

Anchoring element and method for mounting an anchor rail in a structural body of concrete

The present invention relates to an anchoring element for casting in concrete, comprising an anchor rail having a plurality of anchor protrusions and a strip-shaped receptacle for mounting fastening means, wherein at least one retaining bracket is fixed to the anchor rail, which engages over the anchor rail perpendicularly to its longitudinal direction and by means of which the anchor rail can be fixed to a formwork component, wherein at least one flange projecting laterally from the anchor rail is formed on the retaining bracket, and a method for mounting an anchor rail in a structural body of concrete.

DE 10 2008 029 838 A1 discloses an anchor rail for fixing fastening means to a structural body of concrete, wherein the anchor rail has a plurality of anchor protrusions which are cast into the concrete. In order to position such an anchor rail before concrete is poured, it is known to fix the anchor rail to a formwork component via nails. After concrete has been poured, the formwork component is then removed, leaving the nails in the concrete. This leads to the disadvantage that the nails pose a risk of injury and rust spots form on the nails. There is also the disadvantage that the nails are a nuisance in the mounting area of the anchor rail. The insertion of nails into small openings on the anchor rail is also time-consuming with regard to installation, as the nails cannot be inserted with so-called nail guns.

US 2005/0217197 A1 discloses a clamp for fixing a rail in a concrete component, in which two sleeve-shaped fastening elements are integrally formed on a bracket, which are then torn off when a formwork is removed. Openings are formed in the formwork into which the sleeve-shaped fastening elements can be inserted. The assembly of these clamps with the fastening elements is therefore complex.

In GB 2 243 395 A, a rail is fixed to a formwork by means of clamps in order to cast the rail into a concrete component. The clamp is fixed to the formwork by means of nails which are to be pulled out of the clamp when the formwork is removed. If the nails remain in the clamp, the tips of the nails will protrude from the concrete member and pose a risk of injury.

It is therefore the object of the present invention to provide an anchoring element having an anchor rail as well as a method for mounting an anchor rail in a

structural body of concrete, which ensure simple mounting and secure positioning of the anchor rail.

This object is solved with an anchoring element having the features of claim 1 as well as a method for mounting an anchor rail having the features of claim 12.

In the anchoring element according to the invention, an anchor rail with a plurality of anchor protrusions and a strip-shaped receptacle for mounting fastening means, such as hammerhead screws, is provided, wherein the anchor rail is fixed via at least one retaining bracket, via which the anchor rail can be secured to a formwork component. The retaining bracket enables secure positioning and alignment of the anchor rail on the formwork component and indirect positive fixing of the anchor rail, since the anchor rail can be fixed to the formwork component via the at least one retaining bracket. The fixing of the retaining brackets facilitates the installation of the anchor rail before concrete is poured.

The at least one retaining bracket engages over the anchor rail perpendicular to its longitudinal direction. At least one flange projecting laterally from the anchor rail is formed on the retaining bracket, preferably one flange is provided on each of the opposite sides. Each flange is connected to a central section of the retaining bracket via a predetermined breaking point. This allows the anchor rail to be fixed by means of fixing elements, such as nails or staples, which are inserted into the flange. When the formwork component is removed, the flange can then be removed from the anchor rail together with the fixing element, so that no fixing elements remain on the concrete structure. When the formwork component is removed, the flanges can be separated from the central section of the retaining bracket. The indentation in the concrete body caused by the removal of the flange is negligible in terms of the retaining forces of the anchor rail and visual impact. For example, the flange may have a thickness of less than 5 mm, preferably between 1 mm to 4 mm, so that it can be easily penetrated and the indentation left in the concrete by removing the flange is small. The size of each flange can be, for example, between 1 cm² to 4 cm², making it easy to hit during installation.

For easy mounting of the retaining brackets, they can be plugged onto the anchor rail. The retaining brackets can be fixed to the anchor rail by clamping or latching. A positioning aid, for example a web or projection, can be provided on an inner side of the retaining bracket, which engages in a receptacle or recess on the anchor rail

to prevent the anchor rail from shifting in the longitudinal direction.

Each anchor rail is preferably fixed to a formwork component by several retaining brackets. The retaining bracket is preferably made of plastic, but can also be made of other materials.

The anchoring element is preferably assembled into a unit before casting, in which the anchor rail is fixed to a plate-shaped formwork component via at least one retaining bracket. In this case, the at least one retaining bracket is fixed via at least one fixing element, preferably via one nail each on a protruding flange of the formwork component.

Such a unit can also be manufactured in any length, in which case a retaining bracket is used to align two adjacent anchor rails, which engages over both anchor rails in the joint area. This allows the two anchor rails to be aligned via the retaining bracket.

