

Formwork element and formwork construction kit

The invention relates to formwork elements having a formwork skin, having a frame bearing the latter, and having struts which are arranged within the frame and support the formwork skin.

Furthermore, the invention also relates to a formwork construction kit which comprises such formwork elements and from which formworks of a wide variety of kinds can be formed.

Such formwork elements are already known from practice in a wide variety of embodiments and are used, for example, in concrete formwork construction.

On account of the loadings to which such formwork elements are subjected, it is necessary for the formwork elements to be configured to be robust. This is accompanied as a rule with a comparatively high weight of the formwork elements, which can make handling of such formwork elements more difficult.

It is therefore the object of the invention to provide formwork elements of the type stated at the outset whose use properties are improved by comparison with already known formwork elements.

To achieve this object, what is proposed first of all is a formwork element having the features of the first independent claim directed to such a formwork element. In particular, to achieve this in a formwork element of the type stated at the outset, what is thus proposed is that the frame of the formwork element is produced from unprofiled flat steel and that the struts of the formwork element are produced from open sectional steel. What can be considered as an example of an

open sectional steel is such a sectional steel which has an open cross section. In relation to struts consisting of flat steel, the struts consisting of sectional steel have the advantage that the contact points of the struts on the formwork skin are removed further away from one another. In this way, the struts can be arranged to be somewhat further removed away from one another than is possible in the case of previously known formwork elements of the type stated at the outset, although, in spite of the greater distance of the struts from one another, a comparable or even higher loadability and stability of the formwork element can be achieved than for the previously known formwork elements. Furthermore, the use of struts which are produced from sectional steel allows the total weight of the formwork element to be reduced by comparison with previously known formwork elements of comparable size. Overall, there is thus created a formwork element which offers a good compromise between highest possible loadability and low intrinsic weight. Furthermore, struts consisting of open sectional steel can be coated, for example with a corrosion protection, relatively simply on all sides. It is thus possible with comparatively little effort to improve corrosion resistance of the formwork element equipped with these struts.

Unprofiled flat steel can, for example, be characterizable by the fact that production with cylindrical rolls is possible.

In one embodiment of the formwork element, there can be provision that the struts are arranged in such a way that the sectional steel is open to the formwork skin. In this way, a head side and/or a head part of the respective strut can be used for fastening.

Furthermore, it is possible that the sectional steel has a symmetrical profile, in particular a hat profile. The use of a

sectional steel with symmetrical profile can promote an advantageous stress distribution on the strut. If the profile of the sectional steel of the struts is a hat profile, the struts offer support surfaces against which the struts bear flat against the formwork skin and/or which can be used, for example, for fastening by rivets to prepunched holes.

The sectional steel can have at least one longitudinal bead on its head side. A fastening element which is intended to be secured to the strut can engage behind this longitudinal bead and thus be secured to the strut in a rotationally fixed manner.

To achieve the object, what is further proposed is a formwork element of the type stated at the outset which has the features of the second independent claim directed to such a formwork element. In particular, what is proposed to achieve the object in this formwork element is that an even number of struts is arranged within the frame, of which two outer struts each have at least one plug-through opening for an anchor. These plug-through openings define so-called anchor points of the formwork element. Particularly when the struts are arranged in a uniformly distributed manner within the frame, it is possible to mount accessory parts on any desired struts. Moreover, the formwork element can thereby obtain a certain symmetry which simplifies its handling and in particular its orientation in use.

Particularly when four struts are arranged in a uniformly distributed manner within the frame, the resulting advantage is that anchor points defined by the plug-through openings of the at least two outer struts are automatically arranged in $1/5$ of the total length or total height of the formwork element. This distance from the edge of the formwork element and/or frame defines a position of an anchor on the formwork

element that is particularly favorable with regard to the occurring loads and with regard to the desired stress distribution. There is thus namely found a particularly advantageous or even optimal balance between a load which is introduced at a short end with respect to the anchoring and a loading of the formwork skin that is introduced into the formwork skin at a long end or between two adjacent anchor points.

