

assessment report

Title:

The Fire Resistance
Performance Of Timber Or
Mineral Composite Based
Insulated Doorsets When
Fitted Häfele Hardware

Report No:

175633

Prepared for:

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Date:

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Executive Summary

Objective	This report presents an appraisal of the fire resistance performance of timber or mineral composite based doorsets when fitted with Häfele door hardware, if tested in accordance with BS EN 1634-1: 2000 or BS 476: Part 22: 1987.
Report Sponsor	Häfele GmbH & Co KG
Address	P.O.B. 12 37, D-72192 Nagold, Germany
Summary of Conclusions	Should the recommendations given in this report be followed, it can be concluded that the Häfele door hardware listed within the table included in Annex A of this report may be fitted to previously tested or assessed (by Bodycote warringtonfire) insulated doorsets, to provide up to 120 minutes (subject to the specifics of the assessed item) integrity performance if tested in accordance with BS EN 1634-1: 2000 or BS 476: Part 22: 1987.
Valid until	1 st August 2013

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Introduction

This report presents an appraisal of the fire resistance performance of single-acting insulated doorsets when fitted with Häfele door hardware. The doorset, onto which the proposed hardware is to be fitted, may be of single-leaf or double-leaf configuration. The hardware items considered in this report include locksets, surface mounted door closer, concealed door closers, door guards and door coordinators.

The proposed doorsets are required to provide a fire resistance performance of 60 minutes integrity (locksets, door guards and concealed door closers) or up to 120 minutes integrity (surface mounted closers and door coordinators) with respect to BS EN 1634-1: 2000 or BS 476: Part 22: 1987.

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 Häfele hardware will be fitted to an insulated doorset (timber or mineral composite) 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: 2000 or BS 476: Part 22: 1987 in the proposed configuration i.e. single-leaf or double-leaf.

In any application for the concealed closer, mortice lock or door guard, the door leaf shall be a minimum of 52 mm thick and the leaf construction shall include sub-facings comprising a minimum of 3 mm thick non-combustible board.

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 closed position and, where appropriate, latched position.

Proposals

It is proposed that the Häfele hardware may be fitted into a previously tested (in accordance with BS EN 1634-1: 2000 or BS 476: Part 22: 1987) insulated (timber or mineral composite) doorset which has been shown to be capable of providing 60 minutes integrity (locksets, hinges, door guards and concealed door closers) or up to 120 minutes integrity (surface mounted closers and door coordinators) in the same configuration as that proposed i.e. single-leaf or double-leaf.

Basic Test Evidence

WF Test Report No. 173012

The test referenced WF Test Report No. 173012 included a single-acting, double-leaf timber based doorset fitted with various items of Häfele door hardware.

Amongst the hardware items included were a surface mounted door closer referenced 931.84.820, a concealed door closer referenced 931.84.209, a mortice sashlock referenced 911.02.045, a door guard referenced 911.59.095, a stainless steel hinge referenced 926.22.203, a stainless steel hinge referenced 926.20.903 and a door selector referenced 931.99.900.

Assessed Performance

General

It is proposed that previously fire tested (or assessed by **Bodycote warringtonfire**) timber or mineral composite based insulated doorsets may be fitted with the Häfele hardware without detracting from the performance of the doorset.

The performances of the doorset during the test referenced WF Test Report No. 173012 is cited to display the ability of the hardware items to contribute towards the required fire resistance performance.

The test included insulated (timber based) door leaves and upon examination of the test report it can be seen that there were no modes of integrity failure, which were either attributable to or co-incident with the performance or presence of the proposed items.

Surface mounted door closer

The performance of door leaf B during the test referenced WF No. 173012 is cited to display the ability of the proposed surface mounted closer referenced 931.84.820 to remain in place for a period of 20 minutes, as detailed within the observations to the test report.

The test included insulated (timber based) door leaves and upon examination of the test report it can be seen that there were no modes of integrity failure, which were either attributable to or co-incident with the performance or presence of the door closer for the full test duration.

