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Title: Fire door or fire window

Description

This invention relates to a fire rated door or fire rated window, according to the generic part of patent claim 1, which is basically composed of a glass pane that itself is embedded in a perimetrical metal frame, and is incorporated in a fire rated partition to prevent the spread of smoke and fire.

Such fire rated door is for example disclosed by EP 0 401 555 A2, where a glass pane is mounted in a metal frame equipped with a surrounding groove. In this case the glass pane ends before the frame and is connected with the metal frame by means of additional metal edge strips serving as compensating adapters. The metal strips are glued with traditional fire rated glue for example made on water-glass base.

EP 0 612 910 A2 displays a closing ledge for metal doors, which ledge, to increase stability in the lower part, is fastened between two protruding legs.

A frame profile for fire rated doors is disclosed by EP 0 444 393 A2, where a glass pane is retained in a strong frame profile. The frame profile is executed as hollow section and it presents, inserted into its chambers, fire rated plates that guarantee the fire resistance of such door.

A fire-resistant glazing is described in DE 296 45 259 A1. In this case, silicate glass panes made from tempered glass are used on the one side, and a reinforced silicate glass pane is used on the other side of an intermediate air gap. The construction of such fire-resistant glazing is realised by means of a metal frame embracing and overlapping the border edge.

DE 297 42 665 A1 reveals a fire retarding swing door or pivoted door, where the door case respectively the edges of the door leaves present a thermal insulation material, extending over the entire length respectively width. This thermal insulation material will



expand when heat develops, such that in the event of fire, the door component includes a secure fire barrier. This door is composed of plane material, which is not transparent and, in a partial section, is interrupted by a window to be mounted.

As the above state-of-the-art shows, such technical designs no longer match contemporary architecture. Today's goal is to give the impression that de-materialised transparent structures are used, which can no longer be achieved with the constructions known from the state-of-the-art.

The object of the invention is to create a fire rated door respectively a fire rated window suitable with glazed components to be integral part of modern aesthetic architectural buildings and which does not disfigure the whole appearance, and moreover opens possibilities for most differing application purposes.

The problem is solved with the characteristic of patent claim 1, whereby the sub-claims represent a further embodiment of the inventive idea. According to the inventive idea, the fire rated door respectively the fire rated window is a modular construction. In the following description, it is only referred to a fire rated door, whereby the inventive idea also includes a fire rated window. By creating a basic body for a fire rated door, different door types, like pivoted doors, single action doors etc. can be realised without any additional work. In this case, the fire rated door consists of a door leaf composed of two spaced glass panes, whereby the glass panes almost extend as far as to the edge of the door leaf. The profiles are in this case executed as hollow sections, and via corner connectors, they are connected as a frame. However, the frame is not supported on the exterior side and is not visible to the exterior, as it is located in the interior region, that means between the spaced glass panes and in the region of the profiles, due to an enamelling, the glass panes cover this part of the profiles. The space within the door leaf, that means between the perimetrical frame and the spaced glass panes, is filled with a transparent fire protection material. Depending on the application type, it is also possible to withdraw from the liquid transparent fire protection material, or in case of a higher fire rating class, to insert a special fire rated glass pane into the space. This design type creates a transparent door, even providing the user with a certain free vision in the event of a fire and thus shows that for example behind such door a fire has started.

The frame profile is identical for the longitudinal string as for the cross-sectional string and presents at least one hollow chamber, whereby one hollow chamber is equipped with an opening or a deepening to the outside, provided to connect more profiles. The profile of the covered frame presents projections covering the glass pane's edges of the used glass panes, whereby the glass pane's edges are provided with a recess to accommodate a further profile, which acts as closing profile. This closing profile is pushed in the opening or the groove of the first hollow chamber of the perimetrical profile and with its projections thus securely covers the end zone of the glass pane. In its central region, the closing profile is provided with a T-shaped groove, which is suitable to receive sealing components. The outline of the closing profile is furthermore crown-shaped in its outer contour for a single action door, whereby other executions are possible. Fire rated laminates can be integrated into said outer contour. In the event of fire, the fire rated laminates serve the purpose to expand due to the increased temperature and thus guarantee the door leaf is sealed with regard to the surrounding door case.

A fire rated door according to the inventive idea can therefore be pre-mounted from a covered perimetrical frame and from two glass panes, composed of individual single layer safety glass panes. If, besides the aforementioned execution with a closing profile, another application type is desired, for example the use of a single action door, a differently conceived profile is used, which is likewise introduced into the opening of the hollow chamber and also covers the edges of the glass panes, but moreover presents a deflecting leg, serving as rebate for the door leaf at the door case.

It is moreover conceivable that the locating leg is not directly conformed, but that an additional profile is used, which in its exterior zone presents at least preferably two T-shaped grooves, whereby a sealant can be introduced into one of the T-shaped grooves and a correspondingly formed locating profile can be introduced into the second T-shaped groove.

The used profiles may be produced from plastic or from light metal. In this case, corresponding fittings are inserted into the profiles, in order to guarantee good functioning of such fire rated door. Such door leaves can be executed as single leaf or double leaf swing doors or as pivoted doors.

