

A FIRE RESISTANT SHUTTER ASSEMBLY

FIELD OF INVENTION

5 The present invention relates to a fire resistant shutter assembly for use on a window. In particular, the shutter assembly is for use with a window in a door leaf and operates in an emergency to locally enhance the fire resistance of the window.

10 BACKGROUND ART

Fire resistant door leaf assemblies containing windows are common. The windows allow for safer ingress and egress through the doorway by permitting a person to see if anyone is on the other side of the door before opening the door.

15

Fire resistant door leaf assemblies are mandatory in both domestic and commercial buildings, and their performance is governed by relevant fire safety codes that govern aspects of the door's performance under a fire situation. One such aspect is the amount of time the door can resist a fire before it permits the fire to encroach into the space on the opposite side of the door to the fire side. This aspect of a door leaf's performance is known as its fire rating.

20

One of the problems associated with providing a fire resistant door leaf assembly with a window is that in order to satisfy the fire rating requirements set out in the relevant building codes, the glass used in the window has to be made from fire rated glass. This glass commands a premium price and significantly adds to the cost at which a door can be manufactured and supplied to the builder or building maintenance manager. The present invention solves this problem by replacing the fire rated glass in the window with normal laminated glass. This glass is significantly cheaper than fire rated glass and its use substantially reduces the cost of manufacturing the door.

25

30



However since this glass is not fire rated, a fire resistant shutter is installed. This shutter is held in a normally open position away from the window via a temperature actuated mechanism. When the temperature on the fire side of the door leaf reaches a pre-set temperature, the mechanism releases the shutter
5 which in turn moves into position over the window thereby locally enhancing the fire rating of the door leaf assembly.

This assembly is also perfectly suitable for retro-fitting on existing door leaves that contain damaged or defective fire rated glass windows. The cost of
10 repairing these doors is substantially reduced by replacing the fire rated glass with normal laminated glass and the associated temperature actuated shutter assembly.

SUMMARY OF INVENTION

15 The present invention provides a fire resistant shutter assembly for use on a window in a door leaf including a shutter made up of at least one panel of suitably fire resistant material and a temperature actuated mechanism for holding the shutter in the normally open position such that when it is actuated, it releases
20 the shutter and allows it to move from its normally open position, whereby the window is uncovered by the panel, into its closed position, whereby the window is sufficiently covered by the panel to locally enhance the fire rating of the door leaf assembly, said mechanism being actuated when the temperature on the fire side of the door leaf assembly reaches a set point.

25 In one embodiment, the fire resistant shutter assembly includes a plurality of sliding panels, each capable of covering a portion of the window such that when the mechanism is actuated, each panel slides into a set position relative to the window so that the combined effect of the panels is to sufficiently cover the
30 window.

Preferably the panels are held in side by side substantially overleaf arrangement above the window when the shutter is in the normally open position, one of the outermost panels having latching means that engages with the heat activated mechanism, and each panel having interengagement means with its
5 neighbouring panel(s) that holds each neighbouring panel in the normally open position when the panel with the locking means is engaged with the heat activated mechanism whereby upon actuation of the mechanism, the panel having the latching means is released which in turn causes the cascading release of all the other panels in the shutter so that each can slide down into position
10 relative to the window so that the combined effect of the panels is to sufficiently cover the window.

In an alternate configuration, the panels are held in side by side substantially overleaf arrangement above the window when the shutter is in the
15 normally open position, each of the panels having locking means that engages with the mechanism which holds the panels in the open position, whereby upon actuation of the mechanism, the panels are released so that each can slide down into position relative to the window so that the combined effect of the panels is to sufficiently cover the window.

20

Preferably each of the panels is constrained to slide when released by a set of slide guides that are fitted into the door leaf assembly, said guides interact with the interengagement means and stop each panel at a desired position in
25 respect of the window such that the combined effect of the plurality of panels is to completely cover the window.

Preferably the panels slide into their closed position under the influence of gravity.

30

Preferably the heat activated mechanism includes a baseplate for attachment of the mechanism to the door leaf, a housing fixed to the baseplate

and extending from it with an opening at the end opposite to the base plate, a piston including a rod having a shoulder plate fixed at one end located within the housing and a portion of the rod that is fixed to the plate and extends from it that is capable of extending beyond the housing through the opening, the
5 end of the rod that extends beyond the housing is capable of engaging with the latching means on at least one shutter panel, a biasing means that biases the piston to retract at least a portion of the rod that extends beyond the housing, and a block of material that resists the biasing means under normal temperature conditions and holds the piston in position with the portion of rod
10 extended, but when the temperature rises to the melting point of the material, it quickly melts and is thereby no longer capable of resisting the biasing action of the biasing means, therefore allowing the piston to move and at least partially retract the portion of the rod that extends beyond the housing and thereby disengage with at least one shutter panel.

