between metal grids protruding from a reinforced concrete floor slab, which are then covered with concrete over the entire length of this space, with or without interruptions. The box elements are open at the bottom and equipped with transverse closure walls and stiffening walls that are fastened by wedging and/or other suitable means.

Attempts to use displacement bodies in semi-precast floor slabs are also known. For example, DE 603 09 733 T2 discloses a building element and a method for its manufacture. The building element has a "hardened concrete layer," which can also be referred to as a concrete panel, as well as reinforcing elements, whereby the reinforcing elements extend partially upward from the hardened concrete layer. The building element also has elements that define cavities, which can have the shape of an inverted flower pot in particular.

With regard to the stability of a concrete slab manufactured using element plates, the transition areas from one element plate to the next are particularly critical.

Summary

In an aspect, the present disclosure refers to an element plate (1) for producing a semi-precast floor slab, comprising a reinforced concrete panel (2) which has an element panel length (23) along a longitudinal extension direction and an element panel width (24) along a transverse direction perpendicular to the longitudinal extension direction, and from whose upper side (10) protrude a plurality of displacement devices (3), each of which has at least one hollow vessel (4) whose vessel opening (5) is arranged in the concrete panel (2) and whose vessel opening (5) is closed by the concrete of the concrete panel (2), wherein the element plate (1) has a plurality of longitudinal reinforcing bars (22) extending in the longitudinal extension direction, which are arranged at a distance from the upper side (10) of the concrete panel (2), characterized in that in each case a groove (14) extending in the transverse direction is formed between adjacent hollow vessels (4), into which a reinforcing bar (8) can be inserted in the transverse direction in such a way that it protrudes laterally beyond the concrete panel (2).

In an aspect, the present disclosure refers to a semi-precast floor slab comprising a plurality of element plates (1), in particular identical element plates (1), according to the above aspect, wherein

a. the element plates (1) are arranged relative to one another in such a way that reinforcing bars (8) can be inserted into or are inserted into the grooves (14) of adjacent element plates (1) parallel to each other across the element plates at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or from 20 cm to 25 cm or at a distance of 20 cm, and/or wherein

b. the element plates (1) are arranged and their displacement devices (3) are designed and arranged in such a way that reinforcing bars (8) can be placed or are placed on support sections (7) of the displacement devices (3) of adjacent element plates (1) parallel to each other across the element plates at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or from 20 cm to 25 cm or at a distance of 20 cm.

In an aspect, the present disclosure refers to a concrete component, in particular concrete slab, wherein the concrete component comprises several element plates (1) according to the above aspect or a semi-precast floor slab according to the above aspect, and/or wherein the concrete component is manufactured using a plurality of element plates (1) according to the above aspect or using a semi-precast floor slab according to the above aspect.

In an aspect, the present disclosure refers to a method for manufacturing an element plate (1) according to the above aspect, characterized in that

c. at least one reinforcement (19) is arranged in a formwork, onto which the displacement devices (3) are placed in such a way that between each pair of adjacent hollow vessels (4) a groove (14) extending in the transverse direction is formed, into which a reinforcing bar (8) can be inserted in the transverse direction such that it protrudes laterally beyond the concrete panel (2), and that the formwork (20) is then filled with liquid concrete until the vessel openings (5) are located in the concrete and closed by the concrete, in particular until the support section (7) of the support element (6) has a distance (9) to the upper side (10) of the concrete panel (2) in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm, or that

d. at least one reinforcement (19) is arranged in a formwork and the formwork (20) is then filled with liquid concrete, and that the displacement devices (3) are then arranged and pressed into the not yet hardened concrete in such a way that between each pair of adjacent hollow vessels (4) a groove (14) extending in the transverse direction is formed, into which a reinforcing bar (8) can be inserted in the transverse direction such that it protrudes laterally beyond the concrete panel (2), and that the vessel openings (5) are located in the concrete and are closed by the concrete, in particular

until the support section (7) of the support element (6) has a distance (9) to the upper side (10) of the concrete panel (2) in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm.

In an aspect, the present disclosure refers to a method for manufacturing a concrete component, in particular a concrete slab or a concrete wall, using several element plates (1) arranged in particular directly next to each other according to the above aspect, characterized in that reinforcing bars (8) are inserted across the element plates into the grooves (14) of the displacement devices (3), and that the space above the element plates (1) is then filled with liquid concrete.

