

Improved Drainage Sheet

Field of the Invention

This invention relates an improved drainage sheet/cell.

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Background of the invention

The control and flow of surface water, such as rain water or storm water, is important in preventing the build-up of surface water adjacent to the foundations of buildings or other structures, and in other areas such as playing fields, golf courses, landscaped decks, gardens and the like. Roof gardens are becoming increasingly popular both to "green" buildings and make them more environmentally friendly, and also to provide recreational spaces. The use of drainage cells in roof gardens is critical in allowing excess water to escape quickly from the roof garden to drainage outlets. This reduces the potential for leakage of water through roofs, and also helps prevent load issues due to the weight of water, growth media and the like on top of a building's roof.

A typical drainage cell (often known as a dimpled drainage sheet) is formed from an extruded sheet of plastic in which is formed an array of protruding frusto-conical dimples. A layer of geotextile may be adhered to the base of the frusto conical sections of the drainage cell in one application. The cells are placed with the base of the frusto-conical sections and the geo-textiles facing upwards. The opposite face, or base, of the cell typically lies on a sheet of waterproof membrane or like when used in a roof garden application.

Drainage cells are also used in other applications including in "under screed" applications as an intermediate layer below tiles or the like particularly on apartment balconies and the like. In this application a layer of drainage cells is placed on the balcony, coated with cement and tiles are laid on the cement. The drainage cell provides drainage channels under the tile layer to prevent the build-up of water. The cell is typically laid on top of a waterproof membrane.

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The use of drainage cells for this application has the problem that being generally quite flexible and being made of plastic, there is a tendency for flexing of the cells causing the tiles to separate from the underlying drainage module.

The present invention aims to provide an improved drainage cell which
5 addresses some of the problems of prior art drainage cells discussed above.

Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the
10 field relevant to the present invention as it existed before the priority date of each claim of this application.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of
15 any other element, integer or step, or group of elements, integers or steps.

Summary of the Invention

According to the present invention there is provided a drainage cell comprising a sheet of material defining an upper surface and an array of dimples or depressions
20 which support the upper surface of the drainage cell with drainage channels being defined between the dimples, wherein at least some of the dimples define receiving formations having a restricted aperture and splayed walls the arrangement being such that a solidifying material such as cement or grout may be located in the receiving formation which when solid forms a plug a portion of which is wider than the aperture
25 and which resists removal from the receiving formation.

Typically, the sides of the receiving formations are angled at 20 to 30° to the vertical when the cell is horizontally oriented.

Preferably, the receiving formations have a generally square base and are frusto-pyramidal.

30 Typically, the walls of the receiving formations define slots.

Typically the edges of the cell define flanges which define male or female engaging formations for use in interlocking a plurality of cells together.

In use, a plurality of modules can be assembled together by connecting the male and female connections of the flanges and placed in position on a balcony or other surface to be tiled. A solidifying material such as tiling cement is then laid over the drainage modules in particular inside the receiving formations and tiles laid on top of the cement. Cement in the receiving formations will solidify and form a plug and will resist separation from the module reducing the likelihood of the tile lifting.

Less cement can be used as the cement in the main need only be placed on the top of the sheet and in the receiving formations and it is not necessary to also fill in the dimples.

The invention also provides flooring comprising a plurality of drainage cells as according to the first aspect of the invention, arranged on a sub-surface a layer of cement covering at least parts of the drainage cells and defining solid plugs in at least some of the receiving formations of the drainage cells and an array of tiles or the like on top of the cement layer.

Brief Description of the Drawings

A specific embodiment of the present invention will now be described, by way of example only, and in which:-

Figure 1 is an isometric view of a drainage module from above;

Figure 2 is a top view of the drainage module of Figure 1;

Figure 3 is a side view of the drainage module of Figure 1;

Figure 4 is an enlarged isometric view of the drainage module;

Detailed Description of a Preferred Embodiment

Referring to the drawings, Figure 1 shows a drainage cell in the form of a generally square sheet of plastics material which is shaped to define an array of depressions or dimples. The sheet is typically approximately 500mm by 500mm in area. The dimples are generally square in plan and have inwardly sloping sides so that their base is smaller than their top.

