CLAIMS

1. A support and drainage material comprising a foldable element comprising:
at least one first section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls; and,
at least one second section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls; wherein the first section is connected to the second section by a flexible hinge;
wherein, the at least one first section further comprises at least one first section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side, and/or the at least one second section further comprises at least one second section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side;
wherein, when the foldable element is folded, a portion of the first section fits in the at least one aperture of the at least one second section, and/or a portion of the second section fits in the at least one aperture of the at least one first section, providing parallel flow channels.

2. A support and drainage material comprising a foldable element comprising:
at least one first section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and at least one first section aperture extending a length of at least 75% a distance between the first end and the second end,

and extending a length of 2% to 100% a distance between the first side and the second side;

and,

at least one second section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls;

wherein the first section is connected to the second section by a flexible hinge; and,

wherein, when the foldable element is folded, a portion of the second section fits in the at least one aperture of the at least one first section, providing parallel flow channels.

3. The support and drainage material of claim 1, further comprising an additional first section and an additional second section, wherein the additional first section is connected to the second section by a second foldable hinge, and the additional second section is connected to the additional first section by a third foldable hinge;

wherein, when the foldable element is folded, a portion of the additional first section fits in the at least one aperture of the at least one additional second section, and a portion of the additional second section fits in the at least one aperture of the at least one additional first section, providing parallel flow channels.

4. The support and drainage material of claim 2, further comprising an additional first section and an additional second section, wherein the additional first section is connected to the second section by a second foldable hinge, and the additional second section is connected to the additional first section by a third foldable hinge;

wherein, when the foldable element is folded, a portion of the additional second section fits in the at least one aperture of the at least one additional first section, providing parallel flow channels.

5. The support and drainage material of claim 1 or 3, wherein the at least one first section has at least two first section apertures, each extending a length of 2% to 50% a distance between the first side and the second side; and/or

the at least one second section has at least two single second section apertures, each extending a length of 2% to 50% a distance between the first side and the second side.

6. A support and drainage material system comprising

a first support and drainage material and a second separate support and drainage material;

(a) the first support and drainage material comprising:

at least one first section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls; and,

at least one second section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls;

wherein the first section is connected to the second section by a flexible hinge;

wherein, the at least one first section further comprises at least one first section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side, and/or the at least one second section further comprises at least one second section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side;

wherein, when the foldable element is folded, a portion of the first section fits in the at least one aperture of the at least one second section, and/or a portion of the second section fits in the at least one aperture of the at least one first section, providing parallel flow channels;

(b) the second support and drainage material comprising:

at least one first section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow

channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls; and,

at least one second section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls;

wherein the first section is connected to the second section by a flexible hinge;

wherein, the at least one first section further comprises at least one first section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side, and/or the at least one second section further comprises at least one second section aperture extending a length of at least 75% a distance between the first end and the second end, and a extending a length of 2% to 100% a distance between the first side and the second side;

wherein, when the foldable element is folded, a portion of the first section fits in the at least one aperture of the at least one second section, and/or a portion of the second section fits in the at least one aperture of the at least one first section, providing parallel flow channels

wherein the first support and drainage material and the second support and drainage material are suitable for arrangement on opposing sides of a pleated filter having pleat roots and pleat tips.

7. A support and drainage material system comprising

a first support and drainage material and a second separate support and drainage material;

(a) the first support and drainage material comprising:

at least one first section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and at least one first section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side;

and,

at least one second section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls; wherein the first section is connected to the second section by a flexible hinge; and,

wherein, when the foldable element is folded, a portion of the second section fits in the at least one aperture of the at least one first section, providing parallel flow channels;

(b) the second support and drainage material comprising:

at least one first section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and at least one first section aperture extending a length of at least 75% a distance between the first end and the second end, and extending a length of 2% to 100% a distance between the first side and the second side;

and,

at least one second section having a first end and a second end, a first side and a second side, a first major surface and a second major surface, and a plurality of parallel flow channels extending from the first end to the second end, the flow channels comprising side walls arranged in parallel and projecting upwardly from, and perpendicular to, the first major surface, the side walls having top walls; wherein the first section is connected to the second section by a flexible hinge; and,

wherein, when the foldable element is folded, a portion of the second section fits in the at least one aperture of the at least one first section, providing parallel flow channels;

wherein the first support and drainage material and the second support and drainage material are suitable for arrangement on opposing sides of a pleated filter having pleat roots and pleat tips.

8. A filter arrangement comprising:

a pleated porous filter having a plurality of pleats and having an upstream surface and a downstream surface; and

the support and drainage material of any one of claims 1-5, arranged to contact the upstream surface of the pleated porous filter, or to contact the downstream surface of the pleated porous filter.

9. A filter system comprising:

a pleated porous filter having a plurality of pleats and having an upstream surface and a downstream surface; and

the support and drainage material system of claim 6, wherein the pleated porous filter is arranged between the first support and drainage material and the second support and drainage material.

10. A filter system comprising:

a pleated porous filter having a plurality of pleats and having an upstream surface and a downstream surface; and

the support and drainage material system of claim 7, wherein the pleated porous filter is arranged between the first support and drainage material and the second support and drainage material.

11. The filter system of claim 9 or 10, wherein the pleated porous filter comprises a laid-over-pleat filter.

12. The filter system of claim 10 or 11, further comprising an inner core and an outer cage.

13. The filter system of any one of claims 9-12, wherein the apertures are relatively uniformly spaced between the pleat roots and the pleat tips.

14. A method of filtering fluid, the method comprising passing a fluid through the filter system of any one of claims 9-13, including passing fluid through the first support and drainage

material, the upstream surface of the pleated porous filter, the downstream surface of the pleated porous filter, and the second support and drainage material.