

PCT as filed

"Method of making a filter floor for treating water"

5 The present invention relates to a method of producing filter floors for treating water and more specifically draining filter floors with suction strainers or nozzles, supporting the filtration material.

10 It is known that certain filtration operations in the domain of water treatment are performed through filters, particularly filters with a granular filtration material, whose structure, generally made of reinforced concrete, mainly comprises a liner comprising a raft which rests on peripheral walls, and a perforated floor supporting the filtration material.

15 The functions of such floors are well known to the specialist. These are, in addition to supporting the filtration material, to allow the liquid, particularly the water filtered by the said material during the filtration phase, to pass through and to flow, and to allow for the passage and distribution of fluids during the washing phase.

20 In general, these filter floors comprise a structure made up of girders or columns, which supports a monolithic slab or a collection of prefabricated slabs.

25 As far as producing the floor support structure is concerned, there are various possible solutions, specifically:

- 30 - casting concrete girders or columns in the filter liners;
- laying prefabricated girders or columns in the filter liners.

There are also various techniques for producing the upper part of the floor.

35 Thus, FR-A-2,596,385 reveals a method which consists in assembling prefabricated small-sized slabs or sheet which are installed, connected and fixed to the girders or columns of the support structure by an appropriate anchoring system.

EP-A-0,324,673 describes a method which consists in casting a reinforced concrete slab on lost formwork previously installed on the girders or columns that constitute the filter floor support structure.

5 There are also techniques involving casting the concrete of the entire support structure/monolithic slab in a single phase, but this technique entails the use of several types of lost formwork for producing the girders or columns and the slab, respectively.

10 These known techniques exhibit a certain number of drawbacks. Specifically, they entail:

- either the assembling of numerous prefabricated elements (slabs, rods, bolts, seals, etc) which is tricky, lengthy and expensive to implement;
- 15 - or the use of girders, then pre-slabs or lost formwork placed on the girders and finally the casting of a concrete slab, the overall implementation of which proves tricky and expensive;
- or the assembly of several types of lost formwork to
- 20 produce the support structure/slab assembly, this technique also being characterized by being tricky and expensive to implement.

To alleviate the drawbacks of the previous techniques mentioned above, the present invention
25 proposes to provide a method of producing a concrete filter floor which makes it possible to reduce the implementation times and therefore the cost prices.

In consequence, the subject of this invention is a method of producing a filter floor for treating
30 water, comprising a structure made of girders or columns supporting a slab which has a number of orifices intended to take suction strainers, characterized in that the concrete of the said structure and of the slab is cast directly into the
35 filter liner, the said structure and the lower part of the slab being shaped by one single design of lost formwork.

The method according to the invention comprises the following successive steps:

- producing the filter liner,
- installing the reinforcement for the girders or columns of the filter support structure;
- positioning lost formwork and securing it;
- 5 - mounting rings, protected by caps, on the lost formwork at the locations intended for the suction strainers;
- producing the reinforcement of the upper part of the slab;
- 10 - casting the concrete of the support structure and of the slab,
- removing the caps that protect the rings and mounting suction strainers (11) on the said rings.

According to the invention, the support structure and the slab may be cast in a single stage or in
15 two stages.

The invention is also aimed at lost formwork for implementing the method as defined hereinabove and as a filter for treating water, comprising a concrete
20 floor laid in accordance with this method and employing lost formwork as specified hereinabove.

Other features and advantages of the present invention will emerge from the description given hereafter with reference to the appended drawings which
25 illustrate some entirely non-limiting embodiments thereof.

In these drawings:

- Figure 1 diagrammatically illustrates the implementation of the method that is the subject of the present
30 invention according to a first embodiment;
- Figure 2 is a diagrammatic view similar to Figure 1, illustrating a second embodiment;
- Figure 3 is a partial plan view of one embodiment of lost formwork used in the method that is the subject of
35 the invention,
- Figures 4 and 5 are respectively sections on IV-IV and V-V of Figure 3, and

- Figures 6 and 7 illustrate an alternative form of the invention in a partial view in vertical section and in a view on F of Figure 6, respectively.