It is therefore the object of the present disclosure to provide an element plate that makes it possible to save concrete and to produce particularly stable concrete slabs, especially flat slabs.

The object is achieved by an element plate characterized in that a groove running in the transverse direction is formed between adjacent hollow vessels, into which a reinforcing bar can be inserted in the transverse direction in such a way that it protrudes laterally beyond the concrete panel.

In a particularly advantageous example, the grooves are designed and arranged in such a way that several reinforcing bars can be inserted at equal intervals so that a reinforcing bar is arranged in each groove running in the transverse direction and adjacent reinforcing bars have a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or in the range of 20 cm to 25 cm or 20 cm. This makes it possible to arrange the reinforcing bars across the element plates in a number and density that is advantageous for the stability of the concrete component to be manufactured when producing a concrete component, in particular a concrete slab, using several of the element plates according to the invention, which are arranged along their long sides, in particular immediately next to each other.

Preferably, the grooves each have a width in the range of 3 cm to 10 cm, in particular in the range of 3 cm to 7 cm or in the range of 6 cm to 8 cm or 5 cm. The special spacing advantageously ensures that, after filling with cast-in-place concrete, the reinforcing bars are completely surrounded in every direction by a thickness of concrete that is advantageous for

the stability of the concrete component.

According to an example, the element plate has several longitudinal reinforcement bars running in the longitudinal extension direction. The longitudinal reinforcement bars are preferably spaced apart from the upper side of the concrete panel and/or arranged parallel to the upper side of the concrete panel. In this way, a particularly high stability and rigidity of the concrete component to be manufactured is achieved.

In a particularly advantageous example, reinforcement elements, in particular in the form of lattice girders, to which the longitudinal reinforcement bars are attached, protrude from the concrete panel. The longitudinal reinforcing bars can be attached in particular to the free ends of the reinforcing elements. Such an embodiment makes it possible in a particularly advantageous manner to arrange the longitudinal reinforcing bars at a distance from the top of the concrete panel and/or parallel to the top of the concrete panel.

A particularly advantageous example is one in which the reinforcement elements are arranged in several straight and mutually parallel rows and one of the longitudinal reinforcement bars is attached to each of the reinforcement elements in a row. The statics of such an embodiment are comparatively easy to calculate and must be taken into account in the manufacture of a semi-finished slab. In addition, such an example can be manufactured particularly efficiently, especially with the aid of robots. In such an embodiment, it may be advantageous in particular to provide that at least one row of reinforcement elements runs between each two straight and mutually parallel rows of displacement devices.

Preferably, the reinforcement elements and/or the longitudinal reinforcement bars are designed and arranged in such a way that they do not hinder or even prevent the reinforcement bars from being inserted into the grooves 14 across the element plates. For this purpose, it may be advantageous to provide that the alignments of the grooves 14 remain free of reinforcement elements and longitudinal reinforcement bars.

A particularly stable and rigid embodiment of the element plate is one in which the longitudinal reinforcement bars extend over the entire length of the element plate or have at least one longitudinal reinforcement bar length that is 0.8 to 1.0 times, in particular 0.9 to 1.0 times, the length of the element plate.

The element plate width can, for example, be in the range from 0.6 m to 2.4 m. The element plate length can advantageously be up to 12 m or more.

In an advantageous example, at least one support element with a support section arranged outside the concrete panel for supporting a reinforcing bar is arranged on the outside of at least one of two adjacent hollow vessels, wherein the support section preferably has a distance from the upper side of the concrete panel in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm. This has the particular advantage that a particularly good stability of the concrete component to be manufactured can be achieved by the fact that reinforcing steel, in particular in the form of reinforcing bars, can be easily installed on the construction site. In particular, the reinforcing bars, especially across element plates, can be easily placed on the support sections of the support elements of the displacement devices. The special distance between the support sections and the top of the concrete panel, in the range of 0.5 cm to 3 cm, ensures, on the one hand, that the reinforcement can be installed at a short distance from the top of the concrete panel in a statically advantageous manner and, on the other hand, that the reinforcement (apart from the points where it rests on the support sections) is completely encased in concrete when filled with cast-in-place concrete.

