

**Title: Standardized compression bar system for a
 braced façade structure**

Description

The invention relates to a compression bar system for a
5 braced façade structure, the compression bar system
having a compression bar as well as connecting elements,
disposed at the compression bar, for tie members and the
like.

A braced façade structure or also a rear-braced façade
10 structure is composed of the following structural parts:
compression bar system, tie member (cable) and
corresponding structural connections such as connecting
brackets, dowels, etc. These structural parts represent a
static system, which decomposes all external forces, such
15 as wind, acting on the façade, into the individual
components tension and compression, and then introduces
these safely into the building. The structural elements tie
member and compression bar system, which are suitably
interconnected such as to create a self-supporting façade
20 lining, are used for the relevant assignment or reception of
the individual components tension and compression. The
compression bar system is composed of a compression
bar and further connecting elements for connecting tie
members and further holding elements, e.g. for connecting

them to the building. In the conventional application of these compression bar systems, a monolithic structural part is manufactured customized for the project or structure, wherein the different connecting elements for the tie members, and the additional holding elements are directly mounted, e.g. welded, to the bar which is individually cut to length. However, this execution is uneconomical and inflexible, because each time a unique part needs to be produced for the respective individual application, at high manufacturing expense and with the requirement to precisely respect predetermined dimensions.

Therefore, the object of the present invention is to eliminate the above mentioned disadvantages and to provide a compression bar system which can be manufactured at less expense.

This problem is solved with the features of patent claim 1.

According to the invention, the compression bar system is used for a braced façade structure, the compression bar system having a compression bar, as well as connecting elements, disposed at the compression bar, for tie members and the like, and each connecting element is formed as a pre-fabricated individual part, which is connectable to the compression bar.

On account of the inventive configuration, the connecting elements can be pre-fabricated in large batches. This reduces the cost per unit for the connecting elements. On site, these connecting elements just need to be connected
5 to the compression bars. This simplifies the mounting expense. The compression bars can be delivered by the meter and cut to the required length directly on the construction site. This reduces the logistic expense as well.

The dependent claims feature advantageous further
10 developments of the invention.

The connection of compression bar and connecting element is particularly simple if, according to an advantageous configuration, this is realized with a releasable connection. Such a connection can be produced
15 with simple means on the construction site.

According to a preferred configuration, respectively one connecting element can be fastened at the front and at the rear end of the compression bar. This covers the majority of all application cases, because generally the tie members
20 need to be connected to both ends of the compression bar, respectively.

In order to be able to reliably attach the compression bar at the building, according to a preferred configuration, the

connecting element to be fastened at the front end has an attaching element for attachment at the building.

Advantageously, the connecting element to be fastened at the rear end can be covered by a cover cap, in order to
5 achieve a homogeneous façade from the visual point of view as well.

The connection of compression bar and connecting element is particularly simple if, according to an advantageous further development, the compression bar
10 and the connecting elements are screwable to each other via a connecting rod passing through the compression bar and through the connecting elements. Such a connection is not only simple and easy to make, but it also guarantees an overall maintenance-friendly structure.

15 In order to be able to fasten another plane of tie members in a plane located between the ends of the compression bar, according to a preferred configuration, an additional connecting element can be inserted into the compression bar between the connecting elements, which can be
20 fastened at both ends of the compression bar.

Fastening the tie members at the connecting element is particularly simple if, according to a preferred configuration, each connecting element is provided with connecting lugs for the tie members.

In order to be able to realize all connecting variants for the tie members occurring in practice, four differently formed connecting elements are provided. According to variant 1, two connecting lugs are provided, uniaxially opposite each other. According to variant 2, four connecting lugs are provided, biaxially crosswise opposite each other. According to variant 3, four connecting lugs are provided, uniaxially in pairs opposite each other. According to variant 4, six connecting lugs are provided, biaxially crosswise opposite each other. Thus, all connecting combinations for tie members, that are actually applicable in practice, can be covered with only four different connecting elements.

According to a preferred configuration, each connecting element has a hollow, pot-shaped body, on the bottom of which a through opening is provided for the passage of the connecting rod. Such a connecting element is particularly easy to manufacture and to manipulate.

If, according to an advantageous further development, the pot-shaped body has a peripheral wall, which is provided with a thread at its inside, the body is individually usable and is adaptable to different situations.

Depending on the requirements, an adapter for attaching the additional compression bar, the attaching element for attaching the compression bar system at the façade, or the

cover cap can be screwed into the thread. Thus, the same body can be used for very different purposes.

In order to guarantee a secure support of the compression bar at the connecting element and a good introduction of forces into the connecting element, in its bottom area, the pot-shaped body has a stepped shoulder on which the compression bar can be fitted. Thus, the compression bar bears in a secure position on the connecting element, simultaneously guaranteeing a good transmission of forces.

An annular groove for receiving an O-ring is provided in the area of the shoulder, on the one hand, in order to achieve a play-free support of the compression bar at the connecting element and, on the other hand, in order to prevent moisture from penetrating into the compression bar.

