Exova Warringtonfire
Holmesfield Road
Warrington
WA1 2DS
United Kingdom

T : +44 (0) 1925 655 116
F : +44 (0) 1925 655 419
E : warrington@exova.com
W: www.exova.com

Testing. Advising. Assuring.

Title:

The Fire Resistance Performance Of Timber-/Mineral-Based Insulated Doorsets When Fitted With Various Hardware

Report No:

402262

Prepared for:

ZOO HARDWARE LTD

Unit H, Dukes Drive,
Kingmoor Park North,
Carlisle
CA6 4SH

Date:

19th July 2018

TABLE OF CONTENTS

Executive Summary

Objective	This report presents an appraisal of the fire resistance performance of single-acting timber/mineral-based doorsets when fitted with Zoo stainless steel flushbolts, if tested in accordance with BS EN 1634-1.
Report Sponsor	**ZOO HARDWARE LTD**
Address	Unit H, Dukes Drive, Kingmoor Park North, Carlisle CA6 4SH
Summary of Conclusions	Should the recommendations given in this report be followed, it can be concluded that the Zoo stainless steel flushbolts detailed within this report may be fitted to previously tested or assessed (by Exova Warringtonfire, BM TRADA or Chiltern International Fire) insulated single-action, double-leaf timber/mineral-based doorsets to provide 30 minutes or 60 minutes integrity and insulation performance, if tested in accordance with BS EN 1634-1.
Valid until	19th July 2023

Introduction

This report presents an appraisal of the fire resistance performance of single-acting insulated timber/mineral-based doorsets when fitted with a range of Zoo stainless steel flushbolts. The doorset, onto which the proposed hardware is to be fitted, shall be a single-action, double-leaf configuration.

The proposed doorsets are required to provide a fire resistance performance of 30 minutes 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

Doorsets

It is assumed that the flushbolts will be fitted to an insulated timber-based doorset which has also been previously shown to be capable of providing the required fire resistance performance when tested in accordance with BS EN 1634-1 and fitted with similarly sized and positioned flush bolts in the proposed configuration i.e. single-action, double-leaf. The critical aspects of the door construction are detailed later in this report.

In addition, it is assumed that the door leaves will be in the closed position, with the primary leaf latched and the secondary leaves bolted top and bottom.

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.

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.

Installation

It is assumed that the doorsets will be installed in a similar manner to that of the previously tested assembly by competent installers.

Proposals

It is proposed that the Zoo stainless steel flushbolts, as referenced within this report, may be fitted into a previously tested (in accordance with BS EN 1634-1) insulated timber-based doorset which has been shown to be capable of providing 30 minutes or 60 minutes integrity and insulation in the same configuration as that proposed i.e. single-action, double-leaf.

Basic Test Evidence

WF Test Report No. 388830

The fire resistance test referenced WF No. 388830 to determine the fire resistance performance of one typical 30 minute single-acting, single-leaf doorset (Doorset C), a narrow typical 30 minute single-acting, double-leaf doorset (Doorset B) and a narrow typical 60 minute single-acting, double-leaf doorset (Doorset A) incorporating various items of hardware in accordance with BS EN 1634-1: 2014.

Doorset B and C achieved 36 minutes and Doorset A 63 minutes.

Assessed Performance

General

It is proposed that the Zoo stainless steel flushbolts, as referenced within this report, may be fitted into the meeting edge or face of the door leaves within a previously tested (in accordance with BS EN 1634-1) insulated timber-based doorset which has been shown to be capable of providing 30 minutes or 60 minutes integrity and insulation in the same configuration as that proposed i.e. single-action, double-leaf.

The range consists of lever action flushbolts with the mechanism fully exposed behin dthe forend, with a maximum size of 904 mm long x 20 mm wide x 42 mm return (20 mm bolt throw), and a minimum size of 200 mm long x 20 mm wide x 42 mm return, with a 42 mm x 19 mm keep fitted in the head of the frame, manufactured entirely from stainless steel, as follows:

Product code	Product description
ZAS02	Lever Action Flush Bolt 20 x 150mm
ZAS02R	Lever Action Flush Bolt 20 x 150mm, Radius
ZAS03	Lever Action Flush Bolt 20 x 200mm
ZAS03R	Lever Action Flush Bolt 20 x 200mm, Radius
ZAS05	Lever Action Flush Bolt 20 x 305mm
ZAS05R	Lever Action Flush Bolt 20 x 305mm, Radius
ZAS09	Lever Action Flush Bolt 20 x 914mm
ZAS09R	Lever Action Flush Bolt 20 x 914mm, Radius
ZAS12	Lever Action Flush Bolt 20 x 457mm
ZAS12R	Lever Action Flush Bolt 20 x 457mm, Radius
ZAS13	Lever Action Flush Bolt 20 x 609mm
ZAS13R	Lever Action Flush Bolt 20 x 609mm, Radius

The performances of the flushbolts during the test referenced WF No.388830 is cited to display the ability of the flushbolts to contribute towards the required fire resistance performances in both the edge mounted and face mounted applications.