As already mentioned, this has the particular advantage that the reinforcement, especially in the form of reinforcing bars, can be laid across element plates. In particular, reinforcing bars can be advantageously installed in such a way that they rest both on the support sections of the displacement devices of an element plate according to an example and on the support sections of the displacement devices of an immediately adjacent element plate according to the invention (in particular, the same element plate). In this case, the displacement devices can be designed and arranged in a particularly advantageous manner so that the reinforcing bars can be installed at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or 20 cm to 25 cm, or in particular at a distance of 20 cm. This advantageously ensures that a semi-precast floor slab produced in this way and reinforced by means of reinforcement bars spanning the element plates is particularly stable, especially in the transition areas from one element plate to the next. As a result, the concrete slab ultimately produced is also particularly stable. In particular, the invention makes it possible to produce particularly flat concrete slabs in element plate construction that are nevertheless particularly stable.

The support element can advantageously be elongated and/or designed as a support bar, in particular a cylindrical support bar. This has the advantage that the contact area with the applied reinforcement bar is particularly small, so that only this small surface area of the applied reinforcement bar remains free of cast-in-place concrete during the concreting process on the construction site.

In a particularly advantageous example, the support section has a concave shape and/or is designed to be concavely curved. This has the particular advantage that a target position for

the reinforcing bar is defined because the reinforcing bar tends to roll and/or slide to the lowest point of the support section. This avoids the need for an employee to manually align and fix the reinforcing bar in detail. This also prevents the reinforcing bar from unintentionally resting on other parts of the element plate, such as the wall of the hollow vessel, except at the support sections.

In a particularly cost-effective yet very robust example, at least one support element and the hollow vessel are manufactured together in one piece, in particular by injection molding. In particular, the at least one support element and the hollow vessel can be advantageously manufactured, in particular together in one piece, by plastic injection molding.

Although it is not fundamentally excluded, the hollow vessel is preferably not cuboid in shape. A cuboid shape of the hollow vessel would result in beams running essentially between the hollow vessels being concreted, which would reduce the stability of the concrete slab.

Particularly stable concrete slabs can be achieved with element plates in which at least one section of the wall of the hollow vessel, in particular each of the hollow vessels, is curved. In particular, it may be advantageous to provide that at least one section of the wall of the hollow vessel has a curved, in particular circular, section in a cross-sectional plane parallel to the upper side of the concrete panel. In a particularly advantageous design, a section of the wall of the hollow vessel has the shape of a spherical segment.

Preferably, several of the displacement bodies and/or several of the hollow vessels of the element plate are of identical design. In particular, all displacement bodies and/or all hollow vessels of the element plate may be of identical design.

In a special example, the element plate has at least two displacement devices which differ from each other in terms of their shape and/or their size and/or their volume. For example, smaller displacement devices with a lower displacement volume may be arranged in an area of the element plate in which a greater load is to be expected in the concrete component to be manufactured, while larger displacement devices with a larger displacement volume are arranged in an area of the same element plate where a lower load is to be expected in the concrete component to be produced. This has the advantage that the concrete component has more concrete in the area of higher load than in the area of lower load.

The element plate may (alternatively or additionally) also have at least one area with displacement devices, while another area is free of displacement devices, even though it is large enough to accommodate displacement devices of the same size. This has the advantage

that the concrete component in the free area has the maximum possible amount of concrete and therefore has particularly high stability and/or load-bearing capacity there.

The wall of at least one of the hollow vessels, in particular of all hollow vessels of the element plate, may have at least one flat section. For example, the flat section may be arranged at an angle of 70 degrees to 90 degrees to the upper side of the concrete panel. In particular, this section may delimit a groove between two hollow vessels of a displacement device, which is described in detail below.

Alternatively or additionally, the wall of at least one of the hollow vessels, in particular of all hollow vessels of the element plate, may have a section that is parallel to the upper side of the concrete panel, in particular a flat section. This may advantageously be the upward-facing bottom of the hollow vessel with the vessel opening facing downwards.

At least one spacer may advantageously be arranged on the upper side of at least one of the hollow vessels, in particular all hollow vessels of the element plate. The spacer may, for example, be designed in the form of a web and/or a rib. In particular, the spacer may be manufactured integrally with the wall of the hollow vessel. Further reinforcements, in particular reinforcing bars or reinforcing mats, can be placed on the spacer at the construction site prior to a concreting process, whereby the spacers prevent direct contact between the further reinforcement and the wall of the hollow vessel. This has the advantage that the contact area with the additional reinforcement is particularly small in each case, so that only a small surface area of the additional reinforcement remains free of cast-in-place concrete during the concreting process on the construction site.