10 The plug-through openings defining the anchor points are here preferably provided in the edge vicinity of the frame or of the formwork element. The arrangement of plug-through openings in the struts has the advantage, in the case of such struts which are produced from sectional steel, that the sectional steel simultaneously also offers a support for a plate or washer by means of which the anchoring holds the formwork skin and ultimately also the formwork element. This is particularly important in order to prevent a situation in which a formwork element, which is adjacent in the use position of the formwork element and preferably has the same design and in which, however, no anchor is used, is pressed out of its position by the pressure of poured-in concrete and thereby pivots said plate or washer.

25 The object stated at the outset is finally also achieved by a formwork element of the type stated at the outset that has the means and features of the third independent claim directed to such a formwork element. In particular, what is thus proposed to achieve the object in a formwork element of the type stated at the outset is that at least one strut has at least two plug-through openings, wherein a shortest distance between a first plug-through opening of the at least two plug-through openings and the frame of the formwork element is shorter than a shortest distance between a second plug-through opening of the at least two plug-through openings and the frame. This

allows the selective use of the formwork element in a vertical or horizontal position.

It should be mentioned in this connection that it is particularly advantageous if the aforementioned formwork element, and moreover also the formwork elements which are claimed by the two first independent claims, are rectangular. As already mentioned above, the plug-through openings define, for the anchors, anchor points of the formwork element. The anchor points which are arranged close to the edge of the formwork element, that is to say at a smaller distance from the frame of the formwork element, can as a rule not be used for anchoring in the horizontal position of the preferably rectangular formwork element. It is frequently the case namely that separating plates or separating elements are cast into a foundation of a building structure on which further walls are intended to be produced with the aid of formwork elements. These separating plates or separating elements serve to close joins or gaps between the wall, which is to be newly cast on the foundation, and the foundation. However, since the separating plates or separating elements have already been introduced during production of the foundation, they interfere in principle with the setting of anchors in the case of horizontal formwork elements. However, by virtue of the second plug-through opening whose distance from the frame is greater than the distance between the first plug-through opening and the frame, in the case of the formwork element according to the invention there is at least one plug-through opening available which, with a probability bordering on certainty, remains reachable for setting an anchor or anchor bar even when the formwork element is used or arranged horizontally. This is even the case when a separating plate or separating element has been cast in the aforementioned manner in the foundation of the building structure to be produced.

It should be mentioned at this juncture that, in this embodiment of a formwork element, too, the features of the above-described formwork elements, to which in particular one of the independent claims 1 and 2 or both are directed, can be expediently applied. Thus, for example, it is particularly favorable to provide the aforementioned plug-through openings in a plurality of, or all of, the struts. This plurality of plug-through openings can be provided in different struts of a formwork element in one direction at the same height and/or at an identical distance from the frame.

It is thus possible, in particular with a corresponding arrangement of the second plug-through openings, which can be situated inwardly with respect to the frame, to ensure that, for a formwork element rotated through 90°, the anchor points defined by the plug-through openings continue to lie at the same height. This has an esthetic advantage, since then the corresponding anchor points which can be seen on the finished structural part are aligned with one another in the cast concrete.

In all of the aforementioned formwork elements, a formwork skin having a thickness of 12 mm can be used. It should be mentioned in this connection that the formwork skin can be produced, for example, from plywood. It is possible for the formwork skins for the formwork elements to be produced in various thicknesses. Thus, it is possible to provide a range of formwork elements of the type stated at the outset that differ from one another in terms of their formwork skins. It is possible here, for example, in a formwork element of the range of formwork elements, to use a formwork skin having a thickness of 12 mm, whereas another formwork element from the range of formwork elements can have a formwork skin having a thickness of, for example, 15 mm.

As has already been indicated above, it can be advantageous if two or four struts are arranged within the frame of the aforementioned formwork elements. In particular, the use of four struts, which are preferably uniformly distributed within the frame, is particularly advantageous, since the struts are then arranged in such a way that the plug-through opening arranged in the two outer struts of the total of four struts here are arranged, with respect to at least one side of the frame and/or of the formwork element, in a position which corresponds to $1/5$ and/or $4/5$ of the length of this side.

