FIRE RESISTING SHEET UNIT

Abstract: The present invention refers to a fire resisting or retarding sheet unit (1) intended to be provided in/at e.g. an insulating glass, windows, a door, a facade, in order to improve their fire retarding qualities during a fire. Said sheet unit (1) comprises at least two hardened glass sheets (2) between which at or near an edge area (6) of said sheet unit (1) at least one spacer element (3) is provided in achieving of a distance (4) between the hardened glass sheets (2), said glass sheets (2) are cooperating in a fire technical way to withstand fire and that at least one space (7) is created between the hardened glass sheets (2) containing at least one gas (5) such as air, inert gas, argon, so that the fire retarding sheet unit (1) can resist fire during a certain of time in order to reach a predetermined fire requirement.
**Fire resisting sheet unit**

The present invention refers to a fire resisting or retarding sheet unit intended to be provided in e.g. an insulating glass, windows, a door, a facade, in order to improve their fire retarding qualities during a fire, said sheet unit has hardened glass sheets provided at a distance from each other, which together cooperate against the fire, and between these, at their edge area spacers are provided in achieving of a distance between these in constituting of a space between the hardened glass sheets containing a gas, so that the fire retarding sheet unit can resist the fire during a certain time corresponding to a predetermined fire requirement.

Today fire classed glass sheets of this type are used on the market in order to create fire retarding sheet units of different types to stop fire in a window, a door, a insulating glass and so on. These glass sheets comprise expensive and complicated structures containing different silicates in laminated structures in the form of gel or layers of material having fire retarding qualities, which then are provided between the glass sheets. These glass sheets are intended to stand EI classes, i.e. that the temperature during fire, on not the fire side, is not allowed to reach over a certain predetermined temperature of about 140° during a certain predetermined time e.g. 30 minutes. Neither flames are allowed to penetrate the glass sheet during this time. Then it is classed as a EI 30 glass. There are also expensive boron silicate-glass sheets, which get softer at higher temperatures than common sodium glass or window glass does during fire. Special hardened glass sheets having specially grinded edges are also used, which also are expensive and complicated to manufacture and use. These and the boron silicate-glass sheets are E-classed, which means that the temperature is allowed to become higher that what is stipulated for EI-class, but that no flames are allowed to pass through during a predetermined time, e.g. 30 minutes and will then be classed to E30. A normal insulation glass having two or more hardened glasses cannot withstand fire, so that it manages an E-class, since the
distance is too big between these in relation to the glass thickness, why these cannot cooperate in order to resist fire.

One object with the present invention is to eliminate those drawbacks existing with the fire retarding sheet units mentioned above by that according to the invention hardened glass sheets are provided in a distance from each other, which together cooperate against fire, so that between these, at their edge area, distance elements are provided in creating a distance between the same and a space between the hardened glass sheets containing a gas, so that the fire retarding sheet unit in a favourable way cooperate to resist fire a certain time matching to a predetermined fire requirement.

Thanks to the invention a simple and cheap fire retarding sheet unit for use in e.g. an insulating glass, in a frame or casement, a door, a facade, in order to enhance its fire retarding qualities, which reach E-class during fire. According to the invention the fire retarding sheet unit comprises at least two hardened glass sheets provided in a distance from each other, which makes that the hardened glass sheets cooperate in order to resist fire. Between these, at their edge area, spacers are provided in creating a distance between the same of between 0,5 – 10 mm and preferably of mainly between 0,5 – 8 mm in creating a space between the hardened glass sheets, which contains a gas such as e.g. air, inert gas, argon. The good fire retarding qualities are created by that the hardened glass sheets stand a higher temperature than common sodium glass in combination with that the distance between these is well determined in relation to the thickness of the hardened glass sheets. The optimum distance is about 2 mm in avoiding that the glasses touch each other before fire. The hardened glass sheet does not alone stand to give enough fire retarding power, since it will be softer during fire and risks to collapse. According to the invention it takes a longer time to make two or more adjacent hardened glass sheets to collapse, since these during fire together give a fire resistance, when at least one of the hardened glass sheets gets softer, so that the distance is so small to the other one, that it touches the other
when it gets softer, so that the hardening gradually disappears in stead of collapsing as a granulate. At a temperature increasing of the gas during fire it is subjected to a pressure increasing. If the space is hermetically closed, the distance is chosen so that the volume of the space does not will be bigger than that the hardened glass sheets can resist the pressure increase without get broken. The distance shall in this case not be bigger than the thickness of the thinnest hardened glass sheet, but maximum 10 mm and preferable 8 mm. Otherwise the hardening does not disappear gradually before the over pressure granulate the hardened glass sheet. The spacer element consists of a profile made of plastic or metal, which is sealed against the hardened glass sheets by aid of butyl or poly-sulphide, silicon, polyurethane (PU). The spacer element comprises a drying agent in order to take up moisture, which can be present in the space to prevent condense between the hardened glass sheets. When the fire retarding sheet unit is used in insulating glass one or several of those glass sheets, which normally exist in an insulating glass are replaced by the fire retarding sheet unit according to the invention. In a variant of the invention one or more of the hardening glass sheets can have a bigger thickness than an adjacent hardened glass sheet. During a fire the thicker hardened glass is then stiffer and because of that more resistive against the fire and protects thereby the thinner one, so that the distance is not allowed to be greater than the thinnest hardened glass sheet in the fire retarding sheet unit, whereby those together cooperate against the fire. Of course one or some of the hardened glass sheets can be provided with a low emission layer, which makes the warm insulating in the insulating glass better, at the same time as it has a capacity to reflect back the infrared warm radiation from the fire, so that the fire retarding sheet unit in a better way resists the fire. The most important advantages of the invention will thus be that one has succeeded to provide a cheap and simple fire retarding sheet, which can be manufactured by a manufacture of insulating windows of a common hardened glass form a hardening plant of our own or from somebody else, so that short delivery times can be achieved and low store costs. The fire retarding sheet unit can be used inside and outside without any risk to be broken down by cold weather and UV-light. Furthermore
the fire retarding sheet unit can be used instead of a simple glass in e.g. a "2 plus structure" or such as an unit in an insulating window.