Preferably, the support element is shorter in one direction, in particular vertically, away from the wall of the hollow vessel than the length and width of the vessel opening. Such a design is sufficient for the installation of the reinforcing bars and allows particularly efficient positioning of the displacement devices relative to each other without mutual obstruction. The length can advantageously be in the range of 2 cm to 7 cm.

An example in which the support element protrudes, in particular vertically, from the wall of the hollow vessel is particularly advantageous. This means that the support element only takes up the space required for its function.

Preferably, several support elements are arranged on the outside of the hollow vessel. In particular, several support elements can be arranged on the outside of the hollow vessel, protruding in different directions, in particular in opposite directions from the wall of the hollow

vessel. Such a design allows reinforcing bars, in particular parallel to each other, to be placed on opposite sides of the hollow vessel.

In a particularly advantageous example, the wall of at least one of the hollow vessels, in particular each hollow vessel, has a vessel opening edge which is arranged in the concrete panel. This anchors the hollow vessel securely and inseparably in the concrete panel. The vessel opening edge can advantageously have a height in the range of 0.5 cm to 3 cm in the vertical direction. In particular, the vessel opening edge can be bounded at the top by a collar arranged on the outside of the displacement device and/or the hollow body. In a particularly advantageous manner, the collar can rest on the upper side of the concrete panel. The collar can advantageously have a width in the range of 0.5 cm to 2 cm.

In particular, it can be advantageously provided that the vessel opening edge stands up in the concrete panel in direct contact with a reinforcement. Such a design can be produced, for example, by first arranging at least one reinforcement in a formwork and then placing the at least one displacement device, in particular a plurality of displacement devices, on the reinforcement, each with the vessel opening directed towards the reinforcement, in such a way that the vessel opening edge is in direct contact with the reinforcement. The concrete panel is then concreted by pouring in liquid concrete, whereby so much liquid concrete is poured into the formwork until the vessel opening edge is surrounded by concrete. In particular, as already mentioned, it may be advantageous to provide that the hollow vessel and/or the displacement device has a circumferential collar which marks an upper end of the vessel opening edge and up to which the liquid concrete is poured into the formwork to produce the concrete panel.

In a particularly advantageous example, at least one of the displacement devices, in particular each of the displacement devices, has one, in particular exactly one, further hollow vessel, wherein the hollow vessel and the further hollow vessel are connected to each other by means of the at least one support element. Such an example has the particular advantage that reinforcing bars can be arranged both laterally next to the hollow vessels and between the hollow vessels on the support elements. Such an example also has the further particular advantage that it is particularly easy to handle during the production of the element plate. Such an embodiment is particularly stable when the hollow vessel and the further hollow vessel are connected to each other by means of several support elements. Preferably, at least two of the connecting support elements are of identical design and/or arranged parallel to each other.

Preferably, the support section of each of the support elements is spaced from the upper side of the concrete panel in the range from 0 cm to 3 cm. This has the advantage that the reinforcing bars, in particular parallel to the upper side of the concrete panel, can be placed at a small

distance from the upper side of the concrete panel in such a way that they are completely encased in concrete (apart from the points where they rest on the support sections) when filled with cast-in-place concrete.

In a particularly cost-effective yet very robust example, the at least one support element and the hollow vessel and the further hollow vessel are produced together in one piece, in particular by injection molding. In particular, the at least one support element and the hollow vessel and the further hollow vessel can be advantageously produced by plastic injection molding.

As already mentioned, the displacement device can be advantageously designed such that a groove is formed between the hollow vessel and the further hollow vessel. The groove can advantageously have a width in the range of 3 cm to 10 cm, in particular in the range of 3 cm to 7 cm or in the range of 6 to 8 cm or 5 cm. This makes it possible to insert a reinforcing bar easily and without complication. In addition, with such a width of the groove, it is ensured that the reinforcing bar (apart from the points where it rests on the support sections) is completely encased in concrete when filled with cast-in-place concrete.

As already mentioned, the groove can be formed partly by a particularly flat outer wall of the hollow vessel and partly by a particularly flat outer wall of the further hollow vessel of the displacement device.

In a special example, the outer walls of the hollow vessel and the further hollow vessel, which form part of the groove, are arranged in planes that form an angle of between 0 degrees and 30 degrees to each other. Such an embodiment has the particular advantage that the in-situ concrete can flow reliably into the groove and surround the inserted reinforcing bar or bars.