Referring first of all to Figure 1 which refers
5 to the production of a filter floor in which fluids are collected and/or distributed through a duct 2 lying under the floor of the filter. In this Figure 1, the reference 1 has been used to denote the filter lining which consists, in the known way, of a raft resting on
10 peripheral side walls. The duct 2 for distributing and/or collecting water is covered with slabs such as 3 which support the formwork 4 according to the invention and allow for the passage of water. A blower manifold 5 is also provided to distribute the air necessary for
15 the method under the filter floor.

According to the present invention, once the filter liner 1 has been made, the reinforcement 6 intended to mechanically secure the floor to the liner is installed. The lost formwork 4 is then set in place
20 and fixed to the liner.

Figures 3 and 4 depict one embodiment of a single type of formwork used in the method that is the subject of the invention. This formwork, made of plastic, steel or composite material (resin plus glass
25 fibre, concrete, glass fibre) has a thickness which varies depending on the material, depending on how it was made, depending on its width and depending on its height. As a preference, this thickness is between 1 and 15 mm, for example between 3 and 7 mm. Its height
30 is chosen in accordance with the desired rate of travel of the fluid under the filter floor (choosing a suitable rate makes it possible to obtain good, even distribution across all the suction strainers of one and the same floor) and on the desired accessibility.
35 This height is between 100 and 700 mm, preferably between 120 and 250 mm. The width of the formwork such as 4 is determined as a function of the mechanical properties of the material used to make this formwork, of its cost and of its method of manufacture. According

to the invention, this width is between 300 and 1300 mm, preferably between 450 and 700 mm. The length of the formwork may for example be between 2 and 7 metres.

5 Reference is made to Figures 6 and 7 of the appended drawings which illustrate an alternative form of the formwork according to the invention. In this alternative form, air is distributed under the filter floor through orifices such as 13 and water is distributed and/or collected through orifices such as 14. The orifices 13 and 14 are produced at the time of manufacture of the formwork as can be seen in these figures. An orifice of large cross section, and of suitable geometry is made when setting up the formwork for the wall of the filter, this orifice allowing the duct 2 to be connected to the formwork 4. A seal 18 is then made using an appropriate material. In other respects, the implementation of the method of the invention for producing the filter floor using the lost formwork such as 4 is identical to that which was described above with reference to Figure 1.

 The shape of the formwork 4 is chosen in such a way as to obtain a maximum rigidity of this formwork in the horizontal and vertical planes. In the embodiment illustrated in the drawings, the formwork 4 therefore comprises ribs such as 15 and 15'. Their shape is specially designed to reduce as far as possible any pressure drops created by the walls of the formwork. To this end, preference is given, according to the invention, to geometries with steep curvature, particularly on the side walls of the formwork.

 In other respects, the shape of the formwork 4 is defined in such a way that the pressures exerted on its side walls by the concrete while it is being cast create a reverse-deflection at the upper part of the formwork to partially compensate for the deflection due to the weight of the concrete. This particular geometry makes it possible to optimize the thickness of the formwork...

The lost formwork such as 4 is fixed together by any appropriate means, the formwork 4 for this purpose being provided with fixing holes such as 17 allowing it to be secured to the filter raft. The seal
5 between the formwork 4 and the raft, or the walls of the filter, is made by an appropriate seal. Each piece of formwork 4 also has, at its upper part, orifices intended to take rings to which the suction strainers or nozzles of the filter floor will be fixed.

10 Once the lost formwork such as 4 has been fixed to the filter raft, the rings such as 7, fitted with protective caps, are fitted into the orifices 16 provided for this purpose on the upper wall of the lost formwork 4.