A surface mounted door closer is usually required to restrain a timber door leaf up until the time at which the intumescent seals react. After a test period of 10 -15 minutes the intumescent seals would be expected to have reacted and as such the restraint offered via the closer is deemed to be superfluous to requirements. The referenced test therefore provides direct evidence on the ability of the proposed closer to be capable of restraining the door leaf for the required test period.

The door closer remained in place for a test period of 20 minutes the intumescent seals had sufficiently reacted by this time to retain the door leaf for the remainder of the test duration.

The tested closer unit was mounted in a projecting arm configuration. This assessment considers that the arm configuration may be fundamental to the performance of the closer, and so limits its assessed use only to this arm configuration. Use of the closer is considered acceptable on timber or mineral cored insulated doorsets for fire resistance periods of up to 120 minutes.

Concealed door closer

The performance of door leaf B during the test referenced WF No. 173012 is cited to display the ability of the proposed door closer referenced 931.84.209 to keep the door leaf in the closed position until such time as the intumescent seals have reacted providing additional restraint to the door leaf.

Concealed closers also pose additional problems to that of surface mounted models as they require the removal of significant amounts of both door leaf and frame material to facilitate their installation. The installation of such a large mass of thermally conductive material like that of a concealed closer body and arm assembly can lead to earlier erosion of the remaining door leaf and frame material causing burn through and integrity failure local to the installation of the closer.

Whilst integrity failures of the doorset were recorded after 36 and 51 minutes, these failures were not as a consequence of the closer's ability to hold the leaf in the closed position, nor could they be considered to be coincident with, or as a consequence of, the closer's presence. There were no modes of integrity failure relating to the door closer until after 60 minutes of the test duration.

The tested closer was provided with a lining of 2 mm thick Interdens intumescent sheet material to all sides of the closer body and to the back and sides of the guide rail where it fitted into the door frame head member.

The performance of the closer in the test provides confidence that the proposal to allow its use in other, previously tested or assessed doorset constructions for 60 minute integrity performances and is acceptable, subject to the inclusion of the 2 mm thick Interdens intumescent protection being provided in all applications and that in all instances the proposed doorset shall have a minimum thickness of 52 mm and shall include non-combustible sub-facings having a minimum thickness of 3 mm.

Mortice sashlock The tested mortice sashlock referenced 911.02.045 was fitted into the meeting edge of door leaf A and was provided with an intumescent wrapping of 2 mm thick Interdens sheet to all faces of the lock case, behind the forend and behind the strike plate to the opposite door leaf.

Reviewing the observations taken from the test report referenced WF No. 173012 it is clear that no instance of integrity failure occurred at the position of the lockset, or as a consequence of its inclusion. The report observations remark that after 65 minutes of testing there was no glowing at the lock position indicating that integrity of the doorset in this area continued to be maintained well beyond the 60 minute requirement.

The performance of the lockset in the test provides confidence that the proposal to allow its use in other, previously tested or assessed doorset constructions for 60 minute integrity performances and is acceptable, subject to the inclusion of the 2 mm thick Interdens intumescent protection being provided in all applications and that in all instances the proposed doorset shall have a minimum thickness of 52 mm and shall include non-combustible sub-facings having a minimum thickness of 3 mm. The tested door leaves included hardwood lippings, therefore, any alternative proposed door leaves shall also include hardwood lipping and these lippings shall have a minimum density of 650kg/m³.

Door guard The door guard referenced 911.59.095 comprised two parts the door guard assembly being mortised into the meeting edge of leaf A and the retainer being mortised into the meeting edge corner of door leaf B. Each component was provided with a 2 mm thickness of Interdens intumescent sheet, the door guard's body being wrapped with the material before insertion into the mortise with additional intumescent sheet material fitted behind its forend. The retainer was bedded onto a 2 mm thickness of Interdens where it fitted to the edge of leaf B.

The test observations are cited to confirm the door guard's performance and show that no instance of integrity failure occurred at the location of the door guard for the full 66 minute duration of the test.

The door guard assembly was fitted at a height of approximately 1500 mm from the base of the doorset such that it could be evaluated without influencing, or being influenced by, the performance of the mortice sashlock. In moving the door guard to this position it is recognised that it would have been subjected to higher furnace pressure conditions resulting in more severe test conditions. The results of the test therefore provide a high degree of confidence in the ability of the door guard unit to be used in other previously tested timber or mineral composite based doorset assemblies for the required 60 minute integrity performance.