The invention is described more in detail below by aid of some preferable embodiment examples during reference to the accompanying drawings, in which

fig. 1 shows a vertical section through a fire retarding sheet unit according to the invention,

fig. 2 shows a vertical section through an insulating window, where one of the glass sheets is replaced by the fire retarding sheet unit,

fig. 3 shows a vertical section through a "two plus one window-structure", where a single glass sheet is replaced by the fire retarding sheet unit.

As can be seen from Fig. 1, here is illustrated a fire retarding unit 1, which comprises two hardened glass sheets 2 having a thickness 10, provided in a distance 4 from each other depending of their thickness. Between these sheets 2 near the edge area 6 of the sheet unit 1 a spacer element 3 is provided constituting said distance 4, so that a space 7 is formed between the hardened glass sheets 2 containing at least a gas 5, such as e.g. air, inert gas, argon.

In Fig. 2 the fire retarding glass sheet 1 is illustrated, which has replaced one of those glass sheets, which normally is present in an insulating window 8 without special fire protecting qualities.

In Fig. 3 the "single glass" constitutes the fire retarding sheet unit 1, which normally is present in a "two plus one window structure" 9.
Claims

1. A fire resisting or retarding sheet unit intended to be provided in/at e.g. an insulating glass, windows, a door, a facade, in order to improve their fire retarding qualities during a fire, characterized in that said sheet unit (1) comprises at least two hardened glass sheets (2) between which at or near an edge area (6) of said sheet unit (1) at least one spacer element (3) is provided in achieving of a distance (4) between the hardened glass sheets (2), said glass sheets (2) are cooperating in a fire technical way to resist fire and that at least one space (7) is created between the hardened glass sheets (2) containing at least one gas (5) such as air, inert gas, argon, so that the fire retarding sheet unit (1) can resist fire during a certain of time in order to reach a predetermined fire requirement.

2. A fire resisting sheet unit according to claim 1, characterized in that the distance (4) between the hardened glass sheets (2) is mainly 0.5 – 10 mm and preferably 0.5 – 8 mm.

3. A fire resisting sheet unit according to claim 1, characterized in that the space (7) is hermetically enclosed and that the distance (4) when a fire is taken place during a temperature increasing of the gas (5) is not more than 8 mm, whereby the thinnest of those hardened glass sheets (2), which are included in the fire retarding sheet unit (1), can manage a pressure increasing without being pressed into pieces.

4. A fire resisting sheet unit according to claim 1, characterized in that the spacer element (3) consists of at least one profile made of plastic and/or metal, which is sealed against/to the hardened glass sheets (2) by butyl and/or poly-sulphide/silicon/PU.

5. A fire resisting sheet unit according to claim 1, characterized in that the spacer element (3) comprises drying agent for absorbing moisture
which can be present in said space (7) in order to prevent condense between the hardened glass sheets (2).

6. A fire resisting sheet unit according to claim 1, characterized in that the fire retarding sheet unit (1) are replacing at least one of those glass sheets, which normally is present in an insulating window or constitutes "the single glass" in a "two plus one window structure" (9).

7. A fire resisting sheet unit according to claim 1, 2 or 3, characterized in that at least one of the hardened glass sheets (2) has a bigger thickness and at least one adjacent thinner hardened glass sheet (2), whereby when a fire is actual the thicker hardened glass (2) is stiffer during said fire and because of that protects the thinner one, which during a pressure increasing takes up the same without that the thinner glass breaks, at the same time as the thicker glass then better can stand fire, since the distance (4) is not bigger than the thinner hardened glass sheet (2).

8. A fire resisting sheet unit according to any of the preceding claims, characterized in that at least one of the hardened glass sheets (2) in the fire retarding sheet unit (1) consists of a low emission glass.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: E06B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Date of the actual completion of the international search: 21 Sept 2007
Date of mailing of the international search report: 25-09-2007

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