- In one embodiment of the formwork elements, there is provision that the, in particular two or four, struts are oriented parallel to one another and/or spaced uniformly apart from one another. This gives a symmetrical design of the formwork element formed in such a way, which in turn can simplify the handling and the orientation of the formwork elements in practice.

- The aforementioned struts of the formwork elements can be produced from a sectional steel which has a trapezoid profile. The struts can thus have a trapezoidal cross section.

- It is particularly advantageous if the frame of the formwork elements has a side ratio of 3 to 5. This is particularly advantageous, in particular in connection with the formwork element according to the third independent patent claim, since there thus automatically results a situation in which the plug-through openings for anchors that are used for horizontal mounting or for horizontal use of the formwork element are situated on $1/3$ of the total height of the formwork element and thus also remain accessible for anchoring in the case of separating plates which are cast into a foundation. It is particularly favorable if a formwork element with these dimensions has four struts which are arranged in a uniformly

distributed manner and has two uniformly distributed plug-through openings on a strut, since consequently - independently of the orientation of the formwork element - a uniform arrangement of the anchor bars can be achieved.

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All of the above-described formwork elements preferably take the form of manually transportable formwork elements which can be carried by two persons. There can thus be achieved an intrinsic weight of the formwork elements of 50 kg or less.

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The formwork element preferably has handles for this purpose.

In a particularly advantageous embodiment of the afore-

mentioned formwork elements, there is provision that the

formwork element has at least one additional strut. This

15 additional strut can be arranged or oriented transversely or

at right angles to at least one strut of the formwork element.

Furthermore, it is possible that the formwork element has at

least one additional strut, in particular such an additional strut which is arranged transversely or at right angles to at

20 least one strut of the formwork element, which has at least

one holding handle and/or the at least one holding opening. Of

course, it is also possible that at least one strut of the

formwork element/of the aforementioned formwork elements has

at least one holding handle and/or at least one holding

25 opening.

Preferably, holding handles and/or holding openings are formed

on two mutually opposite sides. Carrying by two persons can

thus be made possible, in particular for an intrinsic weight

30 of 50 kg or less.

It should be mentioned at this juncture that all of the

aforementioned holding handles and/or holding openings of the

formwork element can be designed for fastening a load

35 receptacle which in turn is suitable for crane transport of

the formwork element. In one embodiment of the formwork element, the aforementioned at least one load receptacle can be a constituent part of the formwork element. In this way, there is avoided an additional element and/or an additional handling step when using a formwork element configured in such a manner.

The frame of the aforementioned formwork elements can have, for example, a height of 75 mm or less. Furthermore, it should be noted that an inner construction of the frame, which consists of the struts of the formwork element and the formwork skin, can have overall a height which corresponds to the height of the frame or is less than the height of the frame.

Particularly when the height of the aforementioned inner construction corresponds to the height of the frame, the formwork skin does not project beyond the frame. It is thus possible to achieve a flush arrangement of the formwork skin on the frame of the formwork element that prevents a situation in which formwork elements constructed in such a way catch when they are stacked for transport or for storage. Thus, damage to the stacked formwork elements can be avoided. Furthermore, it can be expedient to avoid the formwork skin projecting beyond the frame since, when using a plurality of formwork elements above one another, reinforcements in the form of laths are mounted from outside and should lie both on the struts of the respective formwork element and on the frame of the formwork element.

In another embodiment, the formwork element can have a frame with a square basic shape. In another embodiment, the formwork element can have a frame with a non-square and/or rectangular basic shape. A rectangular formwork element can thus result. Particularly in the case of rectangular formwork elements, the

struts can be oriented along a short side of a rectangular basic shape of the frame of the formwork element.

In an advantageous embodiment, there can be provision that the frame is formed in a projection-free manner on the inner side. It is advantageous here that the flat steel does not have to be provided with additional structures. This can save costs in the production.

In an advantageous embodiment, there can be provision that the frame preferably has punched connection openings. The formation of punched connection openings is advantageous particularly for relatively small piece numbers with respect to the use of sectional steel, because no rolling tools have to be purchased.

It is particularly favorable if at least two different types of connection openings are formed. Fastening possibilities of different types can thus be formed.

