatched for the duration of the test.

The specimen satisfied the test requirements for the following periods:

		Doorset B
Integrity	Sustained Flames	46 minutes#
	Gap Gauge	62 minutes*
	Cotton Pad	17 minutes#
Insulation		3 minutes

*The test duration. The test was discontinued after a period of 62 minutes.

The integrity failure occurred in an area not associated with the door closer and the integrity of the doorset in the door closer area was maintained for the full duration of the test.

Test date : 19th June 2013

The closers were not independently sampled

Samuel Heath & Sons PLC

**WF Report No.
397894**

To determine the fire resistance performance of two single-acting, single-leaf doorsets incorporating various items of hardware in accordance with BS EN 1634-1: 2014.

For the purpose of the test the doorsets were referenced Doorset A and Doorset B.

Doorset A had overall dimensions of 2080 mm high by 1000 mm wide incorporating a door leaf with overall dimensions 2040 mm high by 933 mm wide by 44 mm thick. The door leaf was of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges. The leaf was hung within a softwood frame on three steel butt hinges, opening towards the heating conditions of the test. The doorset was fitted with a Perko 'Powermatic R100' concealed closer. The closer was fitted on the hinged edge with the closer body morticed into the leaf. The centre line of the closer was positioned nominally 782 mm from the notional floor level. The doorset was unlatched for the duration of the test.

Doorset A had overall nominal dimensions 2090 mm high by 1040 mm wide incorporating a door leaf with overall dimensions 2051 mm high by 974 mm wide by 45 mm thick. The door leaf was formed from 1.5 mm thick galvanised steel facings with a paper honeycomb core. The leaf was hung within a profiled steel door frame such that it opened away from the heating conditions of the test. The doorset was fitted with a Perko 'Powermatic R100' concealed closer. The closer was fitted on the hinged edge with the closer body morticed into the leaf. The centre line of the closer was positioned nominally 782 mm from the notional floor level. The doorset was unlatched for the duration of the test.

The specimens satisfied the test requirements for the following periods:

		Doorset A	Doorset B
Integrity	Sustained Flames	42 minutes	243 minutes*
	Gap Gauge	44 minutes#	243 minutes*
	Cotton Pad	42 minutes	35 minutes
Insulation		42 minutes	5 minutes

*The test was discontinued after a period of 243 minutes.

The door was blanked off to allow the test to continue.

Test date : 2nd May 2018

A representative of Warrington Certification sample selected the concealed closers on the 13th December 2017

Samuel Heath & Sons PLC

Declaration by Samuel Heath And Sons Plc

We the undersigned confirm that we have read and complied with the obligations placed on us by the UK Fire Test Study Group Resolution No. 82: 2001.

We confirm that the component or element of structure, which is the subject of this assessment, has not to our knowledge been subjected to a fire test to the Standard against which the assessment is being made.

We agree to withdraw this assessment from circulation should the component or element of structure be the subject of a fire test to the Standard against which this assessment is being made.

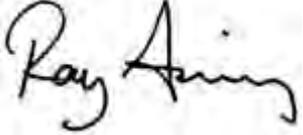
We are not aware of any information that could adversely affect the conclusions of this assessment.

If we subsequently become aware of any such information we agree to cease using the assessment and ask warringtonfire to withdraw the assessment.

Signed:

For and on behalf of:

Signatories


Responsible Officer (Issue 3)
R Anning* - Principle Certification Engineer


Approved (Issue 3)
A Kearns* - Technical Manager

* For and on behalf of warringtonfire.

Report Issued: 13 th December 2005

Issue 2 – offset closer option added (17th July 2007)

Issue 3 – add 30 minute scope and 240 minute steel doorset scope, also general update, including revised review date based on 358686 (14th December 2018)

The assessment report is not valid unless it incorporates the declaration duly signed by the applicant.

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