



Title: Connecting component for a post and beam construction made from glass

Description

The present invention relates to a connecting component
s for a post and beam construction made from glass, in
which the posts and the beams are made from glass,
such that the glass posts and glass beams have a
supporting function, the load transfer between the beam
and the post being realized via a glass panel. The
10 present invention relates furthermore to a post and beam
construction made from glass.

Obvious and remarkable characteristics of glass are the
translucency and transparency thereof. Therefore, the
material glass recently has become an important building
15 material and design feature in architecture. Architects
increasingly elaborate projects in which they use glass
as construction material for the supporting framework.
Such transparent projects very often serve to create
spaces for meetings, for communication, and as a
20 passage for connecting two or more buildings.

From such applications results the need for a post and
beam construction which is constituted as an all-glass
construction, in order to satisfy the higher requirements
for transparency of architecture.



Depending on the application case, glass which is utilized in the building industry can be basically classified in plate glass, profiled glass and glass building blocks. In this case it is usually an alkali silica glass. The latter has
5 a high amount of silicic acid. Usually glass is confined within a frame as it has to withstand wind load, respectively snow load in horizontal glazing, and moreover, it has likewise to bear its own weight. As a rule, sheet glass supported on several sides is subject to
10 bending stress. Until now, these were the classical application fields of glass, today the application of glass as the proper load-bearing element is increasingly trendy. In this context, "load-bearing glass" is to be understood as a supporting construction, which entirely
15 consists of glass. These glass constructions include for example girders, posts, frames, struts, reinforcements, etc.

Essentially, glass is a brittle material, which moreover should be elastic, ideally. In this case, breaking of the
20 glass is possible without any plastic deformation. Therefore, it is important to take the above characteristics of glass into consideration, if glass is used as the load-bearing element. This is the reason why, until now, the definitions for glass were understood
25 such that, on the one hand, it was used as a designation for a material and, on the other hand, as a designation

for a condition. In this latter case, glass can be designated as a "frozen, super-cooled molten mass".

Float glass, single-pane toughened safety glass and moreover partially pre-stressed glass can be used as a
5 basic element for load-bearing glass. In this case, such glass panes are ordinarily processed into composite multilayer safety glass. As these glass types are already known, there is no need to explain more details thereof in the present invention.

10 The damage of the glass and thus breaking of the glass, which is or can be particularly caused by various thermal stresses, originates at the edges thereof. Processing the edges through polishing will thus increase the stability of the edges, as such processing will even out the fissures
15 resulting from cutting.

Ideally, the glass surface is free of scratches, fissures, or indentations. For example, if such a glass pane, presenting an existing damage, is subject to tensile stress, it may be prone to develop excessive stress at
20 the fissure heads. If, in this case, the material resistance is exceeded, supercritical fissure development may be expected and, result in sudden breaking of the glass pane.

Examples for "load-bearing glass" are published in a
25 research report titled "The Glass Support, Report Number 20, ETH Zurich, Switzerland, Institut für

Hochbautechnik" (*Institute for Civil Engineering and Construction*), page 31 and 32. This report describes a building project representing a glass construction on the research terrain of the University of Architecture, RWTH Aachen, Germany. There, the post as well as the beam, and thus the complete supporting framework, are made from glass. The region of overlapping glass panes of the posts and the beams is connected by means of boreholes provided within the glass panes, through which pass corresponding metal screw elements. In this case, single-pane toughened safety glass panes were used. Through the connection of the supports with the posts by means of corresponding screwed connections, a solid connection of the glass panes (supports, posts) is achieved. Such boreholes must be provided with a corresponding small tolerance, such that sufficient bearing surface for the screw heads respectively the nuts is provided on the surface of the glass panes. Because of the above-mentioned reasons, such boreholes are relatively expensive to manufacture.

Therefore, it is an object of the present invention to provide a connecting component for a post and beam construction made from glass, as well as a post and beam construction made from glass, which, while presenting a simple conception and being simple and inexpensive in manufacturing, will satisfy highest requirements as to transparency and can be realized

with almost all types of glass. Likewise, simple mounting should be possible.

The object of the invention is solved with a connecting component, respectively a post and beam construction
5 having the characteristics of patent claim 1, respectively of patent claim 12. Advantageous further developments are an object of the dependent claims, respectively.

The inventive connecting component for a post and beam construction made from glass presents a first
10 fitting, a second fitting, as well as a load-transferring component, which is disposed between the first and the second fitting.