There can be provision here that a clear width of the different connection opening transversely to the formwork skin is chosen to be corresponding. Thus, an orientation of the formwork skins with respect to one another transversely to their extent can be defined independently of which connection openings are chosen.

Alternatively or additionally, there can be provision here that at least a first type of connection openings takes the form of an oblong hole. Thus, a fixing or defined orientation of the connected formwork elements in one direction and a tolerance in a second direction is possible in a simple manner.

Alternatively or additionally, there can be provision that a second type of connection openings takes the form of a round hole. Thus, a fixing or defined orientation of the connected formwork elements in two directions is possible in a simple manner.

An oblong hole can here, for example, be characterized in that a connection means, for example a plug-through bolt, which can be placed in a play-free manner in the oblong hole in a transverse direction or narrow direction, has play in a longitudinal direction. A round hole can here, for example, be characterized in that a connection means, for example a plug-through bolt, which can be placed in a play-free manner in the oblong hole in a transverse direction, likewise has no play in a longitudinal direction.

In an advantageous embodiment, there can be provision that the struts are formed identically to one another. Thus, a part number for production of formwork elements can be reduced and tool costs can be reduced. Formation of additional plug-through openings for anchor bars is also able to be facilitated, since the struts do not necessarily have to be post-machined.

The invention allows the provision of a formwork construction kit according to the independent claim directed to such a one, which comprises at least two types of different formwork elements of the above-described type. The formwork kit can favor the production of so-called light formworks, in particular when an intrinsic weight of the formwork elements is in each case 50 kg or less. The use of this formwork construction kit has the advantage that a crane for building up and/or dismantling a formwork which is formed with the formwork construction kit is not absolutely necessary. This can save time and costs.

Here, two intersecting lines of plug-through openings of a first type of formwork elements can be matched in their positions, that is to say for example with respect to a height in relation to a setting-up surface in the respective use position, with a line of plug-through openings of a second type of formwork elements. It is advantageous here that anchor bars can be placed at a uniform height, in particular with two different orientations of the first type of formwork elements. This is particularly favorable in the processing of facing concrete, since there then results a uniform image of the (closed) holes with respect to the anchor bars.

There can also be provision that at least one type of formwork elements is formed according to the invention, in particular as described above and/or according to one of the claims directed to a formwork element, and that at least one connection clamp is present in the formwork construction kit. Thus, the formwork elements can be connected to one another in a simple manner on the unprofiled frames. Here, there can be provision that holding projections on clamp arms of the connection clamp are designed to fit with connection openings in the frame of the formwork elements. The connection clamps can thus be prevented from sliding off.

The invention further allows the use of a connection opening in a frame of a formwork element, in particular as described above and/or according to one of the claims directed to a formwork element, for selectively fastening a connection clamp and a plug-through bolt for connecting the formwork element to a further formwork element. Thus, more cost-effective plug-through bolts or connection clamps which can be more simply handled can be selectively used. The formwork elements can, for example, stem from an above-described formwork construction kit.

The invention will now be described in more detail on the basis of two exemplary embodiments, but is not limited to these exemplary embodiments. Further exemplary embodiments result through a combination of the features of individual claims or a plurality of claims with one another and/or in the combination of individual features or a plurality of features of the exemplary embodiment. In the figures, in part in highly schematic illustration:

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figure 1 shows an isometric rear view of a formwork element within whose frame four struts are arranged in a uniformly distributed manner,

15 figure 2 shows an isometric front view of a formwork skin of the formwork element illustrated in figure 1,

figure 3 shows an isometric rear view of a further formwork element within whose frame two struts are arranged in a uniformly distributed manner,

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figure 4 shows an isometric front view of a formwork skin of the formwork element illustrated in figure 3,

25 figure 5 shows an isometric rear view of a formwork arrangement which is assembled from the two formwork elements illustrated in figures 1 to 4, wherein the formwork element which has four struts within its frame is arranged in a vertical position,

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figure 6 shows an isometric rear view of a further formwork arrangement which is assembled from the two formwork elements illustrated in figures 1 to 4, wherein the formwork element which has four struts within its frame is arranged in a horizontal position,

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figure 7 shows a partly cut-away isometric rear view of one of the formwork elements illustrated in the previous figures,

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figure 8 shows a detail view in a sectional illustration of two formwork elements which are held together with a connection clamp, and

10 figure 9 shows a basic diagram analogous to figure 8, wherein the formwork elements are held together with a plug-through bolt.