Preferably, the hollow vessel and the further hollow vessel are of identical design. At least, it may be advantageous to provide that the hollow vessel and the further hollow vessel are of identical size and/or that the hollow vessel and the further hollow vessel have the same shape.

In a particularly advantageous example, the hollow vessel and the further hollow vessel are designed and arranged to be mirror-symmetrical to each other. Such an example has the particular advantage that the displacement device and the concrete structure of the concete slab formed around it have symmetrical stability properties.

Preferably, the vessel opening of the further hollow vessel is also arranged in the concrete panel and closed by the concrete of the concrete panel. Alternatively or additionally, it may be advantageous to provide that the vessel openings of the hollow vessel and the further hollow

vessel are arranged completely in a common plane.

In a particularly advantageous example, the space above the at least one support element is free. This makes it particularly easy to place a reinforcing bar.

In an advantageous example of the element plate according to the disclosure, several displacement devices are arranged in at least one, in particular straight, row. In particular, the distance between immediately adjacent displacement devices in the row can advantageously be in the range of 3 cm to 10 cm, in particular in the range of 3 cm to 7 cm or in the range of 6 cm to 8 cm, or in particular 5 cm.

It can be particularly advantageous for the element plate to have several rows of displacement devices, in particular parallel to each other. In particular, it can be advantageous to arrange several displacement devices, in particular identical ones, in several parallel, in particular straight, rows. In such an example, it may also be advantageous to provide that at least one of the reinforcement elements of the element plate, in particular a reinforcement element designed as a lattice girder, protrudes from the upper side of the concrete panel between the rows parallel to each other.

A semi-precast floor slab comprising several element plates according to the disclosure is particularly advantageous. Preferably, the element plates are designed identically.

The element plates of the semi-precast floor slab can be arranged relative to each other in such a way that reinforcement bars can be inserted or are inserted across the element plates parallel to each other at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or 20 cm to 25 cm or at a distance of 20 cm can be inserted or are inserted into the grooves of adjacent element plates. Preferably, each groove contains exactly one reinforcing bar, although it is not excluded that several reinforcing bars may be arranged in at least one groove, in particular in all grooves.

In particular, it may be advantageous to arrange the element plates of the semi-precast floor slab in such a way and to design and arrange their displacement devices in such a way that the reinforcing bars are arranged parallel to each other across the element plates at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or 20 cm to 25 cm or at a distance of 20 cm, on support sections of the displacement devices of adjacent element plates. In this way, it is advantageous to ensure that each of the reinforcement bars extending across the element plates rests on support sections belonging to different element plates.

The element plate according to the disclosure can be advantageously manufactured in such a way that at least one reinforcement is arranged in a formwork, on which (preferably in straight rows parallel to each other) the displacement devices are placed. In this case, a programmable automatic movement device, in particular an industrial robot, can be advantageously used to place the displacement devices. In this way, a high degree of accuracy is achieved, which is important in order to be able to place the required reinforcement bars in the required manner later on, after the finished element plate has been installed on the construction site. The formwork is then filled with liquid concrete until the vessel opening edges are positioned in the concrete and the vessel openings are sealed by the concrete, whereby it may be advantageous to fill the formwork with liquid concrete to such a height that the support sections of the support elements are spaced from the top of the concrete panel in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm. The displacement devices are preferably placed on the reinforcement in such a way that the groove running in the transverse direction is formed between adjacent hollow vessels, into which a reinforcing bar can be inserted in the transverse direction in such a way that it protrudes laterally beyond the concrete panel.

According to a particularly advantageous method, the element plate according to the disclosure is manufactured in such a way that at least one reinforcement is arranged in a formwork and the formwork is then filled with liquid concrete. The displacement devices (preferably several displacement devices in rows) are then pressed into the concrete, which has not yet hardened, until the vessel opening is located in the concrete and sealed by the concrete. The displacement devices are preferably pressed into the uncured concrete until the support section of the support element is spaced from the upper side of the concrete panel (2) by a distance in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm. The at least one displacement device can remain spaced apart from the reinforcement. In particular, as already mentioned above, the displacement device may advantageously have a circumferential collar, wherein the collar is arranged relative to the bearing section of the bearing element in such a way that the bearing section of the bearing element has a distance to the upper side of the concrete panel in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm, when the collar rests on the upper side of the concrete panel. This facilitates precise pressing in of the at least one displacement device and prevents unwanted sinking of the pressed-in displacement device. In particular, this method also allows the advantageous use of a programmable automatic movement device, in particular an industrial robot, to position the displacement devices. This achieves a high degree of accuracy, which is important in order to be able to lay the required reinforcing bars in the required manner later on, after the finished element plate has been installed on the construction site.

