

Title:

The Fire Resistance
Performance
Of Doorsets When Fitted With
'Perko Powermatic R108' Jamb
Mounted Concealed Door
Closers

Report No:

416132

Prepared for:

Samuel Heath and Sons Plc

Leopold Street
Birmingham
B12 0UJ

Date:

3rd September 2019

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Foreword

This assessment report has been commissioned by Samuel Heath and Sons Plc and relates to the fire resistance of Perko Powermatic R108 Jamb Mounted Concealed Door Closers.

This assessment is for National Application and has been written in accordance with the general principles outlined in BS EN 15725: 2010; Extended application reports on the fire performance of construction products and building elements, as appropriate.

This assessment uses established empirical methods of extrapolation and experience of fire testing similar products, in order to extend the scope of application by determining the limits for the design based on the tested constructions and performances obtained. The assessment is an evaluation of the potential fire resistance performance, if the elements were to be tested in accordance with EN1634.

This assessment has been written using appropriate test evidence generated at a UKAS accredited laboratory to the relevant test standard. The supporting test evidence has been deemed appropriate to support the manufacturer's products and is summarised within the assessment.

The defined scope presented in this assessment report relates to the behaviour of the proposed door closers under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the door closers in use.

This assessment has been prepared and checked by Certification Engineers with the necessary competence, who subscribe to the principles outlined in the PFPF guidelines to undertaking assessments in lieu of fire tests. The aim of the PFPF guidelines is to give confidence to end-users that assessments that exist in the UK are of a satisfactory standard to be used in lieu of fire tests for building control and other purposes.

The PFPF guidelines are produced by the UK Fire Test Study Group (FTSG) an association of the major fire testing laboratories in the UK and are published by the PFPF, the representative body for the passive fire protection industry in the UK.

Executive Summary

Objective This report presents an appraisal of the fire resistance performance of single-acting timber-based doorsets when fitted with a 'Perko Powermatic R108' jamb mounted concealed door closer if tested in accordance with BS EN 1634-1.

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 R108' jamb mounted concealed door closers may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated timber-based doorsets, to provide 30 or 60 minutes integrity and insulation 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 31st August 2024

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Introduction

This report presents an appraisal of the fire resistance performance of single-acting insulated (timber-based) doorsets, when fitted with a 'Perko Powermatic R108' jamb mounted concealed door closer. The doorset, onto which the closer is to be fitted, may be of single-leaf or double-leaf configuration.

The proposed timber/mineral-based doorsets are required to provide a fire resistance performance of 30 or 60 minutes integrity and insulation 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 R108' jamb mounted concealed door closers will be fitted to an insulated timber-based doorset, 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 1000 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.

The chosen 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 those measured for the relevant fire tested doorset. In addition, it is assumed that the door leaves will be in the closed position.

Proposals

It is proposed that 'Perko Powermatic R108' jamb mounted concealed door closers may be fitted onto a previously tested (in accordance with BS EN 1634-1) insulated timber-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.

Basic Test Evidence

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.

WF Report No. 401347

The test report referenced WF report No. 401347 and described briefly in the supporting data section of this report describes a fire resistance test utilising the heating and pressure conditions of BS EN 1363-1:2012 on two single-leaf doorset assemblies.

The specimens comprised of simulated 30 and 60 minute, single-acting, single-leaf timber-based doorsets. The doorsets, which were unlatched, incorporated the 'Perko Powermatic R108' jamb mounted concealed door closers. The closer units fitted incorporated the closer body within the door leaf and associated armature plate in the frame jamb.

The test demonstrated the ability of Doorset A (E30) to provide 30 minutes and Doorset B (E60) to provide 67 minutes integrity performance.

Assessed Performance

Manufacturing location

The closers were identified as being produced at manufacturing plant E/018. Full details are retained on file by Warringtonfire.

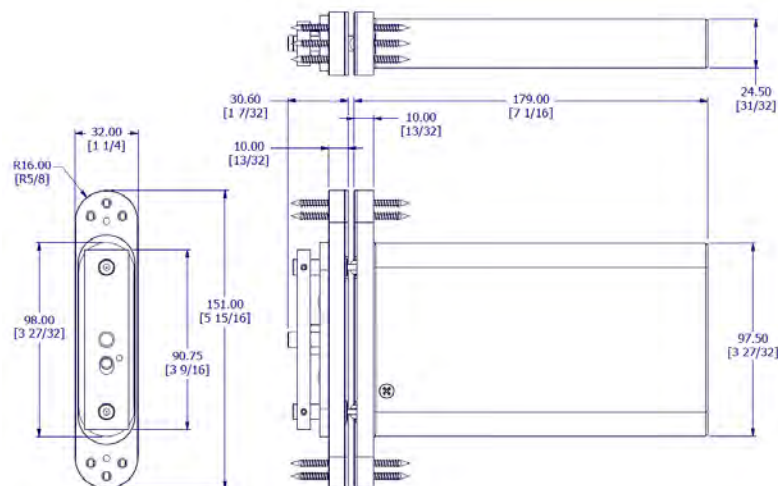
It is proposed that previously fire tested (or assessed by Warringtonfire, BM TRADA or Chiltern International Fire) timber-based insulated doorsets may be fitted with a 'Perko Powermatic R108' jamb mounted concealed door closer in order to provide 30 or 60 minutes integrity and insulation, without detracting from the performance of the doorset.

