

The invention relates to a fire-proof glazing system.

In this type of fire-proof glazing system, there is the requirement, among others, that hot smoke gases must not be able to travel from the side of the fire to the side lying opposite the fire at any point of the fixing of the edges of the glazing within a predetermined time. In the so-called F90 system fire test, the fire-proof glazing must last for 90 minutes without a temperature increase occurring in the region of the frame which exceeds 140° in the centre in the difference between ambient temperature and the side facing the fire. In connection with this, there is the requirement that combustible smoke gases must not enter the region of the frame.

The proposal is known from DE 36 21 943 A1 for arranging foaming means for cases of fire in the region of the frame and particularly in the fixing region of fire-proof glazings, said means foaming upon a temperature increase caused by fire and providing sealing between the glazings, framework and gripping elements. A disadvantage of such means is that they are not resistant to ageing and lose their effect due to taking up moisture, so that in the event of fire, no foaming and thus no sealing takes place and paths for the passage of hot smoke gases are created and the standard is not met.

A fire-proof glazing is known from DE 35 37 718 A1, in which thick monolithic glass sheets are surrounded at the edges with fire-proof insulating material and are gripped between the facade profile and glass holding strip. This arrangement is not suitable for multiple pane glazings.

The aim of the invention is to produce a fire-proof glazing system in which temperature increases in the region of the frame and passage of smoke gases are reliably prevented by simple means without the properties of the glazing being adversely affected.

This aim is achieved according to the invention by means of a fire-proof glazing system, comprising fire safety glazings gripped in frames or facade profiles by glass holding strips, said glazings comprising an inner pane of glass and at least one outer pane of glass joined by spacers with a layer of expandable material or the like arranged therebetween, there being arranged in the space between the adjacent edges of the inner panes of glass adjoining the facade profile a packing made of an insulating material and covered in the region of the inner panes of glass by a sealing layer leaving the spacers free, and sealings with the glass holding strip and the frame or facade profile being provided at the outer sides of the glazings.

In the glazing system according to the invention, a cleansing of the edge join of the fire-proof glazing is made possible together with sealing and insulating against smoke gases, which enables the fire-proof glazing, that is the expandable material between the glass panes, to retain its property of expansion and thus the absorption of temperature over a long period. By means of the space in the gap between the glazing elements, reduced by the insulation arranged there, convection is reduced, which contributes to the additional prevention of heat transfer.

In a further embodiment of the invention, a sealing is arranged in the region of the edges in the outer region of the outer glass panes adjacent to the glass holding strip, said sealing providing additional protection against the passage of smoke gases.

In a further embodiment of the invention an element leaving the spacers free is arranged in the region of the spacer of the glazings and between the element and the additional sealing an insulating packing is arranged. Thereby the space bounded by the glazing elements is largely filled with insulating material

and sealing, whereby a sufficiently large space is left for cleansing the edge join of the glazing. This space can also be used for the purposes of drainage, so that rain water or condensation, which might collect, can be removed. The element leaving the region free is preferably a tube or U-shaped profile.

The insulating material is preferably rock wool which can be thickly packed and is only destroyed at very high temperatures.

According to a further preferred embodiment the insulating material is formed of a silicon foam which silicifies in the event of fire and then fills the space which is bounded by the glazing elements, so that no smoke gases can enter. When silicon foam is used, sealings arranged to shut off the insulating material when this is formed of mineral wool, can be eliminated as the silicon foam alone provides an adequate seal.

Exemplary embodiments of the invention are described below in more detail with the aid of the drawings. These show:

Fig. 1 to 4 various embodiments of fire-proof glazing systems

Figures 1 to 4 show cross-sections through facade members with fire-proof glazings fixed thereon with connecting strips. The fire-proof glazings comprise, for example, at least one layer of expandable material, such as hydratised sodium silicate, which is arranged in sandwich fashion between flat sheets of glass-like material.

In the embodiment shown in Figure 1, a space 70 is bounded by a facade post 72, glazings 74, 76 and a glass holding strip 78. Between the facade members 72 and the glazings 74 and 76 sealings 80 and 82 are arranged and between the glazings 74 and 76 and the glass holding strip 78 sealings 84 and 86 are arranged. In the space 70 a packing 92 made of insulating

material, for example mineral wool, is arranged in the region of the inner pane 88 of the glazing 74 and 90 of the glazing 76. In the outer edge region of the inner pane 88 or 90 a sealing 94 is arranged which leaves free the spacers 96 or 98 to the outer panes 89 or 90 of the glazings 74, 76, so that the edge join of the glazing 74, 76 can be cleansed, which both ensures a long life of the expandable material of the glazings 74, 76, and also fulfills the glazing regulations of the glass manufacturers (compensation for vapour pressure in exterior glazings).