In the following description of various embodiments of the invention, elements which correspond in their function are given corresponding reference numbers even where their configuration or design possibly differs from one another.

All of the figures each show formwork elements designated overall by 1. Each of the formwork elements 1 has a formwork skin 2, a frame 3 bearing the latter, and struts 4 which are arranged within the frame 3 and support the formwork skin 2.

In all of the embodiments of formwork elements 1 which are shown in the figures, the frames 3 are each produced from flat steel. The struts 4 of the formwork elements 1 shown are for their part produced from open, symmetrical sectional steel. Thus, by virtue of their profiled cross section, the struts 4 of the formwork elements 1 obtain a higher stiffness, in relation to the material used for producing the struts 4, than those struts which are used in previous formwork elements and are produced from unprofiled flat steel. This higher stiffness of the struts 4 on the one hand favors a higher overall stiffness and hence also a higher loadability of the respective formwork element 1. On the other hand, through the

use of struts 4 which are produced from steel profiles, the formwork element 1 has a particularly low overall weight in relation to its loadability and stability. This promotes the simplified handling of the formwork element 1.

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The sectional steel of the struts 4 is open to the formwork skin 2 of the respective formwork element 1. In particular, the sectional illustration according to figure 7 further shows that the sectional steel used for the struts 4 is or has a hat profile. The struts 4 thus have support surfaces 16 by which they bear flat against the formwork skin 2. The formwork skin 2 is fastened by rivets 15 to the struts 4. The sectional steel of the struts 4 additionally has, on its head side 13, two longitudinal beads 14 which are oriented parallel to one another. A fastening element which is not shown in the figures, for example an anchor, can engage behind these longitudinal beads 13 and in this way be secured to the struts 4 in a rotationally fixed manner.

Each of the formwork elements 1 shown has an even number of struts 4 within its frame 3. At least two outer struts 4a and 4b of these struts 4 are each equipped with a plurality of plug-through openings 5, 6 and 7 for anchors which are not shown in the figures.

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In the case of the formwork elements 1 shown in the figures, there is even provision that all of the struts 4 each have at least two plug-through openings 5, 6 and/or 7. Here, a shortest distance between a first plug-through opening 6 of the at least two plug-through openings 5 and the frame 3 of the respective formwork element 1 is shorter than a shortest distance between a second plug-through opening 7 of the at least two plug-through openings and the frame 3.

In the exemplary embodiment of a formwork element 1 that is shown in figures 1 and 2, a total of four struts 4 are arranged within the frame 3. In the exemplary embodiment of a formwork element 1 that is shown in figures 3 and 4, a total of two struts 4 are arranged within the frame 3.

All of the struts 4 are oriented parallel to one another and moreover spaced uniformly apart from one another within the respective frame 3. Here, the respective second plug-through opening 7 is identically spaced apart from two mutually adjoining frame legs 8 and 9 of the frame 3.

Particularly the sectional illustration of the formwork element 1 according to figure 7 illustrates that the struts 4 consist of trapezoid profiles. At least the formwork element 1 shown in figures 1 and 2 has a frame 3 which has a side ratio of 3 to 5.

Each of the formwork elements 1 further has additional struts 10. These are arranged transversely, more precisely at right angles, to the struts 4 of the respective formwork element 1. Furthermore, a holding opening 11 is formed in each of these additional struts 10. The holding openings 11, which each of the formwork elements 1 has, simplify the handling of the formwork elements 1. The holding openings 11 allow the manual transport of the formwork element 1 by two persons.

There are additionally provided stiffening elements 12 between adjacent frame legs 8 and 9 of the frame 3 of the respective formwork element 1.

In particular, the inner plug-through openings 5, 6, 7 take the form of oblong holes, which can facilitate the insertion of anchor bars or concrete anchors.