As the door guard is a mortised fitted item it shall subject to the same installation requirements given previously for the concealed door closer and sashlock, namely other previously tested or assessed doorset constructions for 60 minute integrity performances, subject to the inclusion of the 2 mm thick Interdens intumescent protection being provided in all applications and that in all instances the proposed doorset shall have a minimum thickness of 52 mm and shall include non-combustible sub-facings having a minimum thickness of 3 mm. The tested door leaves included hardwood lippings, therefore, any alternative proposed door leaves shall also include hardwood lipping and these lippings shall have a minimum density of 650kg/m³.

Stainless steel hinges

The doorset within the test referenced WF No. 173012 included two door leaves each hung within the door frame on three stainless steel butt hinges.

Door leaf A was provided with hinges referenced 926.22.203. The hinges had nominal dimensions of 114 mm high by 102 mm wide by 3.4 mm blade thickness with a nominal knuckle diameter of 15 mm.

Door leaf B was provided with hinges referenced 926.20.903. These hinges had nominal dimensions of 102 mm high by 89 mm wide by 3.0 mm blade thickness with a nominal knuckle diameter of 14 mm.

Integrity failures of the hinges were recorded after 53 minutes and 45 seconds on door leaf B and 55 minutes and 56 seconds on door leaf A, when sustained flaming occurred at a position coincident with the lowest hinge on each door leaf.

Both sets of hinges were provided with a bedding of 2 mm thick Interdens intumescent sheet material to prevent the erosion of the timber door leaf edge and door frame, which could occur due to the presence of the thermally conductive body of the steel hinge. To enable the hinges to be used successfully for 60 minute integrity performances it is proposed that increases in thickness of the intumescent bedding material are made.

Given the shortfall in performance of less than five minutes, it is proposed that the intumescent bedding material to the hinge referenced 926.22.203 be increased from 2 mm to 4 mm. For the hinge referenced 926.20.903 a greater increase of intumescent material of 6 mm thick shall be made. These increases of 100% and 200% are considered to be conservative modifications providing for a high margin of confidence in the ability of the hinges to achieve a 60 minute integrity performance.

Both hinge types were fixed with nominally 32 mm long steel screws for the test, whilst no change to the fixing length for the 926.22.203 hinge is felt necessary, the screw length for the hinges referenced 926.20.903 shall be increased by at least 4 mm to 36 mm. This will ensure that the same engagement of the screw into the door leaf and frame is achieved.

Door coordinator A door coordinator referenced 931.99.900 was included in the test and was fitted to the head of the door frame on the unexposed side of the doorset. The unit is essentially a surface mounted screw fixed item which would not be considered likely to have any adverse effect on the performance of a timber or mineral composite based doorset.

It is therefore considered acceptable to appraise the use of the 913.99.900 door coordinator for use on other timber or mineral composite cored insulated doorsets for fire resistance periods of up to 120 minutes without any further concern.

Comparison of test standards The fire test report proposed as evidence of the hardware's suitability details a fire resistance test conducted to the European test standard BS EN 1634-1: 2000.

For the purpose of this appraisal it is considered acceptable to use data taken from the test and apply it both to applications requiring compliance with BS EN 1634-1: 2000 and BS 476: Part 22: 1987. Test experience has shown that the heating and pressure conditions of BS EN 1364-1: 2000 can be considered to be more severe than those of the BS 476 test.

And on this basis it is reasonable to consider that had the hardware been included in a test conducted in accordance with BS 476: Part 22: 1987, then the results of the tests would have been at least equal, if not better than those achieved.

Proposed Doorsets As stated in this report, the doorset, in the required configuration, will be previously tested (or assessed by Bodycote **warringtonfire**) and its performance is therefore not in doubt.