Particularly advantageous is a method for manufacturing a concrete component, in particular a

concrete slab or a concrete wall, using several (in particular, directly adjacent) element plates according to the disclosure, in which reinforcing bars are inserted across the element plates, running through the grooves, before the space above the element plates is filled with liquid cast-in-place concrete.

According to an independent inventive concept, which can be implemented alone or in combination with one of the other features described in this application, an element plate for producing a semi-precast floor slab is particularly advantageous, comprising a reinforced concrete panel from whose upper side at least one displacement device protrudes, which has at least one hollow vessel, whose vessel opening is arranged in the concrete panel and is closed by the concrete of the concrete panel, wherein at least one support element with a support section arranged outside the concrete panel for supporting a reinforcing bar is arranged on the outside of the hollow vessel, wherein the support section has a distance from the upper side of the concrete panel in the range of 0.5 cm to 3 cm, in particular in the range from 0.5 cm to 1.5 cm.

The invention is shown schematically in the drawing as an example and is described below with reference to the figures, whereby identical or similarly functioning elements are usually given the same reference symbols even in different embodiments. The figures show:

Fig. 1 a first embodiment of an element plate according to the invention,

Fig. 2 a detailed view of the first embodiment of an element plate according to the invention,

Fig. 3 an embodiment of a displacement device for an element plate according to the invention in a perspective view from above,

Fig. 4 the embodiment of a displacement device for an element plate according to the invention in a top view from above,

Fig. 5 the embodiment of a displacement device for an element plate according to the invention in a side view,

Fig. 6 the embodiment of a displacement device for an element plate according to the invention in another side view,

Fig. 7 an embodiment of a displacement device for an element plate according to the

Patent Claims

1. Element plate (1) for producing a semi-precast floor slab, comprising a reinforced concrete panel (2) which has an element panel length (23) along a longitudinal extension direction and an element panel width (24) along a transverse direction perpendicular to the longitudinal extension direction, and from whose upper side (10) protrude a plurality of displacement devices (3), each of which has at least one hollow vessel (4) whose vessel opening (5) is arranged in the concrete panel (2) and whose vessel opening (5) is closed by the concrete of the concrete panel (2), wherein the element plate (1) has a plurality of longitudinal reinforcing bars (22) extending in the longitudinal extension direction, which are arranged at a distance from the upper side (10) of the concrete panel (2), characterized in that in each case a groove (14) extending in the transverse direction is formed between adjacent hollow vessels (4), into which a reinforcing bar (8) can be inserted in the transverse direction in such a way that it protrudes laterally beyond the concrete panel (2).

2. Element plate (1) according to claim 1, characterized in that

   a. the grooves (14) are designed and arranged in such a way that several reinforcing bars (8) can be inserted at equal distances so that a reinforcing bar (8) is arranged in each groove (14) in the transverse direction and adjacent reinforcing bars (8) have a distance (17) of 40 cm or less, in particular a distance (17) of 30 cm or less, or a distance (17) in the range of 15 to 30 cm, or in the range of 20 cm to 25 cm, or of 20 cm, and/or that

   b. the grooves (14) each have a width (15) in the range of 3 cm to 10 cm, in particular in the range of 3 cm to 7 cm or in the range of 6 cm to 8 cm or of 5 cm.

3. Element plate (1) according to claim 1 or 2, characterized in that the element plate (1) has at least one of the following features a to g:

   a. the longitudinal reinforcement bars (22) running in the longitudinal extension direction are arranged parallel to the upper side (10) of the concrete panel (2),

   b. reinforcement elements (11) in the form of lattice girders protrude from the concrete panel (2), to which the longitudinal reinforcement bars (22) are attached,

   c. reinforcement elements (11) protrude from the concrete panel (2), to the free ends of which the longitudinal reinforcement bars (22) are attached,

   d. reinforcement elements (11) protrude from the concrete panel (2), to which the longitudinal reinforcement bars (22) are attached and which are arranged in several

straight and mutually parallel rows, wherein one of the longitudinal reinforcement bars (22) is attached to each of the reinforcement elements (11) in a row,

e. the longitudinal reinforcement bars (22) extend over the entire length of the element plate,

f. a longitudinal reinforcement bar length of the longitudinal reinforcement bars (22) is 0.8 to 1.0 times, in particular 0.9 to 1.0 times, the length of the element plate,

g. the element plate length (23) is greater than the element plate width (24).

