

The invention relates to a permanent shuttering for concrete structures, of the type explained in the preamble of Claim 1.

DE-B-1 259 546 discloses a shuttering of this
5 type. The known shuttering comprises a shuttering wall consisting of two strips of an expanded metal, between which strips there is arranged a receiving device for a flexible water bar in order to produce a joint which is sealed with respect to water. The flexible water bar can
10 be either clamped, by means of a widened edge, in a correspondingly bent region of the shuttering wall or, if a fixed connection is desired, fastened on the shuttering wall with the aid of screws and rivets and using counter-pieces. A fastening of this type is, however, extremely
15 complex.

For certain purposes, for example for water works and sewage treatment works or the like, certain wall openings for pipes or cables have to be watertight. DE-A-29 13 968 discloses a pipe bushing for this purpose.
20 This pipe bushing is designed as a compact structural part and contains a pipe casing which extends through the wall opening and is embedded in the wall by a collar which is used for sealing and anchoring purposes. This pipe casing can, however, no longer be filled with
25 concrete. Rather, two conduit-pipe sections, for connection to the corresponding conduits to be guided through the wall opening, are retained in the interior of the pipe casing with the aid of a sleeve enclosing the two conduit pipes. The sleeve has to be sealed with
30 respect to the pipe casing. It is evident that this embodiment too is complicated to produce.

Furthermore, watertight wall openings for pipes or cables can be produced by first of all lining an opening, which exceeds the size of the cables or pipes,
35 with conventional shuttering. The shuttering wall is erected by shuttering material at hand, for the most part by shuttering boards. In order to ensure the necessary strength, the shuttering walls have to be stiffened transversely via the opening, and this is disruptive when

the pipes and cables are passed through. If the pipes or cables are laid in, then the interspace between these and the previous wall are filled with concrete, once the shuttering has been removed, good contact between the two
5 batches of concrete being ensured in order that shrinkage in the concrete does not produce any cracks through which water can seep.

The object of the invention is thus to provide a permanent shuttering which is simple to produce and by
10 means of which water can be prevented from seeping through shrinkage cracks or joints.

The object is achieved by the characterizing features of Claim 1.

As a result of the material, used according to
15 the invention, for the shuttering wall, i.e. the reinforcement of the metal sheet by transversely running or longitudinally running bars which are fitted on both sides, the shuttering wall is stable enough in order to be able to weld on, in a simple manner, a water barrier
20 consisting of a strip of sheet metal material. The complicated fastening pieces are thus dispensed with, although the water barrier can nevertheless be retained in a dimensionally stable manner and in the predetermined position with respect to the shuttering wall. As a result
25 of the transverse and longitudinal bars, the shuttering wall is, furthermore, able to withstand substantially higher concrete compressions than could a simple open-worked or textured metal sheet.

Claim 2 describes a particularly preferred
30 embodiment of the metal sheet.

Claims 3 to 6 describe a particularly preferred exemplary embodiment of the shuttering, according to the invention, for producing wall openings or the like.

The shuttering described in Claims 7 and 8 is
35 particularly suitable for shuttering wall terminations.

The shuttering is stiffened even further by the lattice beam described in Claims 9 and 10.

Exemplary embodiments of the shuttering according to the invention are illustrated in more detail

hereinbelow with reference to the drawings, in which:

Figure 1 shows a perspective representation of a first exemplary embodiment of a shuttering,

Figure 2 shows the section II-II from Figure 1,

5 Figure 3 shows a further exemplary embodiment of a shuttering according to the invention,

Figure 4 shows the shuttering from Figure 3 with a known stiffening, and

Figure 5 shows a plan view of Figure 4.

10 Figure 1 shows a shuttering 1 for lining an opening, in a concrete wall, with shuttering. The shuttering 1 has a shuttering wall 2 in the form of two strips 2a, 2b of a shuttering material, between which a water barrier 3 is arranged. The strips 2a, 2b consist of
15 a strip 4 of expanded sheet metal which has been welded in between transverse bars 5 and longitudinal bars 6 arranged in the form of a lattice. The transverse and longitudinal bars 5, 6 consist of structural steel. The strips 2a, 2b are connected in each case to form a closed
20 ring which is of square cross-section and the internal width of which corresponds approximately to the size of the opening before the cables or pipes have been introduced.

The water barrier 3 consists of a frame-shaped
25 cut-to-size metal sheet with an internal through-passage 3a, the latter being smaller than the internal width of the ring formed by the strips 2a, 2b, and the external width of the cut-to-size metal sheet exceeding the external width of the ring. The through-passage 2a [sic]
30 is, however, larger than the through-passage which is necessary for the cables or pipes.

In order to produce the shuttering 1, the strips 2a, 2b are first of all bent to the desired ring-shape and are then aligned with one another and are welded
35 (weld seams 7), by one of their end sides, flush on opposite, sheet-like sides of the water barrier 3 in each case. In this manner, the water barrier 3 is fixed in a perpendicular direction with respect to the shuttering wall 2 and projects both on the interior and on the

exterior of the shuttering wall 2. By the type of welding selected, it is ensured that the sealing effected by the water barrier, passing through, is maintained even if corrosion should occur on the weld seams.

