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Testing. Advising. Assuring.

Title:

The Fire Resistance Performance of Steel Mailboxes Designed and Manufactured by Mailboxes GB

WF Assessment Report No:

312014

Prepared for:

Mailboxes GB

Aspec House, Middlemore Lane,
Aldridge, Walsall. WS9 8SP

Date:

31st October 2011

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Executive Summary

Objective	This report provides a considered opinion regarding the fire resistance performance of steel mailboxes with pivot hinged doors and letter plates.
Report Sponsor	**Mailboxes GB**
Address	Aspec House, Middlemore Lane, Aldridge, Walsall WS9 8SP
Summary of Conclusions	Should the recommendations given in this report be followed, it can be concluded that the mailboxes discussed in this report, should, if subjected to a fire resistance test in accordance with BS 476: Part 22: 1987, be capable of providing 60 minutes integrity.
Valid until	27th October 2016

Introduction

This report provides an opinion regarding the fire resistance performance of steel mailboxes with pivot hinged doors and letter plates.

The assemblies are required to satisfy the integrity criterion given in BS 476: Part 22: 1987, Clause 8, for a period of 60 minutes.

Assumptions

It is assumed that the heating conditions of the test will be on the inside of the mailbox with the requirement to satisfy the integrity criteria of the standard from inside to outside.

It is also assumed that the door of the mailbox will be in the fully closed and locked position at the commencement of any fire resistance test.

Proposals

The proposed mailboxes shall be of overall maximum nominal dimensions 385 mm deep by 300 mm wide by 125 mm high and shall be incorporated within a free standing mailbox unit. The free standing unit shall comprise multiple mailboxes vertically stacked.

The mailbox will comprise a 1.5 mm thick mild steel plate formed into a box. The front face of the box incorporates a door, hinged on one side by a mild steel pivot pin nominally 3 mm diameter. The door aperture within the mailbox incorporates a returned profiled edge forming a 6 mm rebate into which the door leaf closes. The door leaf will be locked into the mailbox by means of a single point lock assembly which restrains the leaf at mid height.

An aperture of nominal dimensions 235 mm wide by 24 mm high is provided within the face of the door leaf which is closed via a spring loaded, top hung steel letter plate.

The letter plate assemblies will comprise mild steel flaps pivoted from a mild steel pivot pin nominally 3 mm diameter which is located within a stitch welded tube fixed to the flap's upper edge. The pivot pin will locate into holes within supporting plates welded to the inside face of the mailbox door. The lower edge of the flap has a return flange nominally 10 mm wide and is provided with a continuous graphite based intumescent strip self-adhered to the flange. A corresponding steel angle is spot welded to the inside face of the door such that its own 10 mm wide flange is opposite the intumescent strip with a nominally 2 mm wide clearance gap between the two faces. The pivot pin fitted to the letter flap will incorporate an integral spring to provide a closing force to the flap.

Assessed Performance

Due to the construction of the mailbox there is no submitted test evidence specifically related to this type of assembly. The design however incorporates principles which are associated with successfully tested steel based constructions via empirical evidence.

It is considered acceptable, therefore, to discuss the likely affects that the individual components may have on the performance of the assembly.

As mentioned previously, the mailboxes will be formed from 1.5 mm thick steel. Empirical test evidence has shown that steel with a thickness as low as 0.9 mm will provide as much as 4 hours resistance to fire and will not oxidise sufficiently under standard fire test conditions to cause the formation of holes or gaps within the structure. The 1.5 mm steel box component is therefore expected to be more than capable of resisting the spread of fire from inside to out.

Since steel will expand when heated and may therefore also experience some deflection or distortion, there is a potential for the box construction to separate at the joints and open. It is therefore essential that the welds are at centres no greater than 150 mm at any joints in the construction.

When considering the fire resistance of the overall assembly, one obvious weak area is the aperture in the front face of the mailbox which is closed via a pivoted steel leaf. This aperture may allow the spread of fire from one side to the other or may allow through gaps from one side to the other to form. Both of these occurrences may result in integrity failure of the assembly with respect to BS 476: Part 22:1987.

Another obvious weak area is the aperture and letter plate included within the pivoted steel door leaf. This aperture may allow the spread of fire from one side to the other or may allow through gaps from one side to the other to form. Both of these occurrences may result in integrity failure of the assembly with respect to BS 476: Part 22:1987.

The fire resistance of the overall mailbox assembly, in terms of the integrity criterion specified in BS 476: Part 22: 1987 is considered to be provided by a combination of the letter box enclosure, the pivoted leaf and the letter plate component.

The letter box is fabricated from 1.5 mm thick steel and incorporates a pivoted door. As previously discussed, the 1.5 mm steel box construction, in terms of material thickness, is considered more than adequate to provide the required resistance to fire. It is therefore considered necessary to discuss the performance of the door construction.