4. Element plate (1) according to one of claims 1 to 3, characterized in that on the outside of at least one of respectively two adjacent hollow vessels (4) at least one support element (6) with a support section (7) is arranged, wherein the support section (7) has a distance (9) from the upper side (10) of the concrete panel (2) in the range of 0.5 cm to 3 cm, in particular in the range from 0.5 cm to 1.5 cm.

5. Element plate (1) according to claim 4, characterized in that the element plate (1) has at least one of the following features a to j:

a. the support element (6) is elongated,

b. the support element (6) is designed as a support bar, in particular a cylindrical support bar,

c. the support section (7) has a concave shape and/or is designed to be concavely curved,

d. the at least one support element (6) and the hollow vessel (4) are manufactured together in one piece, in particular by injection molding,

e. the support element (6) is shorter in one direction, in particular vertically, away from the wall of the hollow vessel (4) than the length and width of the vessel opening (5),

f. the support element (6) is longer in a direction, in particular perpendicular, away from the wall of the hollow vessel (4) than half the distance between immediately adjacent displacement devices (3),

g. the support element (6) protrudes, in particular perpendicularly, from the wall of the hollow vessel (4),

h. several support elements (6) are arranged on the outside of the hollow vessel (4), which protrude in different directions, in particular in opposite directions from the wall of the hollow vessel (4),

i. the support section (7) of each of the support elements (6) has a distance from the upper side (10) of the concrete panel (2) in the range of 0 cm to 3 cm,

j. j. the space above the at least one support element is free.

6. Element plate (1) according to one of claims 1 to 5, characterized in that the element plate (1) has at least one of the following features a to g:

a. at least one section of the wall of at least one of the hollow vessels (4), in particular each hollow vessel (4), is curved,

b. the wall of at least one of the hollow vessels (4), in particular each hollow vessel (4), has a curved section, in particular a circular section, in a horizontal cross-sectional plane,

c. the wall of at least one of the hollow vessels (4), in particular each hollow vessel (4), has at least one flat section,

d. the wall of at least one of the hollow vessels (4) has at least one flat section which is arranged at an angle of 70 degrees to 90 degrees to the upper side (10) of the concrete panel (2),

e. the wall of at least one of the hollow vessels (4), in particular each hollow vessel (4), has a section parallel to the upper side (10) of the concrete panel (2),

f. a section of the wall of at least one of the hollow vessels (4), in particular each hollow vessel (4), has the shape of a spherical segment,

g. at least one spacer, in particular a rib-shaped and/or web-shaped spacer, is arranged on the upper side of at least one of the hollow vessels (4), in particular each hollow vessel (4).

7. Element plate (1) according to one of claims 1 to 6, characterized in that at least one of the hollow vessels (4), in particular each hollow vessel (4), has a vessel opening edge (12) which is arranged in the concrete panel (2).

8. Element plate (1) according to one of claims 1 to 7, characterized in that at least one of the hollow vessels (4), in particular each hollow vessel (4), and/or at least one of the displacement devices (3), in particular each displacement device (3), has a circumferential collar (13) which rests on the upper side (10) of the concrete panel (2).

9. Element plate (1) according to one of claims 4 to 8, characterized in that at least one of the displacement devices (3), in particular each displacement device (3), has one, in particular exactly one, further hollow vessel (4), and that the hollow vessel (4) and the further hollow vessel (4) are connected to each other by means of at least one support element (6).