15

Preferably the biasing means is a spring.

Preferably the spring is located concentrically with the rod portion of the piston, and when the piston is held in position by the block of material, the
20 spring is compressed between the face of the shoulder plate that has the rod extending from it and the inner face of the of the end of the housing that has the opening in it through which a at least a portion of the rod passes through.

Preferably the block of material is made from an alloy that has
25 thermodynamic properties that causes it to melt quickly when the temperature rises to a predetermined temperature.

Preferred embodiments of the invention will now be described with
reference to the accompanying drawings, in which:

30

Figure 1 is an isometric view of a door leaf with the shutter assembly attached. In this embodiment, the shutter is shown as being made up of three panels that are shown in the normally fully retracted position.

5 Figure 2 is an isometric view of a door leaf with the shutter assembly attached. In this embodiment, the shutter is shown as being made up of three panels that are shown in the actuated closed position covering the window.

10 Figure 3 is an isometric view of the shutter assembly showing three shutter panels, the latching means that is carried by one of the outermost panels that engages with the heat activated mechanism (not shown), and the interengagement means carried by each panel to engage with its neighbouring panels as well as detail of the guide rail assembly

15 Figure 4 shows the detail of the heat activated mechanism that releases the panels making up the shutter under emergency conditions.

DESCRIPTION OF PREFERRED EMBODIMENTS

20 Turning firstly to Figure 1, this view shows the fire shutter system installed onto a door leaf (1) with a window (2). The panels that make up the shutter are stacked in overleaf arrangement side by side above the window (2) and held in the normally open and retracted position by the interengagement of the tongue (4) carried on the outermost panel (3). The tongue (4) has a hole in it that engages
25 with the heat activated mechanism (5). The panels have interengagement means (6) located along their top edge so that when panel (3) is latched to the heat activated mechanism (5), the other panels making up the shutter are also held in the retracted position by the interengagement means (6).

30 Figure 2 shows the shutter assembly discussed in Figure 1 after the heat activated mechanism 5 has been activated. Panel (3) drops down to cover the lowermost portion of the window and the release of panel (3) allows the remaining

panels (7) and (8) to also move into position to cover their respective portions of the window's area so that the fire resistance of the door leaf is locally enhanced at the region of the window. The panels are guided into position via a pair of guide rails (9).

5

Figure 3 shows an exploded view of part of the shutter assembly. It does not show the heat activated mechanism. This view more clearly shows the interengagement means (6) between the individual panels. In the present embodiment, the interengagement means (6) carried by each of the panels serves two purposes, firstly they interact with their neighbouring panel(s) when the panels of the shutter are held in the normally open position above the window (2) to hold the shutter in the retracted position when panel (3) is latched to the heat activated mechanism, and when panel (3) is released, the interengagement means on panel (3) interacts with step (10) cut into the guide rails in order to position panel (3) in the desired location relative to the window (2). The interengagement means on panel (7) interacts with step (11) to position that panel in a desired location relative to the window (2), and finally the interengagement means carried by panel (8) interacts with the upper door leaf horizontal structural member (12) to position panel (8) in a desired location relative to the window (2). A pair of guide plates (13) are attached to the guide rails (9) and have a gradual gradient for locking the individual panels to minimise the freeplay of each panel within the guides.

Figure 4 shows the detail of the heat activated mechanism (5). The mechanism has a base plate (14) that is fastened to the door leaf. The base plate (14) has a housing (15) attached to it that has an opening at the opposite end of the housing to the base plate (14). The mechanism has a piston that is made up of a rod (16) with a shoulder plate (17) fixed to the end inside the housing. A spring (18) is concentrically located with the rod between the shoulder plate (17) and the inner wall of the end of the housing (15) containing the opening. The piston is held in place by a block of alloy (19) that is placed between the base plate (14) and the opposite face of the shoulder plate (17) that is engaged with

the spring (18). The presence of the block places the spring (18) under compression, and the length of the rod (16) is sufficiently long so that when the block (19) is in position, a portion of the rod (16) extends through the opening in the housing (15) and engages with the tongue (4) [not shown] on panel (3). The
5 block of alloy (19) is made from materials that melt at a desired temperature. When the block (19) melts, it can no longer resist the force exerted on the shoulder plate (17) by the compressed spring (18), the force of the spring (18) then moves the piston so that it moves further into the housing (15), causing the rod (16) to disengage with the tongue (4).