In the method according to the invention for mounting an anchor rail in a structural body of concrete, an anchor rail is first positioned on a formwork component in order to then arrange at least one retaining bracket above the anchor rail. The retaining bracket is then fixed to the formwork component via at least one fixing element, in particular a nail, in order to then cast the anchor rail in concrete. The formwork component with the at least one fixing element is then removed from the anchor rail. As a result, the fixing element can no longer pose a safety risk on the structural body of concrete or lead to a visual impairment due to rust. Preferably, the removal involves removing at least one flange of the retaining bracket with the fixing element, wherein the flange is separated along a predetermined breaking point from a central section of the retaining bracket. As a result, no fixing element interferes with the mounting area of the channel of the anchor rail. For effective assembly, the fixing elements are designed as nails and are shot into the formwork component using a nail gun.

The invention is explained in more detail below by means of an exemplary embodiment with reference to the accompanying drawings, wherein:

Fig. 1 shows a perspective view of an anchor rail with two retaining brackets and a formwork component;

- Figs. 2A to 2D show several views of the anchor rail of Fig. 1 in an assembled position;
- Figs. 3A to 3C show several views of the anchor rail of Fig. 1 after removal from the formwork component;
- Figs. 4A to 4D show multiple views of a retaining bracket for fixing the anchor rail, and
- Fig. 5 shows a perspective view of the assembly of two anchor rails on a formwork component.

An anchoring element for casting in concrete comprises an anchor rail 1 and at least one retaining bracket 20, by means of which the anchor rail 1 can be fixed to a formwork component 10.

The anchor rail 1 comprises a plurality of anchor protrusions 2 projecting from a strip-shaped rail part having a receptacle for mounting fasteners. Each anchor protrusion 2 has a widened end section and is cast in concrete. A molded body 4 made of an elastic material is inserted into the receptacle of the rail section to prevent concrete from penetrating into the receptacle. The anchor rail 1 may be made of two rail parts which are fixed to each other via connecting webs 5. On the side facing the formwork component 10, a channel-shaped receptacle for fastening means, such as hammerhead screws, may be formed. The anchor rail 1 may be designed as disclosed in the document DE 10 2019 106 155.

The at least one retaining bracket 20 engages over the anchor rail 1 in a direction perpendicular to the longitudinal direction. Each retaining bracket 20 has a central bow-shaped section 21, to which a flange 22 is integrally formed on opposite sides in each case. The flange 22 can be connected to the formwork component 10 via a fixing element 11, such as a nail or a staple, in order to fix the anchor rail 1 to the formwork component 10 indirectly via the retaining brackets 20.

In Figs. 2A to 2D, the anchor rail is shown in a position mounted on a formwork component 10. Two retaining brackets 20 are mounted on the formwork component 10. The retaining bracket 20 shown on the left side in Fig. 2A is fixed to the formwork component 10 via fixing elements 11 in the form of nails, wherein the

nails are each inserted into the flange 22 on the retaining bracket 20. The retaining bracket 20 on the right side in Fig. 2A is also fixed to the formwork component 10 via a nail as a fixing element 11, wherein the fixing element 11 engages through a bow-shaped middle section 21 of the retaining bracket 20, so that only one nail is used instead of the two nails for the retaining bracket 20 on the left side.

In Figs. 3A to 3C, the situation is shown after concrete has been poured, when the anchor rail 1 with the anchor protrusions 2 is cast in a structural body of concrete, which is not shown for simplified illustration. Then, the formwork component 10 can be removed from the anchor rail 1. In the case of the retaining bracket 20 on the left side, when the formwork component 10 is removed, the fixing elements 11 remain on the formwork component 10 and a flange 22 is separated from a central section 21 of the retaining bracket 20 via a predetermined breaking point 24. This allows the fixing elements in the form of nails to be removed from the structural body of concrete.

With the retaining bracket 20 on the right side in Fig. 3A, it can be seen that the fixing element 11 is not removed by the formwork component 10 and can optionally now be removed.

Figs. 4A to 4D show the retaining bracket 20 in detail. The retaining bracket 20 is manufactured as a molded body made of plastic, but can also be made of another material. The retaining bracket 20 comprises a central bow-shaped section which engages over the anchor rail 1 in the mounted position. On the inner side of the bow-shaped section, a web or protrusion 23 is formed which is insertable into a groove or receptacle on the anchor rail 1 to secure the anchor rail against displacement and to pre-fix the retaining bracket 20 in a clamping or latching manner. Flanges 22, which are substantially plate-shaped in design, extend from the central bow-shaped section 21 on both sides and are connected to the central section 21 via a predetermined breaking point 24. The predetermined breaking point 24 may be produced by a weakening of the material, i.e. a reduction in the cross-section of the material, for example by reducing the thickness or by a perforation, so that the flange 22 can be safely separated from the central section 21. A reinforcing strut 25 is formed on the central section 21, which reinforces in the area adjacent to the predetermined breaking point 24.