Further details, features and advantages of the invention will become apparent from the following description of preferred exemplary embodiments, wherein:

Figure 1: shows a diagrammatical layout of a braced façade structure,

Figure 2: shows a section through a braced façade structure along the line A-A in Figure 1,

Figure 3a to 3d: show different variants of compression bar systems,

Figure 4a to 4b: show sections through two embodiment variants of the connecting elements, and

5 Figure 5a to 5c: show detailed views of the same connecting element for different application purposes.

In Figures 1 and 2, a conventionally braced façade structure 1 is shown. This façade structure 1 may consist of
10 glass plates, for example, which are suspended in front of the actual building. In order to reliably transfer the loads, which act on the façade structure 1 and are composed of own weight, wind, etc., an assembly consisting of compression bar systems and tie members transferring the
15 forces into the building, is provided behind the actual glass façade.

In Figures 3a to 3d, different variants of compression bar systems are illustrated, which occur in practical applications. Figure 3a shows a compression bar system
20 with a compression bar 2 and one connecting element 3 respectively fitted onto the two ends of the compression bar 2. All connecting elements 3 are formed as a pre-fabricated individual part and thus allow for a modular assembly of connecting elements 3 and compression bars

2 to form the respective structure required on-site. Connecting lugs 4, serving to connect tie members 5, are provided at the connecting elements 3.

5 In Figures 3a to 3d, four different connecting elements 3 are depicted, which guarantee a reliable connection of the tie members 5 to the connecting elements 3 and to the compression bars 2 for all load conditions occurring in practice.

10 The connecting element 3 in Figure 3a is provided with one attaching element 6, which serves for the attachment of the façade structure at the building 7. The two connecting elements 3 are respectively provided with two connecting lugs 4, which are uniaxially opposite each other and thus allow for the connection of respectively two tie members 5, 15 as can be seen in Figure 4a as well, showing a section through a connecting element 3 according to Figure 3a.

Figure 3b shows a compression bar 2, at each end thereof a connecting element 3 being attached. In this case, two tie members 5 can be connected to the left connecting 20 element 3, as already shown in Figure 3a, whereas four tie members 5 are connected to the right connecting element 3. For this purpose, in total four connecting lugs 4 are provided which are uniaxially opposite each other and

therefore allow for connecting four tie members 5, which are all located in the same plane.

Figure 3c shows another embodiment variant of the connecting elements 3, in which not only a connecting element 3 is disposed at both ends of the compression bar 2, but in addition also in the central area of the compression bar 2, in order to be able connect tie members 5 in the central plane as well.

Figure 3d shows an embodiment in which one connecting element 3 is provided at both ends of the compression bar 2 respectively. Each of the connecting elements 3 is provided with six connecting lugs 4 being biaxially crosswise opposite each other.

In Figure 4b one connecting element 2 is illustrated, in which four connecting lugs 4 are provided, which are biaxially crosswise opposite each other and thus allow the connection of a total of four tie members 5.

Figures 5a to 5c show the connecting element 3, illustrated in the other Figures, in an enlarged detailed view for various application purposes. Figure 5a shows the connecting element 3 according to Figure 3a, Figure 5b the connecting element 3 according to Figure 3c, and Figure 5c the connecting element 3 according to Figure 3b, respectively in an enlarged view.

As will result from the comparison of Figures 5a to 5c, in all illustrated cases, the connecting element 3 has a pot-shaped body 8 open to one side, with a bottom 9, in which a central through opening 10 is disposed. A stepped
5 shoulder 11 is provided in the area of the bottom 9, to which the compression bar 2 can be fitted such that the compression bar 2 is bearing with its frontal edge on the body 8. On account of the shoulder 11, partially extending into the compression bar 2, in addition a reliable support of
10 the compression bar 2 at the shoulder 11 of the connecting element 3 is guaranteed. Furthermore, the pot-shaped body 8 has a peripheral wall 12, which, on its inside, is provided with a thread 13. On the outside, the peripheral wall 12 is provided with the connecting lugs 4, as already
15 mentioned, for attaching the tie members 5.

A connecting rod 14, which passes through the compression bar 2 and the through opening 10 in the connecting element 3, serves for a rigid, yet releasable connection of compression bar 2 and connecting elements
20 3. For this purpose, respectively one connecting element 3 is fitted to both ends of the compression bar 2. The connecting rod 14 is then passed through the two connecting elements 3 and the compression bar 2 and screwed-on by means of nuts 15 located on the inside, as

shown in Figure 5a for the right connecting element 3 and in Figure 5c for the left connecting element 3.

In addition Figures 5a to 5c reveal that the same connecting element 3 can be used on both, the right hand side and the left hand side or in the central area of the
5 compression bar 2.

Figure 5a shows the use of the connecting element 3 at the right end of the compression bar 2. In order to attach the compression bar 2 at the building 7, the attaching element
10 6, already mentioned in conjunction with Figure 3a, is screwed into the thread 13 of the peripheral wall 12, by means of which element the compression bar 2 can be attached at the building 7.