10

It should be noted that these illustrations are representative of the best manner of manufacture known to us at the date of this application, however it must be appreciated that variations on these illustrations is possible without departing from the overall scope of the invention as described and/or claimed.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A fire resistant shutter assembly for use on a window in a door leaf including a shutter made up of at least one panel of suitably fire resistant material and a temperature actuated mechanism for holding the shutter in the normally open position such that when it is actuated, it releases the shutter and allows it to move from its normally open position whereby the window is uncovered by the panel, into its closed position whereby the window is sufficiently covered by the panel to locally enhance the fire rating of the door leaf assembly, said mechanism being actuated when the temperature on the fire side of the door leaf assembly reaches a set point.
2. A fire resistant shutter assembly as claimed in claim 1 wherein the shutter includes a plurality of sliding panels, each capable of covering a portion of the window such that when the mechanism is actuated, each panel slides into a set position relative to the window so that the combined effect of the panels is to sufficiently cover the window.
3. A fire resistant shutter assembly as claimed in claim 2 wherein the panels are held in side by side substantially overleaf arrangement above the window when the shutter is in the normally open position, one of the outermost panels having latching means that engages with the heat activated mechanism, and each panel having interengagement means with its neighbouring panel(s) that holds each neighbouring panel in the normally open position when the panel with the locking means is engaged with the heat activated mechanism whereby upon actuation of the mechanism, the panel having the latching means is released which in turn causes the cascading release of all the other panels in the shutter so that each can slide down into position relative to the window so that the combined effect of the panels is to sufficiently cover the window.

4. A fire resistant shutter assembly as claimed in claim 2 wherein the panels are held in side by side substantially overleaf arrangement above the window when the shutter is in the normally open position, each of the panels having locking means that engages with the mechanism which holds the panels in the open position, whereby upon actuation of the mechanism, the panels are released so that each can slide down into position relative to the window so that the combined effect of the panels is to sufficiently cover the window.
5. A fire resistant shutter assembly as claimed in any preceding claim wherein each of the panels is constrained to slide when released by a set of slide guides that are fitted to the door leaf assembly, said guides interact with the interengagement means and stop each panel at a desired position relative to the window such that the combined effect of the plurality of panels is to completely cover the window.
6. A fire resistant shutter assembly as claimed in any preceding claim wherein the panels slide into their closed position under the influence of gravity.
7. A fire resistant shutter assembly as claimed in any preceding claim wherein The heat activated mechanism includes a baseplate for attachment of the mechanism to the door leaf, a housing fixed to the baseplate and extending from it with an opening at the end opposite to the base plate, a piston including a rod having a shoulder plate fixed at one end located within the housing and a portion of the rod that is fixed to the plate and extends from it that is capable of extending beyond the housing through the opening, the end of the rod that extends beyond the housing is capable of engaging with the latching means on at least one shutter panel, a biasing means that biases the piston to retract at least a portion of the rod that extends beyond the housing, and a block of material that resists the biasing means under normal temperature conditions and holds the

piston in position with a portion of rod extended, but when the temperature rises to the melting point of the material, it melts and is thereby no longer capable of resisting the biasing action of the biasing means, therefore allowing the piston to move and at least partially retract the portion of the rod that extends beyond the housing and thereby disengage with at least one shutter panel.

8. A fire resistant shutter assembly as claimed in claim 5 wherein the biasing means is a spring.
9. A fire resistant shutter assembly as claimed in claim 6 wherein the spring is located concentrically with the rod portion of the piston, and when the piston is held in position by the block of material, the spring is compressed between the face of the shoulder plate that has the rod extending from it and the inner face of the of the end of the housing that has the opening in it through which a at least a portion of the rod passes through.
10. A fire resistant shutter assembly as claimed in claims 5, 6 or 7 wherein the block of material is made from an alloy that has thermodynamic properties that causes it to melt quickly when the temperature rises to a predetermined temperature.
11. A fire resistant shutter assembly as hereinbefore described with reference to the drawings.

Dated this 30th day of June 2003

AL-SUS Industries Pte. Ltd.