The invention is explained in detail on the basis of a diagrammatically represented embodiment example. It shows:

- Figure 1: A frontal view of a closed fire rated door.
- Figure 2: A vertical section through a fire rated door according to figure 1.
- Figure 3: A cross-sectional drawing of a portion of the edge zone with different profiles.
- Figure 4: Like figure 3, however with a different profile.

Figure 1 illustrates a fire rated door, which, visible to the outside, presents a door leaf 2 within a door case 1. Such door is for example represented in a vertical section in figure 2. Between the upper section of the door case 1, where a sealant 4 is inserted as fire rated laminate, the sectional drawing displays a door leaf 2, which is represented with a lower door bearing 24 located above the entrance threshold 23 of a floor. The basic construction of the door leaf 1 is achieved by two glass panes 5 and 6, which are secured by an invisible frame, composed of profiles 9. The profile 9 is mounted with non-illustrated corner connectors to form a frame. Into the frame, between the glass panes 5 and 6, more exactly in the remainder space, is introduced a fire rated filling 25, for example in form of a fire rated gel.

The profile 9 is basically composed of two hollow chambers 10 and 14, whereby the hollow chamber 10 is executed as closed hollow chamber and the hollow chamber 14 is executed as open hollow chamber with an opening 19 pointing towards the outer edge of the frame. Within the hollow chamber 14 is located a recess 12, serving to connect further profiles respectively to hold in place further additional profiles inserted via the opening 19. On its exterior side, where the opening 19 is placed too, the profile 9 presents projections 38 on each side pointing towards the glass panes. The projections 38 here cover the border edges 27 of the glass panes 5 and 6. In this section, the glass panes 5 and 6 present a recess 7 with regard to their exterior surface. Instead of the recess 7, the glass panes 5, 6 can also be provided with one chamfer, as represented in figure 4. In the region, where the profiles 9 are placed behind the glass panes 5 and 6, the glass panes 5 and 6 are provided with an enamelling 3. For this reason, such fire rated door's frame is invisible to the spectator or user.

In the embodiment example of figure 2, a closing profile 17 is inserted into the opening 19 of profile 9 on the upper side as well as on the lower side. The closing profile 17 has got a projection 18 providing the closing profile 17 with sufficient support within the opening 19. An outer contour 16 of the closing profile 17 runs in a radius and ends on both sides in protruding legs 8 engaging into the recess 7 of the glass panes 5 and 6 and thus completely cover the glass pane's border edges 27. The outer contour 16 of the closing profile 17 is interrupted in its central region by a T-shaped groove 15. A sealant 39 can for example be inserted into the T-shaped groove 15. Furthermore there is a deepening 21 running on both sides of the T-shaped groove 15, which is filled with fire rated laminates in form of intumescent tape 20. In the event of fire due to increased temperature, these fire rated laminates guarantee that the door securely seals the fire protection partition.

The embodiment example in figure 2 illustrates a door, which can be used for example as a pivoted door. The door leaf's 2 basic body, namely the glass panes 5 and 6 with intermediate frame made from profile 9, however can also be transformed into a single action door, as represented in figure 3. In this case, a profile 28 is used, which with a projection 18 is inserted into the opening 19. Said profile 28 has also got legs 29 at its outside region, which fill in the recesses 7 of the glass panes 5 and 6. With regard to the projection 38, the profile 28 presents two recesses 30, which are supported at the outer contour of the profile 9. Moreover two T-shaped grooves are provided at the outer contour of the profile 28, preferably at the edges. Either a sealant element can for example be inserted into said T-shaped groove, or a locating profile 33. The profiles to be inserted can also be realised from different material. The locating profile 33 is designed to present a leg 34 running parallel with regard to the glass pane 6, which leg later becomes leg 35 having a smaller section than the leg 34. The transition zone of leg 34 to leg 35 is made up by an angled leg 37, which presents in its end zone a T-shaped extension. This T-shaped extension is inserted into the T-shaped groove 31. In addition, a sealant 36 can be mounted to the leg 35. Thanks to the fast insertion of profiles 28 and 33 and due to the modular system, the fire rated door's basic module transforms into a single action door. A recess 32 runs on the outside of profile 28, which can serve for example to receive an intumescent tape acting as fire rated laminate.

In the embodiment example of figure 4 is represented a profile 43, which is conceived with only one hollow chamber 44. An exterior terminal leg 45 is provided with lateral conformed

projections 46, which cover the edges 27 of the glass panes. In this embodiment example, the glass panes 5, 6 are executed with a chamfer 40. In the embodiment of figure 4, a closing profile 41 is connected via the terminal leg 45. The closing profile 41 is U-shaped, whereby two deflecting legs 42 extend as far as into the chamfer 40 of the glass panes 5, 6. A T-shaped groove 15 is centrally formed in the outer contour 16 and on the lateral side an integral fire rated laminate. Depending of the fire rating class, the intermediate space between the spaced glass panes 5 and 6 can be filled with a fire rated medium, for example with gel or a fire rated glass pane or with no fire rated medium at all. Likewise the profiles 9, 43 can be filled or not filled.