On reviewing the observations taken from the test report, it's clear that there were no integrity failures associated with flushbolts fitted to Doorset B (E30), for a test duration of 36 minutes (at which point the door was blanked off to allow the testing of the Doorset A to continue), or Doorset A (E60) for a test duration of 63 minutes.

Alternative Flushbolts

One key aspect of the flushbolts use is it location within the doorset as the performance will be influenced by whether the they fitted in edge or face of doorsets, also the location in the height is significant as flushbolts in the top of the door are subject to increased positive pressure which may result in hot gases and flames being pushed around the bolts, and burn through of the leaf and at the leaf to frame gap at the bolt position.

The ZAS09 904 mm long flushbolts were fitted in the top and bottom edges, and the exposed face of both doorsets; in addition the ZAS13R 608 mm long flushbolts were fitted in to the unexposed face, and bottom of the exposed face of both doorsets. All flushbolts were engaged.

In terms of the flushbolt material, it is critical that materials which are combustible or have a lower melting point are not utilised since materials which melt or ignite may advance the burn through of the leaf and therefore lead to a premature integrity failure.

It is critical that the flushbolt dimensions are not increased since the increased mortice required for a larger body, forend or keep may lead to an earlier burn through of the leaf or increased strike/forend dimensions 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.

In terms of the intumescent protection, it is critical that this is not reduced from that tested, as the reaction of this material when subjected to the heating conditions of the test is essential in limiting the burn through of the leaf and at the leaf to frame gap at the bolt position.

Substitution of alternative flushbolts from the proposed range may therefore be considered in terms of the critical aspects discussed and where such flushbolts fall within the scope of the tested locksets, it is considered reasonable to assume that no reduction in the performance of the doorset would be expected as a consequence of their substitution.

All of the proposed flushbolts are of identical materials and will utilise the same level of intumescent protection and all are of the same or smaller dimensions and therefore they may be positively appraised.

The proposed flushbolts are of the same basic construction as those tested comprising steel bodies and operating mechanism, with steel bolts and keeps. All flushbolts have bolt projections at least equal to that of the tested models. The nominal dimensions of all the flushbolts considered by this report the same or less than the dimensions of the tested flushbolts and therefore the full range of sizes required are considered suitable for use in the leading edge and face of 30 minute and 60 minute timber/mineral-based doorsets.

Radiused and square forends

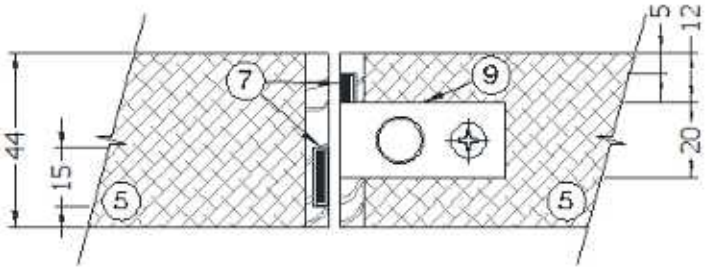
The tested forend and keep plates incorporated were square. It is proposed that radiused forends and keep plates also be permitted.

As the radiused forend and keep plates require the removal of less material to both the frame and leaf edge, when fitted to timber doorsets, their inclusion can only be considered to beneficial. Therefor the alternative forend and keep plate variants are approved subject to intumescent specification discussed earlier in this report.

30 minute Intumescent Protection

It is a requirement of this appraisal that the flushbolts must be installed within the doorsets such that the same level of intumescent protection is provided. This protection shall be such that the mortice in the door leaf is lined (bottom and sides) with a 2 mm thickness of graphite-based sheet material intumescent and that a 2 mm thickness of the same material is provided behind the return and keep plate.

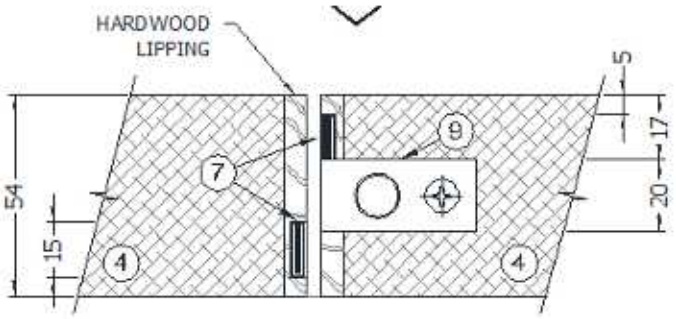
In addition, where the flushbolts are fitted in the meeting edge of the doors, the perimeter intumescent fire seals within the meeting edge of the doors (primary or secondary leaf) shall by-pass the flushbolts by a minimum of 7 mm wide on secondary leaf, with a full intumescent of minimum 15 mm width fitted in the primary leaf (as below).