The main function of a door closer, when used on unlatched timber based doorsets subjected to fire resistance testing is to maintain the door in the fully closed position up until the intumescent in the leaf to frame clearance gaps has been given sufficient time to react. The door closer is not intended to remain in position for the test duration.

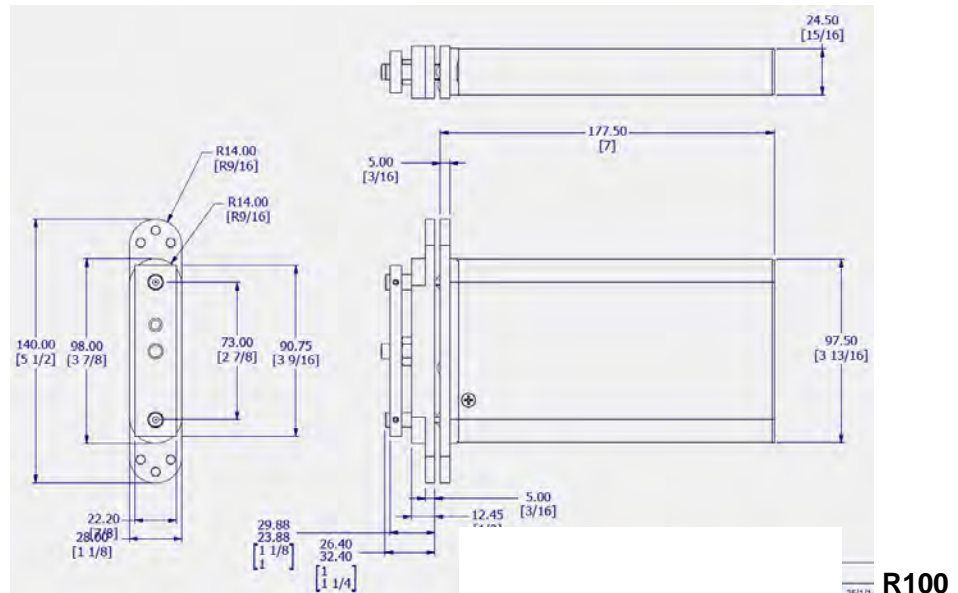
After a period between 10 and 15 minutes of the test, the intumescent seals will have reacted, thereby providing friction between the leaf and frame and inhibiting the tendency of the door leaf to swing open. It is therefore essential that the closer remains in position and operable up until this point.

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 armature 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.

The Proposed R108 closer has an identical mechanism and body to the R100 model, with the forends modified to provide a more aesthetic appearance, incorporating 151 x 32 x 10 mm thick brass forends, as opposed to the 140 x 28 x 5 mm-12.5 mm brass forends associated with the R100:



R108



R100 - 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, referenced R97-XX

The single 15 mm wide perimeter intumescent fire seal was fully 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 off 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.

R100 - 60

The performances of the doorset during the test referenced WF Report No.

minutes

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.

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.

The full-scale testing of the R100 establishes the ability of the R100/108 mechanism to retain the door in the closed position in both the 30 and 60 minute timber-based door applications.

R108

The increased forends will require more material to be removed from the door edge/frame may which may lead to the penetration of flames/hot gases at the leaf edge due to further interruption of intumescent seals and an increase in conducted heat. Furthermore the use of brass may result in the softening and melting of the forends towards the latter stages of the 60 minute test.

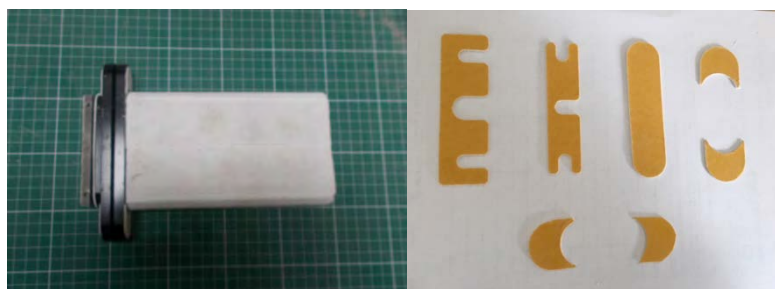
30 minutes

The performances of Doorset A during the test referenced WF Report No. 401347 is cited to display the ability of the R108 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 R108 main closer body was mounted within the door leaf at a notional 740 mm from the bottom of the door to the centre-line of the closers body. The main body and frame armature were protected by the following intumescent kit:

- i. reference : SHR 100
- ii. closer body : Wrapped in 1 layer of 1.5 mm thick self-adhesive MAP (mono-ammonium phosphate) intumescent.
- iii. closer body rear : 1 layer of 1.5 mm thick self-adhesive MAP intumescent.
- iv. closer forends : 1 layer (2 pieces) of 1.5 mm thick self-adhesive MAP intumescent applied to the rear of closer forends.
- v. frame plate body : 2 No. strips (1 either side) of 1.5 mm thick self-adhesive MAP intumescent.