In this case, the first fitting is in communication with a first construction component of the post and beam
15 construction, such as a post, and the second fitting is in communication with a second construction component of the post and beam construction, such as a beam. It should be noted that another post can be used as the second construction component to connect two posts
20 with each other. Thus, the load introduction is realised via the first fitting onto the load-transferring component and from there onto the second fitting and a post being in communication therewith. Thereby, the load-transferring component, as well as the construction components of
25 the post and beam construction, is likewise made from glass. Therefore, it is possible to realise the impression

of an "airborne" beam, as the load-transferring component, being made from glass, is inconspicuous. Furthermore, the boreholes, in the region of the posts and beams to be connected, can be omitted, resulting, besides in cost savings during the manufacturing process, also in reduced mounting time. The first and second fitting present, in this case, preferably one aperture respectively for the reception of the load-transferring component. Due to this inventive realisation of the connecting component, the post and beam construction can be provided in a glass execution, which satisfies highest requirements as to transparency and is not subject to minimal tolerances. In this case, a "load-bearing" glass is utilized for the posts and beams of the post and beam construction such that it is possible to realize an efficient supporting construction made from glass.

Preferably, the load-transferring glass component is cylindrically or elliptically executed. Thus, a particularly advantageous load introduction can be achieved between the construction components of the post and beam construction. Likewise it is possible to use an angular load-transferring component; however, there is, in this case, the risk that the corners will break off.

In order to present, if possible, almost no protruding parts, the load-transferring glass component preferably presents the same thickness or a slightly smaller

thickness than the glass panes of the construction components of the post and beam construction.

In order to allow for simple manufacturing of the load-transferring glass component, it is preferably made from
5 cast glass.

So as to assist in reinforcing the impression of an "airborne" beam, preferably a predetermined distance is provided between the first fitting and the second fitting. Therefore, it is question of a "movable bearing", which
10 does not present any positive or non-positive connecting means.

According to a preferred embodiment of the present invention, the first and the second fitting are made from metal, particularly from stainless steel. It should be noted
15 that any other material, particularly plastic material, presenting a corresponding strength, can be used.

In order to allow for a simple fixing of the fittings at the construction components of the post and beam construction, the fittings, respectively, preferably present
20 an arcuate curvature, which is located in a respective arcuate aperture in the respective post, or in the respective beam. Thereby, a simple and precise positioning of the fittings within the construction components of the post and beam construction can be
25 realized. The curvature, respectively the aperture, is preferably formed in a semi-circular shape, or is

conformed to the shape of the load-transferring component, as the case may be.

A glass protection is provided between the fitting and the glass posts, respectively beams, with the intention to
5 prevent the glass posts, respectively beams, from being damaged. In this case, the glass protection can be realized in one-piece or in several pieces, particularly in three pieces.

Preferably between the load-transferring component and
10 the fittings, a cupped glass protection is disposed to further prevent the load-transferring component from being damaged. In this case, the glass protection can be made from plastic material, silicone or any other suitable material.

15 The inventive post and beam construction made from glass, in which the posts and beams are made from glass, such that the glass posts and glass beams provide a supporting framework, in combination with the glass connecting component, allow for constructing particularly
20 transparent buildings. Preferably in this case, the post and beam construction is used as supporting framework for overhead glass panels and lateral glass panels.

The construction components of the post and beam construction are preferably made from multilayer safety
25 glass or from partially pre-stressed glass or from single-pane toughened safety glass.

In case the post and beam construction made from glass presents additional inside posts in the interior region of the building, these inside posts are preferably provided with lateral stabilizers made from glass. This allows
5 particularly for achieving an improved buckling stabilization of the inside posts. In this case, the border posts of the post and beam construction are likewise stabilized with lateral glass panels in the border region. Furthermore, it is imaginable to interconnect the posts of
10 the post and beam glass construction, for example, via single point fixings, with other stabilizing construction components. Furthermore, it should be noted that the effect of an "airborne" beam can be further increased, if additional illumination applications, such as low voltage
15 light emitting diodes, are provided.

For the first time with the inventive connecting component a post and beam glass construction can be provided, which satisfies highest requirements and can be inexpensively manufactured.