This type of steel door construction is normally associated with leaf movement in the leading edge corners under test conditions. However, as the leaves are fitted within a reveal formed by a returned edge aperture detail provided in the mail box, and the clearance between the perimeter of the door leaf and the mail box aperture is typically just 1.5mm to 2mm maximum, the door leaf is expected to be wedged tight (once thermal expansion of the leaf occurs) against the reveal of the box. This, together with the restraint provided by the locking mechanism, is expected to provide a sufficient degree of resistance to thermal deformation during exposure to a standard fire resistance test.

Locking mechanism

As discussed above it is essential to the performance of the door leaf, and therefore the mailbox, that the locking mechanism retains the leaf in the closed position. The proposed locking mechanism is of part steel, part mazak alloy construction. The mazak part of the mechanism would expected to soften and melt relatively early in a standard fire resistance test.

In anticipation of this, the door leaf is provided with a profiled steel bar, weld fixed to the inside face of the door, which projects through a slot in the mail box reveal. The upper edge of the bar is provided with a notched profile which aligns with the latch bolt which is also notched on its underside. When engaged the latch bolt passes through a slot in a steel plate fitted within the mail box and locates over the notched plate of the door.

This arrangement of the steel latch bolt and door plate, together with the way in which they each locate through slots means that in the event of the mazak lock components melting, the latch bolt will remain in position over the door plate stopping it from withdrawing and any possibility of the door opening.

The melting of the mazak lock components would also potentially leave a small hole in the face of the leaf; however, a rotating steel escutcheon has been provided on the leaf surface to prevent this from occurring. Therefore any potentially deleterious effects due to the loss of the mazak lock components have been sufficiently accounted for.

Where there may still be some potential for the door leaf to distort and allow the formation of through gaps between the door leaf and frame reveal, a graphite based intumescent seal has been provided to the edge of the reveal such that its reaction will swell and fill these gaps. The design of the locking components, together with the addition of the graphite intumescent perimeter seal is expected to be capable of resisting the formation of significant gaps at the perimeter edges of the door leaf up to the maximum size allowable during exposure to a standard fire resistance test for the required period of 60 minutes.

Although the steel mailbox assembly would be expected to satisfy the integrity requirements of the test Standard for a period of 60 minutes on its own, it could be assumed that the letter box may contain combustibles (i.e. paper), which in the event of a fire may decompose and emit flammable gases. In this instance, it is possible that sustained flames may be issued from the aperture provided within the leaf for the passage of mail.

In order to prevent sustained flames issuing from the aperture, a mild steel letter flap is to be fitted over the internal face of the aperture. The letter plate is hinged along its top edge and the hinge incorporates an integral steel spring which retains the flap in the closed position. The flap overlaps the door aperture at both vertical edges and is provided with a graphite based intumescent seal along its bottom edge.

During exposure to standardised fire test conditions, the spring fitted to the letter flap is expected to lose its tension. However, the self weight of the flap would be expected to keep the letter flap closed against the panel. Under exposure to fire test conditions, the graphite intumescent strip will expand and seal any gaps that may form between the letter flap and the lower edge of the letter plate aperture within the door leaf. The reaction of this seal would be expected to prevent sustained flaming from issuing from the flap position, would seal any potential through gaps, and would have the added benefit of restricting any flow of oxygen into the letter box (thus limiting the free combustion of any flammable materials which may be contain therein).

As the panel assembly is classified as an uninsulating construction, the release of hot gases from around the perimeter of the letter plate aperture is not considered critical, since the cotton pad used to evaluate the hot gases is unable to be used to determine integrity failure in accordance with BS 476: Part 22; 1987.

The proposal is therefore based on good engineering construction; the use of the steel mail box, letter plate and steel door leaf together with the use of intumescent seals can be considered to be consistent with the ability of the assembly to achieve a period of fire resistance of at least 60 minutes if subjected to a test in accordance with the Standard previously mentioned in this report.

Conclusions

Steel based mail boxes as discussed in this report, should, if subjected to a fire resistance test in accordance with BS 476: Part 22: 1987, be capable of providing 60 minutes integrity.

Validity

This appraisal is issued on the basis of information and experience available at the time of preparation. If contradictory evidence becomes available to Exova warringtonfire the appraisal will be unconditionally withdrawn and Mailboxes GB will be notified in writing. Similarly the appraisal 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 27th October 2016, at which time it is recommended that it is returned for re-appraisal.

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

Declaration by Mailboxes GB

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.

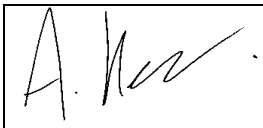
Signed:

For and on behalf of:

Signatories

Responsible Officer

D Forshaw* - Certification Engineer



Approved

A Kearns* - Technical Manager

* For and on behalf of Exova Warringtonfire.

Report Issued: 31st October 2011

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