Figure 5c shows the use of the connecting element 3 at the
15 left end of the compression bar 2. In order to cover this end of the connecting rod 14 and the nut 15 screwed onto the connecting rod 14, a cover cap 16 is screwed into the thread 13 of the peripheral wall 12.

Figure 5b shows a variant, in which the compression bar 2, also in its central area, is provided with a connecting
20 element 3 for connecting to a central plane of tie members 5. For this purpose, an adapter 17 is screwed into the thread 13 of the peripheral wall 12 for fitting an additional compression bar 3. This adapter 17 has an exterior

circumference, which corresponds to the exterior circumference of the shoulder 11, such that the compression bar 2 can be attached to the adapter 17 and, with its frontal side, bears on the body 8. The adapter 17 is
5 provided with a central through bore 18, through which the connecting rod 14 passes, thus connecting the compression bar 2 and the connecting elements 3.

In the area of the bottom 9 of the pot-shaped body 8, the shoulder 11 is provided with an annular groove 19, into
10 which an O-ring is inserted, which allows for a tight connection between the shoulder 11 and the fitted compression bar 2. An annular groove for the O-ring is machined into the adapter 17 as well.

Each connecting element 3 can be used on the right hand
15 side, the left hand side, or in the central area of the compression bar 2 with different tie connecting variants as a standardized, pre-fabricated structural part. The compression bars 2 can be economically pre-fabricated for each individually required length or they may be cut to
20 length in simple operational steps on the construction site. All individual components can be individually inserted into each other and reliably braced with the internally located connecting rod 14 via a simple screw-connection within the connecting elements 3. Thus any compression bar systems
25 in any dimensions can be assembled easily, quickly and

economically from a few manageable individual parts directly at the place of installation.

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

List of reference numerals

	1	façade structure
	2	compression bar
	3	connecting element
5	4	connecting lug
	5	tie member
	6	attaching element
	7	building
	8	body
10	9	bottom
	10	through opening
	11	shoulder
	12	peripheral wall
	13	thread
15	14	connecting rod
	15	nut
	16	cover cap
	17	adapter
	18	through bore
20	19	annular groove

Patent claims

1. A compression bar system for a braced façade structure,
 - with at least one compression bar (2), and
 - 5 - with connecting elements, disposed at the compression bar (2), for tie members (5) and the like,characterized in that
 - 10 - each connecting element (3) is formed as a pre-fabricated individual part, which is connectable to the compression bar (2).
2. A compression bar system according to claim 1, characterized in that the connecting elements (3) are releasably connectable to the compression
15 bar (2).
3. A compression bar system according to claim 1 or 2, characterized in that respectively one connecting element (3) can be fastened to the front and to the rear end of the compression bar
20 (2).

4. A compression bar system according to one of the preceding claims, characterized in that the connecting element (3), able to be fastened to the front end, has an attaching element (6) for attachment at a building (7).
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5. A compression bar system according to one of the preceding claims, characterized in that the connecting element (3), able to be fastened to the rear end, can be covered by a cover cap (16).
- 10 6. A compression bar system according to one of the preceding claims, characterized in that the compression bar (2) and the connecting elements (3) can be screwed to each other via a connecting rod (14) passing through the compression bar (2) and the connecting elements (3).
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7. A compression bar system according to one of the preceding claims, characterized in that an additional connecting element (3) can be inserted into the compression bar (2) between the connecting elements (3) that are able to be fastened at the two ends of the compression bar (2).
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8. A compression bar system according to one of the preceding claims, characterized in that each

connecting element (3) is provided with connecting lugs (4) for the tie members (5).

- 5 9. A compression bar system according to one of the preceding claims, characterized in that two connecting lugs (4) are provided, uniaxially opposite each other.
- 10 10. A compression bar system according to one of the preceding claims, characterized in that four connecting lugs (4) are provided, biaxially crosswise opposite each other.
11. A compression bar system according to one of the preceding claims, characterized in that four connecting lugs (4) are provided in pairs, uniaxially opposite each other.
- 15 12. A compression bar system according to one of the preceding claims, characterized in that six connecting lugs (4) are provided, biaxially crosswise opposite each other.
- 20 13. A compression bar system according to one of the preceding claims, characterized in that each connecting element (3) has a hollow, pot-shaped body (8), at the bottom (9) of which a through

opening (10) is provided for the passage of the connecting rod (14).

- 5 14. A compression bar system according to one of the preceding claims, characterized in that the pot-shaped body (8) has a peripheral wall (12) which, at its inside, is provided with a thread (13).
- 10 15. A compression bar system according to one of the preceding claims, characterized in that an adapter (17) for fitting the additional compression bar (2), the attaching element (6) for attachment of the compression bar system at the building (7), or the cover cap (16) are screwable into the thread (13).
- 15 16. A compression bar system according to one of the preceding claims, characterized in that the pot-shaped body (8), at its bottom (9), has a stepped shoulder (11) on which the compression bar (2) can be fitted.
- 20 17. A compression bar system according to one of the preceding claims, characterized in that an annular groove (19) for receiving an O-ring is provided in the area of the shoulder (11).