20 In the following, the invention will be described on the basis of one preferred embodiment example, reference being made to the drawings, in which:

Figure 1 is a perspective and exploded illustration of a connecting component according to an
25 embodiment example of the present invention,

Figure 2 is a perspective view of the connecting component shown in Figure 1 in the mounted condition,

5 Figure 3 is a perspective partially sectional view of the inventive connecting component,

Figure 4 is a partially cut lateral view of the inventive connecting component,

Figure 5 is a lateral view from the right hand side of the connecting component shown in figure 4,

10 Figure 6 is a perspective illustration of a detail of an inventive post and beam construction, and

Figure 7 is a perspective view of an inventive post and beam construction.

As particularly shown in Figure 1, according to a first embodiment example, a connecting component 1
15 comprises a first fitting 2, a second fitting 8 and a load-transferring component 18, which is disposed between the two fittings 2, 8. The connecting component 1 is used for a post and beam glass construction, which is
20 illustrated in figures 6 and 7. In the post and beam glass construction, the posts, respectively the beams, are entirely made from glass, such that the glass posts, respectively beams, have to fulfil a load-bearing function.

As shown in figure 1, the first fitting 2 consists of an integral basic body, which presents a bottom region 5 and two lateral walls 3 and 4, laterally disposed thereto. The bottom region 5 presents an arcuate curvature 6 which extends between the two lateral walls 3, 4. On the lower side of the first fitting 2, is constituted a correspondingly formed arcuate aperture 7 (see figure 4). In this case, the fitting 2 is made from stainless steel. The fittings 2, 8 can be manufactured from individual components, respectively cast in a casting procedure.

As can be seen in figure 1, the second fitting 8 is formed in the same way as the first fitting 2 with a basic body having a bottom region 11, two lateral ends 9, 10, a curvature and an aperture 13. As can be particularly seen in figure 2, the glass panes, which are used for the posts, respectively the beams, of the post and beam construction, are placed between the lateral walls 3, 4 and 9, 10 of the two fittings 2 and 8. In this case, the glass panes are provided with a not illustrated aperture, which corresponds to the curvature of the bottom regions 5 respectively 11 of the two fittings 2, 8. Thus, the fittings 2, 8 can be precisely positioned into the apertures in the glass pane. A glass protection 16, respectively 17, is placed between each fitting and the glass pane to prevent the glass panes from being damaged by the metal fittings 2, 8. As shown in figure 1, the shape of the glass protection 16, respectively 17, is adapted to the

shape of the fittings 2 and 8. As illustrated in figure 1, the glass protections 16 and 17 are manufactured from three individual components. However, it is possible to use an integral glass protection.

- 5 Likewise visible in figure 1 is the cylindrical shape of the load-transferring component 18 made from glass. The thickness of the load-transferring component 18 (i.e. the height of the cylinder) corresponds in this case to the glass thickness of the posts 29, respectively the beams
10 19. A cupped element 14, 15, respectively, is disposed between the fittings 2, 8 and the load-transferring component 18 in order to prevent the load-transferring component 18 from being damaged by the fittings 2, 8.

It should be noted that for improved fixing the glass
15 protection 14, 15, respectively 16, 17 can be glued to the fittings 2, respectively 8, and the glass construction components of the post and beam construction.

The mounted condition of the inventive connecting component 1 is particularly visible in figures 2, 6 and 7.
20 Hereby, a post and beam construction is illustrated, which consists of a border post 20, an inside post 26 and a beam 19 (see figure 7). The inventive connecting component 1 is in this case placed between the post 20 and the beam 19, as well as between the inside post 26
25 and the beam 19. In this case, the posts 20, 26 and the beam 19 are made from multilayer safety glass. The

inside post 20 is a border post, which is placed at the border of the post and beam construction. Hereby, a lateral glazing member 25 is immediately adjoining the border post 20.

- 5 As can be particularly seen in figure 2, the border post 20 consists of three glass panes 21, 22, 23, the centre glass pane 22 having a supporting function and the two lateral glass panes 21 and 23 do not receive any forces. First of all, the two outside glass panes 21 and 23 serve
10 as edge protection for the centre glass pane 22.

Furthermore, the post and beam construction serves as a bearing for overhead glass panels 24, which are supported on the upper border of the beam 19, respectively the upper border of the lateral glazing
15 member 25. Preferably, an elastomer material is provided on the upper edge of the beam 19, respectively the lateral glazing member 25, in order to prevent damages between the individual glass construction components. Laterally, two lateral stabilizers 27 and 28
20 are provided for stabilization of the inside post 28 in order to allow for improved buckling stabilization. As can be seen particularly in figures 2 and 6, the load introduction from the beam 19, respectively the overhead panels 24, occurs via the first fitting 2 to the cylindrical,
25 load-transferring glass component 18, and from there to the second fitting 8 and thus to the post 20, respectively 26. As can be seen in the figures, the connecting

component 1 is constituted such that between the first fitting 2 and the second fitting 8 a predetermined distance A is provided (see figure 4), such that the lateral regions of the load-transferring component 18 are partially exposed to the outside. This measure intensifies even more the impression of an "airborne" beam 19 of the glass construction. As can be particularly seen in figures 1 and 4, for an improved load transfer, an arcuate aperture having a large radius is respectively provided in the region oriented to the inside of the fittings 2, 8.