10. Element plate (1) according to claim 9, characterized in that the element plate (1) has at least one of the following features a to m:

a. the at least one support element (6), the hollow vessel (4) and the further hollow vessel (4) are manufactured together in one piece, in particular by injection molding,

b. the hollow vessel (4) and the further hollow vessel (4) are connected to each other by means of a plurality of support elements (6),

c. at least two of the support elements (6) are of identical design,

d. at least two of the support elements (6) are arranged parallel to each other,

e. one of the grooves (14) is formed between the hollow vessel (4) and the further hollow vessel (4),

f. one of the grooves (14) is formed between the hollow vessel (4) and the further hollow vessel (4), wherein the groove (14) is formed partly by a, in particular flat, outer wall of the hollow vessel (4) and partly by a, in particular flat, outer wall of the further hollow vessel (4),

g. the outer walls of the hollow vessel (4) and the further hollow vessel (4), which form part of the groove, are arranged in planes that form an angle in the range from 0 degrees to 30 degrees to each other,

h. the hollow vessel (4) and the further hollow vessel (4) are of identical design,

i. the hollow vessel (4) and the further hollow vessel (4) are of identical size,

j. the hollow vessel (4) and the further hollow vessel (4) have the same shape,

k. the hollow vessel (4) and the further hollow vessel (4) are designed and arranged to be mirror-symmetrical to each other,

l. the vessel opening (5) of the further hollow vessel (4) is arranged in the concrete panel (2) and is closed by the concrete of the concrete panel (2),

m. the vessel openings of the hollow vessel (4) and the further hollow vessel (4) are arranged completely in a common plane.

11. Element plate (1) according to one of claims 1 to 10, characterized in that the element plate (1) has at least one of the following features a to c:

a. the plurality of displacement devices (3), in particular identical displacement devices (3), are arranged in a single, in particular straight, row,

b. the plurality of displacement devices (3) are arranged in a row in which the distance between immediately adjacent displacement devices (3) is in the range of 3 cm to 10 cm, in particular in the range of 3 cm to 7 cm or in the range of 6 cm to 8 cm, in particular 5 cm,

c. the plurality of displacement devices (3), in particular identical displacement devices (3), are arranged in a plurality of rows that are parallel to each other, in particular straight rows.

12. Semi-precast floor slab comprising a plurality of element plates (1), in particular identical element plates (1), according to one of claims 1 to 11, wherein

a. the element plates (1) are arranged relative to one another in such a way that reinforcing bars (8) can be inserted into or are inserted into the grooves (14) of adjacent element plates (1) parallel to each other across the element plates at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or from 20 cm to 25 cm or at a distance of 20 cm, and/or wherein

b. the element plates (1) are arranged and their displacement devices (3) are designed and arranged in such a way that reinforcing bars (8) can be placed or are placed on support sections (7) of the displacement devices (3) of adjacent element plates (1) parallel to each other across the element plates at a distance of 40 cm or less, in particular at a distance in the range of 15 to 30 cm or from 20 cm to 25 cm or at a distance of 20 cm.

13. Concrete component, in particular concrete slab, wherein the concrete component comprises several element plates (1) according to one of claims 1 to 11 or a semi-precast floor slab according to claim 12, and/or wherein the concrete component is manufactured using a plurality of element plates (1) according to one of claims 1 to 11 or using a semi-precast floor slab according to claim 12.

14. Method for manufacturing an element plate (1) according to one of claims 1 to 11, characterized in that

a. at least one reinforcement (19) is arranged in a formwork, onto which the displacement devices (3) are placed in such a way that between each pair of adjacent hollow vessels (4) a groove (14) extending in the transverse direction is formed, into which a reinforcing bar (8) can be inserted in the transverse direction such that it protrudes laterally beyond the concrete panel (2), and that the formwork (20) is then filled with liquid concrete until the vessel openings (5) are located in the concrete and closed by the concrete, in particular until the support section (7) of the support element (6) has a distance (9) to the upper side (10) of the concrete panel (2) in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm, or that

b. at least one reinforcement (19) is arranged in a formwork and the formwork (20) is then filled with liquid concrete, and that the displacement devices (3) are then arranged and pressed into the not yet hardened concrete in such a way that between each

pair of adjacent hollow vessels (4) a groove (14) extending in the transverse direction is formed, into which a reinforcing bar (8) can be inserted in the transverse direction such that it protrudes laterally beyond the concrete panel (2), and that the vessel openings (5) are located in the concrete and are closed by the concrete, in particular until the support section (7) of the support element (6) has a distance (9) to the upper side (10) of the concrete panel (2) in the range of 0.5 cm to 3 cm, in particular in the range of 0.5 cm to 1.5 cm.

15. Method for manufacturing a concrete component, in particular a concrete slab or a concrete wall, using several element plates (1) arranged in particular directly next to each other according to one of claims 1 to 11, characterized in that reinforcing bars (8) are inserted across the element plates into the grooves (14) of the displacement devices (3), and that the space above the element plates (1) is then filled with liquid concrete.