Figure 6 illustrates that the struts 4 of the square formwork element 1 arranged on the left-hand side are arranged in such a way that the plug-through openings 5, 6 formed therein are aligned with the second plug-through openings 7 in the struts 4 of the second, rectangular formwork element 1.

All of the figures which relate to a rectangular formwork element 1 illustrate that the struts 4 of these rectangular formwork elements 1 are oriented along a short side of a rectangular basic shape of the frame 3 of the respective formwork element 1.

Figures 5 and 6 also serve to illustrate a formwork construction kit which comprises at least two types of different formwork elements 1 of the above-described type. As figures 5 and 6 show, the formwork construction kit allows a variable configuration of a formwork formed from the formwork elements 1.

Figure 8 shows the connection of two formwork elements 1 by means of a connection clamp 20. For this purpose, the frame has connection openings 18, 19 punched therein in which holding projections 22 and clamp arms 21 of the connection clamp 20 engage. Here, the holding projections 22 are dimensioned and arranged on the clamp arms 21 in such a way that they engage - in a practically play-free manner at least along the clamp arms 21 - in the connection openings 18, 19 in order to orient the formwork elements 1 relative to one another.

There are two types of connection openings 18, 19 formed here.

The connection openings 18 (cf. fig. 7) of the first type are configured as oblong holes, with the result that play-free fixing occurs only transversely to the formwork skins 2, that

is to say in the transverse direction or narrow direction of the oblong hole.

The connection openings 19 (cf. fig. 7) of the second type
5 are, by contrast, configured as round holes (with cutouts for wings 24 of plug-through bolts 23, as will be explained more precisely further below). The round holes have the effect that the formwork elements 1 are also oriented along the frame 3 close to the connection openings 19, since the plug-through
10 bolts 23 or the holding projections 22 are completely fixed.

Overall, it can be seen that the frame 3, on its inner side 17, is formed without projections and from planar unprofiled flat steel.

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The punched connection openings 18, 19 here form undercuts on which the connection clamp 20 can engage in order not to slide
- off.

20 Figure 9 shows an alternative type of connection of two formwork elements 1. Here, a plug-through bolt 23, the diameter of which can be equal to the diameter of the holding projections 22, is plugged through one of the two connection openings 18, 19. Here, the wings 24 are dimensioned in such a
- 25 way that they fit both through the cutouts 25 of the round hole and through the oblong hole. After being rotated through 90°, the plug-through bolts 23 are then fixed.

In order to ensure the freedom of play transversely to the
30 formwork skin 2, a clear width of the different connection openings 18, 19 transversely to the formwork skin 2 corresponds.

By contrast, a space for placing the holding projections 22 in
35 the connection opening 18, 19 in the case of the oblong hole,

that is to say the connection opening 18, along the formwork skin 2 is larger than in the case of the round hole of the connection opening 19.

5 It can also be seen from the figures that the struts 4 are formed identically to one another within a formwork element 1.

A comparison of figures 1 to 6 reveals that, in the formwork element 1 from fig. 2, there are formed two intersecting lines of plug-through holes 5, 6, 7. Thus, the plug-through holes 7
10 form a vertical line and the plug-through holes 6 form two horizontal lines (with further plug-through holes) which each cross or intersect the vertical line.

15 The height of these lines above the edge by which the formwork element 1 is placed on a base or set-up surface is here chosen to be correspondingly equal and corresponds with a height of a corresponding line on the formwork element 1 according to figure 4. With two formwork elements placed next to one
- another, there thus results, independently of their spatial orientation, a horizontal line on which the anchor bars lie.
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The invention is concerned with improvements in the technical field of concrete formwork construction. What is proposed as
- 25 an improvement is, inter alia, the formwork element 1 whose frame 3 is produced from flat steel, whereas the struts 4 of the formwork element 1 consist of sectional steel.