To enable the use of the Häfele hardware 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 hardware to be used safely:

- a) The doorset shall carry valid certification or the doorset, including the door frame and associated hardware should have achieved up to 120 minutes integrity, when tested by a NAMAS/UKAS approved laboratory (or assessed by Bodycote **warringtonfire**) to BS EN 1634-1: 2000.
- b) If the proposed doorset is to be used in double-leaf configuration the test or assessment evidence should be applicable to double-leaf configurations.
- c) The critical aspects of the doorset construction are given earlier in this report and shall be replicated on the proposed doorset, in particular the necessity for the door leaf to include non-combustible sub-facings for those items that require mortising into the door leaf and frame.

Pertaining specifically to the performance of the 926.22.203 and 926.20.903 stainless steel hinges, the critical aspects of the doorset construction are considered to be the material of the door frame, the leaf to frame clearance gaps and the lipping material. Attention should be paid to these details and these should not be amended from that previously fire tested. Where this information is not known the following minimum specification will be followed:

- a) Door frame density - 650 kg/m³
- b) Leaf to frame clearance gaps not to exceed 2.5 mm average and 3 mm maximum
- c) Lipping density - 650 kg/m³
- d) Door leaf thickness – 52 mm minimum

Conclusions

Timber or mineral composite based doorsets that have previously been successfully fire tested by a NAMAS/UKAS accredited laboratory (or assessed by Bodycote **warringtonfire**) which have achieved up to 120 minutes integrity as discussed in this report may be fitted with the Häfele hardware items (subject to the specifics of the assessed item) listed in Annex A without detracting from the overall performance of the doorset.

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 Häfele GmbH & Co KG 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 August 2013, 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. 173012

Test report relating to the performance of a fully insulated, single-acting, double-leaf, timber doorset incorporating various items of building hardware, when subjected to a test in accordance with BS EN 1634-1: 2000 to determine its fire resistance performance.

The doorset had overall dimensions of 2080 mm high by 1942 mm wide and incorporated a door leaves each of overall dimensions 2038 mm high by 928 mm wide by 52 mm thick.

The door leaves were hung within a hardwood door frame, each on three stainless steel hinges. The door leaves comprised a flaxboard core, softwood stiles and rails, hardwood lippings to the vertical edges, magnesium silicate based board sub-facings and MDF outer facings.

The doorset was fitted with two different door closing devices a surface mounted overhead door closer referenced Art. No. 931.84.820 mounted on the exposed side of door leaf B in projection arm configuration and a concealed door closer referenced Art. No. 931.84.209 mounted within the head of door leaf A together with its arm mechanism fitted into the head of the door frame. Door leaf A was hung within the door frame on three stainless steel hinges referenced Art. No. 926.22.203. Door leaf B was hung within the door frame on three stainless steel hinges referenced Art. No. 926.20.903. A door coordinator referenced Art. No. 931.99.900 was screw fixed to the head of the door frame on the unexposed side of the doorset.

The doorset was orientated such that its door leaves opened towards the heating conditions of the test. The lockset was disengaged for the test duration.

The specimen satisfied the test requirements for the following periods:

Integrity	Sustained Flames	51 minutes
	Gap Gauge	66 minutes*
	Cotton Pad	36 minutes
Insulation		36 minutes*

* The test duration. The test was discontinued after a period of 66 minutes.

Test date : 25th May 2008

Test sponsor : Häfele GmbH & Co KG.

Declaration by Häfele GmbH & Co KG

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 Bodycote **warringtonfire** to withdraw the assessment.

Signed:

For and on behalf of:

Signatories


Responsible Officer
D. Forshaw* - Technical Consultant


Approved
A. Kearns* - Technical Manager

* For and on behalf of Bodycote **warringtonfire**.

Report Issued: 8 th August 2008
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The assessment report is not valid unless it incorporates the declaration duly signed by the applicant.

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Annex A – Approved Hardware

Art. No.	Description	Assessed performance
911.02.045	Mortice Sashlock	60 minutes
931.84.209	Concealed door closer	60 minutes
911.59.095	Door guard	60 minutes
926.22.203	Stainless steel butt hinge	60 minutes
926.20.903	Stainless steel butt hinge	60 minutes
931.84.820	Overhead door closer	Up to 120 minutes
931.99.900	Door coordinator	Up to 120 minutes



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