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

Doorset A achieved an integrity performance of 30 minutes at which time sustained flaming was reported at the middle of the leading edge. Doorset A was blanked off at 36 minutes without failure attributed to, or coincident with the R108 closer, 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-based doorsets required to provide 30 minute fire resistance performances.

60 minutes

The performances of Doorset B during the test referenced WF Report No. 401347 is cited to display the ability of the R108 concealed jamb-mounted closer referenced to contribute towards the required 60 minute fire resistance performance.

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 R108 main closer body was mounted within the door leaf at a notional 740 mm from the bottom of the door to the centre-line of the closers body. The main body and frame armature were protected by the following intumescent kit:

- i. reference : SHR 100
- ii. closer body : Wrapped in 1 layer of 1.5 mm thick self-adhesive MAP (mono-ammonium phosphate) intumescent.
- iii. closer body rear : 1 layer of 1.5 mm thick self-adhesive MAP intumescent.
- iv. closer forends : 1 layer (2 pieces) of 1.5 mm thick self-adhesive MAP intumescent applied to the rear of closer forends.
- v. frame plate body : 2 No. strips (1 either side) of 1.5 mm thick self-adhesive MAP intumescent.

2No. 15 mm wide perimeter intumescent fire seals were incorporated within the frame rebate, positioned centrally, 9 mm apart. Approximately 3.5 mm of the intumescent by-passed the armature on each side.

Doorset B achieved an integrity performance of 67 minutes at which time the test was terminated without failure attributed to, or coincident with the R108 closer.

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-based doorsets required to provide 60 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 (excluding Beech).
- c) If the proposed doorset is to be used in a double-leaf configuration the test or assessment evidence should be applicable to double-leaf configurations.
- d) The chosen doorsets must have been proven with an edge mounted device of at least the same rebate and body size.

Intumescent Protection

It is a requirement of this appraisal that the concealed jamb-mounted closers must be installed within the doorsets such that the same level of intumescent protection is provided.

For both 30 and 60 minute timber-based applications, the R108 closer unit shall utilise the manufacturer's SHR 100 intumescent protection kit which comprises pre-cut, self-adhesive intumescent sheet material, as identified on page 10 and 11.

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 3.5 mm wide on each side.

Conclusions

Should the recommendations given in this report be followed, it can be concluded that the 'Perko Powermatic R108' jamb mounted concealed door closers may be fitted to previously tested or assessed (by Warringtonfire, BM TRADA or Chiltern International Fire) insulated timber-based doorsets, to provide 30 or 60 minutes integrity and insulation 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 31st August 2024, 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

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

**WF report No.
401347**

An investigation which utilised the general principles including heating and pressure conditions given in BS EN 1363-1: 2012.

The purpose of the test was to provide an indication of the performance of two 'Perko Powermatic R108' jamb mounted concealed door closers fitted to 30 and 60 minute small scale fire rated timber-based doorsets. For the purpose of the test the doorset were referenced Doorset A and Doorset B.

Doorset A briefly had overall nominal dimensions 1488 mm high by 615 mm wide incorporating a door leaf with overall dimensions 1440 mm high by 545 mm wide by 44 mm thick. The door leaf was of a solid graduated density chipboard construction; with 8 mm hardwood lipping's to the vertical edges and was hung within a softwood frame with a single 15 x 5 mm perimeter intumescent fire seal positioned centrally within the frame rebate. The door was hung on two Butt Hinges.

Doorset B briefly had overall nominal dimensions 1488 mm high by 615 mm wide incorporating a door leaf with overall dimensions 1440 mm high by 545 mm wide by 54 mm thick. The door leaf was of a solid graduated density chipboard construction; with 8 mm hardwood lipping's to the vertical edges and was hung within a hardwood frame with 2No. 15 x 5 mm perimeter intumescent fire seal positioned centrally within the frame rebate (9 mm apart). The door was hung on two Butt Hinges.

The specimen satisfied the test requirements for the following periods:

Integrity	Doorset A	Doorset B
Sustained flaming	30 minutes	67 minutes*
Gap gauge	No failure	67 minutes*
Cotton Pad	30 minutes	67 minutes*

*The test was discontinued after a period of 67 minutes without failure of Doorset B.

The closers were identified as being produced at manufacturing plant E/018. Full details are retained on file by Warringtonfire.

The closers were not independently sampled prior to testing.

Test date : 6th April 2019

Test Sponsors : 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.

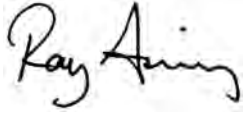
We are not aware of any information that could adversely affect the conclusions of this assessment.


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 R Anning* - Principal Certification Engineer


Approved M Tolan* - Certification Engineer

* For and on behalf of Warringtonfire.

Report Issued: 3 rd September 2019

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