The profiles 9, 17, 28, 41 and 43 can be made from plastic, steel, wood or light metal. In case plastic material is used, it would be glass-fibre reinforced plastic.

References

- 1 door case
- 2 door leaf
- 3 enamelling
- 4 sealant
- 5 glass pane
- 6 glass pane
- 7 recess
- 8 leg
- 9 profile
- 10 hollow chamber
- 11 separating wall
- 12 recess
- 13 exterior wall
- 14 hollow chamber
- 15 T-shaped groove
- 16 outer contour
- 17 closing profile
- 18 projection
- 19 opening

20	intumescent tape (fire rated laminate)
21	deepening
23	threshold
24	door bearing
25	fire rated filling
27	edges of glass panes
28	profile
29	leg
30	recess
31	T-shaped groove
32	recess
33	locating profile
34	leg
35	leg
36	sealant
37	leg
38	projection
39	sealant
40	chamfer
41	closing profile
42	leg
43	profile
44	hollow chamber
45	terminal leg
46	projection

Patent claims

- 1) A fire rated door or fire rated window preventing the spread of smoke and/or fire, which is installed within a fire protection partition, and basically consists of a glass pane that is embedded in a perimetrical metal frame, characterised in that the fire rated door/the fire rated window is a modular construction and that it is in this case composed of at least one mobile component in form of a door leaf (2) respectively a window leaf, which is built by two glass panes (5, 6) spaced apart by means of profiles (9, 43), whereby the glass panes (5, 6) almost extend as far as to the edge of the door leaf (2) respectively the window leaf, and the profiles (9, 43) made from hollow sections are connected such to form a frame, whereby the frame is covered by a partial enamelling (3) on the glass panes (5, 6).
- 2) A fire rated door or fire rated window according to claim 1, characterised in that a transparent fire rated medium (25) is provided between the spaced glass panes (5, 6).
- 3) Fire rated door or fire rated window according to claim 1, characterised in that the profile (9) is provided with at least two hollow chambers (10, 14), whereby the hollow chamber (14) is executed with an opening (19) or a deepening which is suitable to connect further profiles.
- 4) A fire rated door or fire rated window according to the claims 1 and 2, characterised in that the profile (9) presents projections (38) covering the glass pane's edges (27) of the glass panes (5) and (6).
- 5) A fire rated door or fire rated window according to the claims 1 to 4, characterised in that the glass panes (5, 6) present recesses (7) in the zone of the glass pane's edges (27), which are filled by legs (8) of a closing profile (17).
- 6) A fire rated door or fire rated window according to the claims 1 to 4, characterised in that the glass panes (5, 6) present chamfers (40) in the zone of the glass pane's edges (27), which are covered by legs (42) of a closing profile (41).

- 7) A fire rated door or fire rated window according to claim 5 and 6, characterised in that the closing profiles (17, 41) present a crowned or straight outer contour.
- 8) A fire rated door or fire rated window according to claim 7, characterised in that the outer contour of the closing profiles (17, 41) is interrupted by a T-shaped groove.
- 9) A fire rated door or fire rated window according to claim 8, characterised in that a sealant (39) can be inserted into the T-shaped groove (15).
- 10) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that fire rated laminates (20) are integrated into the outer contour (16).
- 11) A fire rated door or fire rated window according to claim 1, characterised in that the profile (43) presenting a hollow chamber (44) is provided with an exterior terminal leg (45) including projections (46), which partially or completely cover the glass pane's edges (27).
- 12) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that a profile (28) can be connected via the opening (19) in the profile (9).
- 13) A fire rated door or fire rated window according to claim 12, characterised in that the profile (28) is provided with legs (29) covering the recesses (7) of the glass pane's edges (27).
- 14) A fire rated door or fire rated window according to the claims 12 and 13, characterised in that the outer contour of profile (28) is provided with T-shaped grooves (31).
- 15) A fire rated door or fire rated window according to claim 14, characterised in that a locating profile (33) can be inserted into the T-shaped groove (31).

- 16) A fire rated door or fire rated window according to claim 15, characterised in that a sealant is inserted into the T-shaped groove (31).
- 17) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that the profiles (9, 17, 28, 41, 43) can be made from plastic, steel, wood or light metal.
- 18) A fire rated door or fire rated window according to claim 17, characterised in that the plastic material is glass-fibre reinforced plastic.
- 19) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that fittings can be mounted inside the profiles (9, 43).
- 20) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that the door leaf (2) is a swing door with one leaf or with two leaves.
- 21) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that the door leaf (2) is a pivoted door with one leaf or with two leaves.
- 22) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that the glass panes (5, 6) are made from safety glass.
- 23) A fire rated door or fire rated window according to one or more of the preceding claims, characterised in that the frame is filled with a fire rated medium (25).
- 24) A fire rated door or fire rated window according to the claims 2 and 23, characterised in that the fire rated medium (25) is a fire rated gel.