5 On producing an opening, the shuttering 1 is used as permanent shuttering and introduced first of all in order to provide the initial size of the opening, the regions of the water barrier 3 extending on the exterior of the shuttering 1 first of all being concreted in.
10 After the pipes or cables have been passed through, the interspace between these and the interior of the shuttering wall 2 is filled with concrete, with the result that the shuttering wall 2 is located in the transition region between the initially introduced and
15 the subsequently introduced concrete. The expanded metal used and the bars arranged on both sides of the expanded metal achieve a good connection between the two batches of concrete, the region which is at particular risk from shrinkage cracks being additionally covered by the water
20 barrier 3. For the purpose of further stiffening the shuttering 1, stiffening beams (see Figures 4 and 5) in the form of a lattice (not shown) may be welded, or otherwise fastened, on the interior or exterior of the shuttering wall 2.

25 Figure 3 shows a further shuttering 11 which is particularly suitable for the watertight shuttering of wall connections [sic] or the like. It is, however, also possible to use the shuttering 11 as a basic element, which is assembled to form various shapes in order to
30 provide shuttering for various openings. The shuttering 11, in turn, comprises a shuttering wall 12 in the form of two planar strips 12a, 12b which are aligned with each other and are welded, by their longitudinal edges, flush on two opposite surfaces of a water barrier 13 in each
35 case. The material already described with reference to Figure 1 is used for the shuttering strips 12a, 12b. The water barrier 13 is a sheet metal strip which runs at right angles to the shuttering wall 12 and projects beyond the shuttering wall 12 on both sides.

In order to provide shuttering for watertight wall connections [sic], the wall portion, to be erected initially, is first of all concreted on on one of the sides of the shuttering wall 12, the water barrier 13 projecting on this side being concreted in. Thereafter, the second wall portion is concreted on on the opposite side of the shuttering wall 12, with the result that the shuttering wall 12 is again located in the transition region between the two wall portions and the water barrier extends transversely via the region which is at risk from shrinkage cracks.

The shuttering 11 can, as shown in Figures 4 and 5, be stiffened, if required, by lattice beams 18 or the like known per se, the lattice beams 18 [lacuna] by three longitudinal bars 18a of structural steel, each forming the vertices of a triangle, which are held in position by at least two structural steel bars 18b bent in wave form. The size of the lattice beams 18 is, in addition to the desired stiffening action, also defined by the distance between the longitudinal bars 16 of the wall portions 12a and 12b, with the result that the two longitudinal bars 18a which are not connected to each other by a bar 18b bent in wave form can be welded in each case on a longitudinal bar 16.

In development of the exemplary embodiments which have been described and shown in the drawings, the shuttering according to the invention may also be used for other purposes where watertight conditions are necessary. The water barrier, in particular in Figure 1, does not categorically have to be designed in one piece, but can be made up of individual parts, which are expediently welded to one another. In place of the expanded metal sheet, other open-work or textured metal sheets, for example perforated metal sheets or goffered metal sheets, may be used. For certain purposes, the shuttering wall may only have one ring or one strip, on the end side of which the water barrier is fastened in each case. If necessary, the water barrier can also be fastened on the shuttering wall such that it projects

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only from one side of the shuttering wall.



Claims

1. Permanent shuttering for concrete structures, comprising a shuttering wall (2, 12) consisting of an open-work or textured metal sheet (4), and comprising a
5 sheet-like water barrier (3, 13) fixedly connected to the shuttering wall (2, 12), characterized in that the metal sheet (4) of the shuttering wall (2, 12) is arranged between transverse and longitudinal bars (5, 6) of a metal supporting lattice and in that the water barrier
10 (3, 13) consists of a strip of sheet metal material.
2. Shuttering according to Claim 1, characterized in that the metal sheet (4) consists of expanded metal.
3. Shuttering according to Claim 1 or 2, characterized in that, in order to form openings, which
15 are partly to be reclosed, for pipes or cables in a concrete wall, the shuttering wall (2a, 2b) is in the form of a ring, on whose end side the water barrier (3) is fastened substantially at right angles to the shuttering wall (2) in such a manner that it projects beyond the
20 shuttering wall (2) on at least one side.
4. Shuttering according to Claim 3, characterized in that the water barrier (3) is arranged between two strips (2a, 2b) of shuttering material which are in the form of a ring.
- 25 5. Shuttering according to one of Claims 2 to 4, characterized in that the water barrier (3) projects beyond the shuttering wall (2) on both sides.
6. Shuttering according to one of Claims 2 to 5, characterized by its arrangement in the transition region
30 between an opening and concrete subsequently introduced for closing the opening.
7. Shuttering according to Claim 1 or 2, characterized in that, for use as a shuttering (12) for terminating a wall, the sheet-like water barrier (13) is
35 arranged substantially at right angles to a shuttering wall (12) having at least one sheet-like strip (12a, 12b) of shuttering material.
8. Shuttering according to Claim 7, characterized in that the sheet-like water barrier (3) is fastened between



two strips (12a, 12b) of shuttering material, which are in alignment with one another, in such a manner that it projects on both sides of the strips (12a, 12b).

9. Shuttering according to Claim 7 or 8,
5 characterized in that a lattice beam (18) is fastened to the shuttering wall (12) as stiffening.

10. Shuttering according to Claim 9, characterized in that the lattice beam (18) is formed by three longitudinal bars (18a) of structural steel, each forming
10 the vertices of a triangle, and by at least two structural steel bars (18b) bent in wave form, two longitudinal bars (18a) of the lattice beam (18) which are not connected by the structural steel bars (18b) bent in wave form being in each case welded to a longitudinal
15 bar (16) of the shuttering wall (12).