15 The reinforcement 8, intended to provide structural integrity to the slab 9 which will then be cast in the formwork 4, is then installed, and the girders 10 of the support structure, together with the slab 9 of the filter floor, are then produced by
20 casting the concrete in one or two stages.

As soon as the concrete is dry, the caps protecting the rings 7 are removed and the suction strainers 11 are mounted on the rings 7. The filter floor is then finished.

25 The embodiment illustrated in Figure 2 differs from the embodiment of Figure 1 only in the fact that the air is distributed and the water is collected and/or distributed by a duct 12 external to the filter liner 1. In this alternative form, air is distributed
30 under the filter floor by orifices such as 13, and water is distributed and/or collected through orifices such as 14. In other respects the implementation of the method of the invention for producing the filter floor using lost formwork such as 4 is identical to that
35 which is described above with reference to Figure 1.

It remains clearly understood that the present invention is not restricted to the embodiments described and/or depicted but that it encompasses all

alternative forms thereof which fall within the scope of the appended claims.



CLAIMS

1. Method of producing a filter floor for treating water, comprising a structure (10) made of girders or columns supporting a slab (9) which has a number of orifices intended to take suction strainers (11), characterized in that the concrete of the said structure and of the slab is cast directly in the filter liner, the said structure and the lower part of the slab being shaped by one single design of lost formwork (4).
2. Method according to Claim 1, characterized in that the support structure (10) and the slab (9) are cast in a single stage.
3. Method according to Claim 1, characterized in that the support structure (10) and the slab (9) are cast in two stages.
4. Method according to any one of the preceding claims, characterized in that it comprises the following successive stages:
- producing the filter liner (1),
 - installing the reinforcement (6) for the girders or columns of the filter support structure;
 - positioning lost formwork (4) and securing it;
 - mounting rings (7), protected by caps, on the lost formwork at the locations intended for the suction strainers;
 - producing the reinforcement (8) of the upper part of the slab (9);
 - casting the concrete of the support structure (10) and of the slab (9),
 - removing the caps that protect the rings and mounting suction strainers (11) on the said rings.
5. Lost formwork for implementing a method according to any one of the preceding claims, characterized in that it is made of a material chosen from the group comprising plastics, steel and composite materials.

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6. Formwork according to Claim 5, characterized in that the thickness of the said lost formwork (4) is between 1 and 15 mm, preferably between 3 and 7 mm.
7. Formwork according to either one of Claims 5 and 6, characterized in that its height is between 100 and 700 mm, preferably between 120 and 250 mm.
8. Formwork according to any one of Claims 5 to 7, characterized in that its width is between 300 and 1300 mm, preferably between 450 and 700 mm.
9. Formwork according to any one of Claims 5 to 8, characterized in that its length is between 2 and 7 m.
10. Formwork according to any one of Claims 5 to 9, characterized in that its geometry is defined in such a way that the pressures exerted on its side walls when the concrete is being cast create a reverse-deflection at the upper part of the said formwork which compensates, at least in part, for the deflection caused by the weight of the concrete.
11. Formwork according to any one of Claims 5 to 10, characterized in that the shape of its walls is defined in such a way as to minimize the pressure drops of the fluid flowing through the filter.
12. Formwork according to Claim 11, characterized in that its walls are covered with ribs (15, 15') which provide its horizontal and vertical surfaces with rigidity.
13. Formwork according to any one of Claims 5 to 12, characterized in that its side walls have a steep curvature.
14. Formwork according to any one of Claims 5 to 13, characterized in that it comprises, at the side, orifices (13) and (14) and, at the top, a number of orifices (16) intended to take the rings (7) to which the filter suction strainers will be fixed and, at the bottom, fixing holes (17) for securing it to the filter raft.
15. Filter for treating water, characterized in that it comprises a floor made in accordance with the





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method specified in any one of Claims 1 to 4, employing
lost formwork according to any one of Claims 5 to 14.

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