Thus the inventive post and beam construction and the inventive connecting component will enable a construction, allowing the realization of a building made entirely from glass, which satisfies the highest functional and aesthetic requirements. In this case, according to the invention, not only the posts, respectively beams, are made from load-bearing glass, but also the connecting component 1 presents a load-transferring glass component 18. Such realization of the construction allows for larger manufacturing tolerances, while simultaneously reducing the mounting time.

The above description of the embodiment examples according to the present invention serves for illustrative purposes only and is not intended to limit the invention. Various changes and modifications are possible within the range of the invention without leaving the scope of the invention or the equivalents thereof.

References

	1	connecting component
	2	first fitting
	3	lateral wall
5	4	lateral wall
	5	bottom region
	6	curvature
	7	aperture
	8	second fitting
10	9	lateral wall
	10	lateral wall
	11	bottom region
	13	aperture
	14	cupped component
15	15	cupped component
	16	glass protection
	17	glass protection
	18	load-transferring component
	19	beam
20	20	border post
	21	glass pane
	22	glass pane

	23	glass pane
	24	overhead panel
	25	lateral glazing member
	26	inside post
s	27	stabilizer
	28	stabilizer
	29	post
	A	distance

Patent claims

1. A connecting component (1) for a post and beam glass construction, which presents posts (20, 26) and beams (19) made from glass as construction components, such that the glass posts and beams fulfil a load-bearing function, comprising a first fitting (2), which is in communication with a first glass construction component, a second fitting (8), which is in communication with a second glass construction component, and a load-transferring component (18) made from glass, which is disposed between the first fitting (2) and the second fitting (8).
2. A connecting component according to claim 1, characterized in that the load-transferring glass component (18) has a cylindrical or elliptical shape.
3. A connecting component according to one of the preceding claims, characterized in that the load-transferring component (18) presents the same thickness as the glass posts (20, 26), respectively the glass beam (19).
4. A connecting component according to one of the preceding claims, characterized in that a

predetermined distance (A) is provided between the first fitting (2) and the second fitting (8).

5. A connecting component according to one of the preceding claims, characterized in that the
5 glass used for the load-transferring component (18) is cast glass.
6. A connecting component according to one of the preceding claims, characterized in that the fittings (2, 8) are made from metal, particularly
10 stainless steel or plastic material.
7. A connecting component according to one of the preceding claims, characterized in that the fittings (2, 8) respectively present an arcuate curvature, which is disposed in correspondingly
15 formed apertures in the post, respectively in the beam.
8. A connecting component according to one of the preceding claims, characterized in that a glass protection (16, 17) is disposed between
20 the fittings (2, 8) and the glass posts (20, 26), respectively the beam (19).
9. A connecting component according to claim 8, characterized in that the glass protection (16, 17) is realized in one piece or in several pieces,
25 particularly in three pieces.

10. A connecting component according to one of the preceding claims, characterized in that a cupped glass protection (14, 15) is disposed between the load-transferring component (18) and the fittings (2, 8).
5
11. A connecting component according to one of the claims 8 to 10, characterized in that the glass protection is made from plastic material or from silicone.
- 10 12. A connecting component according to one of the preceding claims, characterized in that light emitting elements, particularly low voltage light emitting diodes, are provided at the connecting component (1).
- 15 13. A post and beam construction, wherein the posts (20, 26) and the beams (19) are made from glass, such that the glass posts and beams fulfil a load-bearing function, comprising a connecting component (1) according to one of the preceding claims.
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14. A post and beam construction according to claim 13, characterized in that the glass construction components of the post and beam construction are made from multilayer safety glass and/or from partially pre-stressed glass
25

and/or from single- pane toughened safety glass.

15. A post and beam construction according to claim 13 or 14, characterized in that an inside
5 post (26) presents lateral stabilizers (27, 28).

16. A post and beam construction according one or several of the preceding claims, characterized in that the connecting component (1) is a movable bearing.