Holes 18 are defined in the sides of the dimples. An array of drainage holes 20 are also defined in the sheet 12. As is best seen in Figure 2, when the module rests on ground, not shown, the dimples support the sheet and water can flow underneath the sheet in channels 22 between the dimples.

5 Flanges 24 are defined at the edges of the sheet. Two adjacent flanges 24a define female connections in the form of apertures 26 and the opposite flanges define male connections in the form of depending pegs 28 which snap fit into the apertures of an adjacent module to enable a plurality of modules to be interlocked together to form a larger drainage structure.

10 As is best seen in Figure 4, receiving formations in the form of part (frusto-) pyramidal structures 30 are defined in a number of the dimples. The base of each frustum/structure 30 is open and the walls 32 extend upwards and are angled towards each other so that the open top defines a restricted aperture which is smaller than the base. The walls are splayed/angled outwardly from top to bottom at about 20° to 30°,
15 typically about 25° to the vertical. Two opposed side walls also define a vertical slot 34 in the side walls, which assists in the flow of cement into the receiving formations.

In use, a plurality of cells can be assembled together by connecting the male and female connections of the flanges and placed in position on a balcony or other surface to be tiled. A solidifying material such as tiling cement is then laid over the drainage
20 modules in particular inside the structures 30 and tiles laid on top of the cement. Cement in the structures 30 will solidify and form a plug and will resist separation from the module reducing the likelihood of the tile lifting. Further less cement can be used as the cement in the main need only be placed on the top of the sheet 12 and in the structures and it is not necessary to fill in the dimples 14.

25 While the module may be made by different processes, it will typically be injection moulded from recycled plastics.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the above-described embodiments, without departing from the broad general scope of the present disclosure. The present
30 embodiments are, therefore, to be considered in all respects as illustrative and not restrictive.

CLAIMS

1. A drainage cell comprising a sheet of material defining an upper surface and an array of dimples which define side walls and bases and which support the upper surface
5 of the drainage cell wherein drainage channels are defined between the dimples, and wherein at least some of the dimples define receiving formations which comprise walls which extend up from the base of the dimples, the walls of the receiving formations being spaced from the side walls of the dimples and wherein the base of the receiving formation is open and the walls extend away from the base and are angled towards each
10 other so that the open top defines an aperture which is smaller than the base, the arrangement being such that when a solidifying material such as cement or grout is located in the receiving formation and solidifies a plug portion is formed which is wider than the aperture and which resists removal from the receiving formation.
- 15 2. A drainage cell as claimed in claim 1 wherein the sides of the receiving formations are angled at 20 to 30° to the vertical when the cell is horizontally oriented.
3. A drainage cell as claimed in claim 1 or claim 2 wherein the receiving formations have a generally square base and are frusto-pyramidal.
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4. A drainage cell as claimed in any one of claims 1 to 3 wherein the walls of the receiving formations define slots.
5. Flooring comprising a plurality of drainage cells as claimed in any preceding
25 claim arranged on a sub-surface a layer of cement covering at least parts of the drainage cells and defining solid plugs in at least some of the receiving formations of the drainage cells and an array of tiles or the like on top of the cement layer.

ABSTRACT

Improved Drainage Sheet

A drainage cell (10) comprises a sheet of material (12) defining an upper surface and an array of dimples or depressions (14) which support the upper surface of the drainage cell. Drainage channels (22) are defined between the dimples. At least some of the dimples (14) also define receiving formations (30) having a restricted aperture and splayed walls (32). In use, a plurality of cells are assembled together by connecting the male and female connections of the flanges and placed in position on a balcony or other surface to be tiled. A solidifying material such as tiling cement is then laid over the drainage modules and flows into the receiving formations (30). Tiles are laid on top of the cement. When solid the cement in the receiving formations forms a plug a portion of which is wider than the aperture and resists removal from the receiving formation, inhibiting lifting of the tiles.

[Fig. 4]