60 minute Intumescent Protection

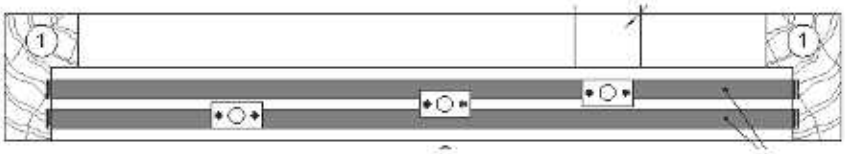
It is a requirement of this appraisal that the flushbolts must be installed within the doorsets such that the same level of intumescent protection is provided. This protection shall be such that the mortice in the door leaf is lined (bottom and sides) with a 2 mm thickness of graphite-based sheet material intumescent and that a 2 mm thickness of the same material is provided behind the return and keep plate.

In addition, where the flushbolts are fitted in the meeting edge of the doors, the perimeter intumescent fire seals within the meeting edge of the doors (primary or secondary leaf) shall by-pass the flushbolts by a minimum of 12 mm wide on secondary leaf, with a full intumescent of minimum 15 mm width fitted in the primary leaf (as below).



In addition the keep plate in the frame head shall be by-passed by the perimeter intumescent fire seals as follows for 60 minute applications only:

- Meeting stile edge-mounted – 9 mm each side
- Face mounted – 15 mm to one side only



Proposed Doorsets

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

To enable the use of the Zoo stainless steel flushbolts 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 locksets to be used safely:

a) The doorset shall carry valid certification or the doorset, including the door frame and associated ironmongery should have achieved 30 or 60 minutes integrity, as appropriate, when tested by a UKAS approved laboratory (or assessed by Exova Warringtonfire, BM TRADA or Chiltern International Fire) to BS EN 1634-1.

b) As the proposed doorset is to be used in double-leaf configuration the test or assessment evidence should be applicable to double-leaf configuration.

c) The leaves of the proposed doorset shall be of a minimum thickness of 44 mm for 30 minute doorsets and 54 mm for 60 minute doorsets.

d) The leaves should incorporate hardwood lippings of a minimum thickness of 6 mm and minimum density 640kg/m^3.

e) The door frame of 30 minute doorsets shall be of softwood or hardwood and have a minimum density of 450kg/m^3.

f) The door frame of 60 minute doorsets shall be of hardwood and have a minimum density of 640kg/m^3.

Conclusions

Should the recommendations given in this report be followed, it can be concluded that the Zoo stainless steel flushbolts detailed within this report may be fitted to previously tested or assessed (by Exova Warringtonfire, BM TRADA or Chiltern International Fire) insulated single-action, double-leaf timber/mineral-based doorsets to provide 30 minutes or 60 minutes integrity and insulation performance, if tested in accordance with BS EN 1634-1.

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 Exova Warringtonfire the assessment will be unconditionally withdrawn Zoo Hardware Ltd 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 19th July 2023, after which time it is recommended that it be returned for re-appraisal.

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 Test Report No. 388830

To determine the fire resistance performance of one single-acting, single-leaf doorset and two narrow single-acting, double-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, Doorset B and Doorset C.

Doorset A had overall nominal dimensions 2200 mm high by 629 mm wide incorporating two door leaves, each with overall dimensions 2132 mm high by 275 mm wide by 54 mm thick. The door leaves were of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges and were hung within a hardwood frame on three steel hinges. The Doorset was fitted with three engaged ZAS13R lever action flush bolts and three engaged ZAS09 lever action flush bolts.

Doorset B had overall nominal dimensions 2200 mm high by 620 mm wide incorporating two door leaves, each with overall dimensions 2132 mm high by 275 mm wide by 44 mm thick. The door leaves were of a solid graduated density chipboard construction, with 8 mm hardwood lippings to the vertical edges and were hung within a hardwood frame on three steel hinges. The Doorset was fitted with three engaged ZAS13R lever action flush bolts and three engaged ZAS09 lever action flush bolts.

Doorset C had overall nominal dimensions 2085 mm high by 990 mm wide incorporating a door leaf with overall dimensions 2029 mm high by 919 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 and was hung within a softwood frame on three steel hinges. The Doorset was installed with a disengaged ZDL7260 Euro sashlock connected to a stainless steel handle and a VDC002.5 surface mounted closer in parallel arm configuration on the exposed face.

For the purpose of the Doorsets A and B were installed so that they opened towards the heating conditions and Doorset C was installed so that it opened away the heating conditions the test.

	Doorset A	Doorset B	Doorset C
Sustained flaming	63 minutes	36 minutes#	36 minutes#
Gap gauge	64 minutes*	36 minutes#	36 minutes#
Cotton Pad	63 minutes	36 minutes#	36 minutes#

* The test duration.
\# Specimen blanked off
The test was discontinued after a period of 64 minutes.

Test date : 25th September 2017

Test sponsor : Zoo Hardware Ltd

Declaration by Zoo Hardware Ltd

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 Exova Warringtonfire to withdraw the assessment.

Signed:

For and on behalf of: Zoo Hardware Ltd

Signatories

Responsible Officer

R. Anning* - Principle Certification Engineer

Approved

A. Kearns* - Technical Manager

* For and on behalf of Exova Warringtonfire.

Report Issued: 19th July 2018

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