A marking 26 or type identification may further be provided on the retaining

bracket 20, for example providing information as to which anchor rail 1 has been cast in the structural body.

In the region of the flanges 22, a profiling can be formed on the upper side to prevent the fixing element from slipping off, such as a corrugation, grid or hole pattern. Such profiling can also be provided on the bow-shaped middle section 21.

Fig. 5 shows a unit consisting of a formwork component 10, for example a wood-based panel, and two anchor rails 1. A first anchor rail 1 is already fixed to the formwork component 10 by two retaining brackets 20, wherein both retaining brackets 20 are held to the formwork component 10 via fixing elements 11 in the form of nails which are inserted in the flanges 22. In order to be able to align the second anchor rail 1 flush with the first anchor rail 1, a retaining bracket 20 is arranged in the butt area and covers one end face of the first anchor rail 1. As a result, one end face of the second anchor rail 1 can be inserted under the already fixed retaining bracket 20, as shown schematically by the arrow 30. This allows two anchor rails 1 to be aligned in a simple manner.

In the illustrated exemplary embodiments, each retaining bracket is provided with two flanges 22, each of which is connected to a central section 21 via a predetermined breaking point 24. It is optionally possible to fix only one of the flanges 22 to a formwork component 10 via a fixing element in order to fix an anchor rail 1 to the formwork component 10.

The retaining bracket 20 may be made of other materials, such as metal, cardboard, paper, or a plastic film or nonwoven fabric, instead of being a molded plastic body.

List of reference signs

1	Anchor rail
2	Anchor protrusion
4	Molded body
5	Connecting web
10	Formwork component
11	Fixing element
20	Retaining bracket
21	Section
22	Flange
23	Protrusion
24	Predetermined breaking point
25	Reinforcing strut
26	Marking
30	Arrow

CLAIMS:

1. Anchoring element for casting in concrete, comprising an anchor rail (1) having a plurality of anchor protrusions (2) and a strip-shaped receptacle for mounting fastening means, wherein at least one retaining bracket (20) is fixed to the anchor rail (1), which retaining bracket (20) engages over the anchor rail (1) perpendicularly to its longitudinal direction and by means of which the anchor rail (1) can be fixed to a formwork component (10), wherein at least one flange (22) projecting laterally from the anchor rail (1) is formed on the retaining bracket (20), **characterized in that** the at least one flange (22) is connected to a central section (21) of the retaining bracket (20) by means of a predetermined breaking point (24).
2. Anchoring element according to claim 1, **characterized in that** the predetermined breaking point (24) is produced by a material weakening, i.e. a reduction of the material cross-section.
3. Anchoring element according to claim 1 or 2, **characterized in that** a flange (22) projecting from the anchor rail (1) is formed on opposite sides of the retaining bracket (20).
4. Anchoring element according to one of the preceding claims, **characterized in that** each flange (22) has a profiling on an upper surface for preventing slipping of the fixing element.
5. Anchoring element according to one of the preceding claims, **characterized in that** the at least one retaining bracket (20) is fixed to the anchor rail (1) in a clamping or latching manner.
6. Anchoring element according to one of the preceding claims, **characterized in that** a plurality of retaining brackets (20) are fixed to the anchor rail (1).
7. Anchoring element according to one of the preceding claims, **characterized in that** the at least one retaining bracket (20) is made of plastic.
8. Anchoring element according to one of the preceding claims, **characterized in that** each flange (22) has a thickness of less than 5 mm, preferably

between 1 mm to 4 mm.

9. Unit consisting of an anchoring element according to one of the preceding claims and a plate-shaped formwork component (10) to which the anchor rail (1) is fixed via at least one retaining bracket (20).
10. Unit according to claim 9, **characterized in that** the at least one retaining bracket (20) is fixed to the formwork component via at least one nail (11).
11. Unit according to claim 9 or 10, **characterized in that** two anchor rails (1) are overlapped in an abutting area by a retaining bracket (20) and fixed to the formwork component (10).
12. Method for mounting an anchor rail (1) in a structural body of concrete, comprising the following steps:
 - positioning an anchor rail (1) on a formwork component (10);
 - arranging at least one retaining bracket (20) on the anchor rail (1);
 - fixing the retaining bracket (20) to the anchor rail (1) via at least one fixing element on the formwork component (10);
 - casting the anchor rail (1) in concrete, and
 - removing the formwork component (1) with the at least one fixing element (11) from the anchor rail (1),**characterized in that** at least one flange (22) of the retaining bracket (20) with the fixing element (11) is also removed during removal.
13. Method according to claim 12, **characterized in that** the fixing elements (11) are designed as nails and are shot into the formwork component (10) via a nail gun.
14. Method according to claim 12 or 13, **characterized in that** the flange (22) is removed at a predetermined breaking point (24) produced by a weakening of the material, i.e. a reduction of the material cross-section.