The exemplary embodiment according to Figure 2 corresponds substantially in its construction to the exemplary embodiment according to Figure 1, however, here two glazings are not gripped by a glass holding strip 100 to a facade element 102. The facade element 102 is arranged in a corner or edge region and is fixed at one side by means of angled member 104 and 106 to a wall 108, whilst on the other side a glazing 110 is gripped by the glass holding strip 100. Between the wall 108 and the facade element 102 insulation 112, for example made of mineral wool, is arranged and a spacer part 114 is provided between the angled member 106 and the facade element 102.

To prevent the passage of smoke gases through the space 116, which is bounded by the spacer element 114, the glass holding strip 100, the glazing 110 and the facade element 102, insulation 118 and a sealing 120 are arranged in the region of the inner pane 122 of the glazing 110. Also in this embodiment the edge join together with the spacer 119 to the outer pane 121 of the glazing 110 is held free so that cleansing of the edge join can take place. By the partial filling of the space 116 by the insulation 118 and the sealing 120 convection in the space is kept to a minimum so that no substantial heat transfer can take place.

The exemplary embodiment shown in Figure 3 corresponds substantially to the exemplary embodiment shown in Figure 1. To a facade post 130 glazings 132 and 134 are gripped by glass holding strips 136. A space 138, which is bounded by the member, the glazings and the glass holding strip is partly filled with an insulation 140 which is covered by a sealing 142 in the outer edge region of the inner panes 145, 147 of the glazings 132 and 134. In addition a sealing 144 is arranged in the outer edge region of the outer panes 146 and 148 of the glazings 132 and 134, so that the passage of smoke gases and thus a temperature increase at a certain point in the gripping region of the glazings is further prevented or rendered more difficult.

In the exemplary embodiment shown in Figure 4 glazings 152 and 154 are gripped on a facade element 150 by means of glass holding strips 156, which are held by screws 158 to the facade element 150. The glazing 152 comprises panes 160 and 162 and the glazing 154 comprises panes 164 and 166. The panes 160 and 162 are joined by a spacer 168 and the panes 164 and 166 by a spacer 170. Between the panes 160 and 162 there is a layer 172 made of expandable material and between the panes 164 and 166 there is a layer 174 of expandable material. In the space 176, which is enclosed by the facade element 150, the glazings 152 and 154 and the arrangement of glass holding strips 156, a layer of insulation 184 and a sealing 186 are provided starting from the facade members 150. The tube 182 is provided in the region of the edge join of the glazings 152 and 154 so that cleansing of the edge join is provided. By the arrangement of a further insulation layer 184 convection in the space 176 is completely eliminated so that no heat transfer can take place due to convection. The arrangement shown in Figure 4 is designed in particular for vertical members whilst with horizontal members the second insulating layer 184 and also the tube 182 are not necessary, because with the small heights of the horizontally running intermediate spaces no significant

convection occurs. The embodiments shown in Figures 1 to 3 are suitable both for horizontally and for vertically extending intermediate spaces between facade elements, glazings and glass holding strips.

The embodiments are described with the aid of glazings arranged on facade profiles. In fire-proof glass walls for example inside a building no difference between outside and inside can be achieved and in such a case it must be arranged that, independently of the source of heat, no temperature increase at a certain point can arise on the side of the glazing facing the source of heat and no passage of smoke gas takes place. By means of the arrangement of insulating material with sealings in the space bounded by the glazings, a frame element and a glass holding strip and the sealings between the frame element, the glass holding strip and the glazings, the requirements set by the German industrial standard are fulfilled.

CLAIMS

1. Fire-proof glazing system, comprising fire safety glazings (74, 76; 110; 132, 134; 152, 154) gripped in frames or facade profiles (72; 102; 130; 150) by glass holding strips (78; 100; 136; 156), said fire safety glazings comprising an inner pane of glass (88, 90; 122; 145, 147; 160, 164) and at least one outer pane of glass (89, 91; 121; 146, 148; 162, 166) connected by spacers (96, 98; 119; 168, 170) with a layer of expandable material or the like arranged therebetween, there being arranged in the space (70; 116; 138; 176) between the adjacent edges of the inner panes of glass adjoining the facade profile a packing (92; 118; 140; 178) which is made of an insulating material and is covered in the region of the inner panes of glass by a sealing layer (94; 120; 142; 180) leaving the spacers free, and sealings (80, 82, 84, 86) with the glass holding strip (78) and the frame or facade profile (72) being provided at the outer sides of the glazings.
2. Glazing system according to Claim 1, in which an additional sealing (144; 186) is arranged in the region of the edges in the outer region of the outer panes of glass (146, 148; 162, 166) adjoining the glass holding strip (136; 156).
3. Glazing system according to Claim 2, in which an element (182) which leaves the spacers free is arranged in the region of the spacer (168, 170) of the glazings (152, 154), and in which an insulating pack (184) is arranged between the element (182) and the additional sealing (186).
4. Glazing system according to Claim 3, in which the element (182) is a tube or a U-shaped profile.

5. Glazing system according to one of Claims 1 to 4, in which the insulating material is rock wool.
6. Glazing system according to one of Claims 1 to 4, in which the insulating material is a silicon foam.