/ List of reference signs

List of reference signs

	1	Formwork element
	2	Formwork skin
5	3	Frame
	4	Strut
	4a	Outer strut
	4b	Outer strut
	5	Plug-through opening
10	6	First plug-through opening
	7	Second plug-through opening
—	8	Frame leg
	9	Frame leg
	10	Additional strut
15	11	Holding opening
	12	Stiffening element
	13	Head side
—	14	Longitudinal bead
	15	Rivet
20	16	Support surface
	17	Inner side
	18	Connection opening (first type)
	19	Connection opening (second type)
	20	Connection clamp
— 25	21	Clamp arm
	22	Holding projection
	23	Plug-through bolt
	24	Wing

Claims

1. A formwork element (1) having a formwork skin (2), having a frame (3) bearing the latter, and having struts (4) which are arranged within the frame (3) and support the formwork skin (2), **characterized in that** the frame (3) is produced from unprofiled flat steel, and the struts (4) are produced from open sectional steel.
2. The formwork element (1) as claimed in claim 1, characterized in that the sectional steel is open to the formwork skin (2) and/or in that the sectional steel has a symmetrical profile, in particular a hat profile, and/or in that the sectional steel has at least one longitudinal bead (14) on its head side (13).
3. The formwork element (1) as claimed in either of the preceding claims, having a formwork skin (2), having a frame (3) bearing the latter, and having struts (4) which are arranged within the frame (3) and support the formwork skin (2), **characterized in that** an even number of struts (4) is arranged within the frame (3), of which two outer struts (4a, 4b) each have at least one plug-through opening (5) for an anchor.
4. The formwork element (1) as claimed in one of the preceding claims, having a formwork skin (2), having a frame (3) bearing the latter, and having struts (4) which are arranged within the frame (3) and support the formwork skin (2), **characterized in that** at least one strut (4) has at least two plug-through openings (5), wherein a shortest distance between a first plug-through opening (6) of the at least two plug-through openings (5) and the frame (3) is shorter than a shortest distance between a second plug-

through opening (7) of the at least two plug-through openings (5) and the frame (3).

- 5 5. The formwork element (1) as claimed in one of the preceding claims, characterized in that two or four struts (4) are arranged within the frame (3).
- 10 6. The formwork element (1) as claimed in one of the preceding claims, characterized in that the, in particular two or four, struts (4) are oriented parallel to one another and/or are spaced uniformly apart from one another.
- 15 7. The formwork element (1) as claimed in one of claims 4 to 6, characterized in that the second plug-through opening (7) is equally spaced apart from two mutually adjoining frame legs (8, 9) of the frame (10).
- 20 8. The formwork element (1) as claimed in one of the preceding claims, characterized in that the struts (4) are produced from a sectional steel having a trapezoid profile and/or have a trapezoidal cross section.
- 25 9. The formwork element (1) as claimed in one of the preceding claims, characterized in that the frame (3) has a side ratio of 3 to 5.
- 30 10. The formwork element (1) as claimed in one of the preceding claims, characterized in that the frame (3) is formed in a projection-free manner on the inner side.
- 35 11. The formwork element (1) as claimed in one of the preceding claims, characterized in that the frame (3) preferably has punched connection openings (18, 19), in particular at least two different types of connection openings (18, 19), in particular wherein a clear width of the different

connection opening (18, 19) transversely to the formwork skin (2) is chosen to be corresponding and/or wherein at least a first type of connection openings (18) takes the form of an oblong hole and/or a second type of connection openings (19) takes the form of a round hole.

12. The formwork element (1) as claimed in one of the preceding claims, characterized in that the struts (4) are formed identically to one another.

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13. A formwork construction kit comprising at least two different types of formwork elements (1) as claimed in one of the preceding claims, in particular wherein two intersecting lines (23, 24) of plug-through openings (5, 6, 7) of a first type of formwork elements (1) are matched in their positions to a line (25) of plug-through openings (5, 6, 7) of a second type of formwork elements (1), and/or wherein at least one type of formwork elements (1) as claimed in one of the preceding claims is present with at least one connection clamp (20), in particular wherein holding projections (22) on clamp arms (21) of the connection clamp (20) are designed to fit with connection openings (18, 19) in the frame (3) of the formwork elements (1).

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14. The use of a connection opening (18, 19) in a frame (3) of a formwork element (1), in particular as claimed in one of claims 1 to 12, and/or of a formwork construction kit as claimed in the preceding claim, for selectively fastening a connection clamp (20) and a plug-through bolt (23) for connecting the formwork element (1) to a further formwork element.

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