use has become untenable, since they put the sport out of reach for certain groups of players and nations with scarce water.

[0006] The present invention attempts to further improve on such sports surfaces by providing a field with a comparable or improved level of functionality while reducing the required amount of water to wet the field and/or entirely omitting the use of water.

Summary of Invention

[0007] Therefore, according to a first aspect, there is provided a sports surface for ball sports, the sports surface comprising a backing layer and a pile layer, wherein the pile layer comprises pile fibres, connected to the backing layer to form loops and the loops are closely packed together to form a substantially continuous playing surface, wherein the pile layer has a pile density ratio of at least 100 g/m^2 per mm.

[0007A] According to an embodiment, there is provided a sports surface comprising a backing layer and a pile layer, wherein the pile layer comprises pile fibres, connected to the backing layer to form loops and the loops are closely packed together to form a substantially continuous playing surface. The pile fibres can be formed by monofilaments, fibrillated tapes, slit tapes or the like. Preferably, the pile fibres are formed by monofilaments i.e. fibres that have been extruded as individual filaments.

[0008] Here the term “sports surface” is used to refer to a specialized surface for carrying out sports or other recreational activities, for example to play field hockey, lawn bowls, cricket, golf, tennis, paddle or soccer. It will be understood that in embodiments the sports surface can be adjusted to comply with norms set by professional sports associations regarding certain performance features such as ball roll distance or ball rebound height. The sports surface according to the present claims marks a significant departure from conventional thinking in that it no longer seeks to approximate natural turf but instead delivers a sports performance that is inherently different from natural turf and existing artificial turf.

[0009] The pile layer comprises a plurality of loops and the playing surface is formed by an upper part of the plurality of loops. The term “loop crest” is used to refer to the upper and outer part of the plurality of loops that forms the playing surface. Typically, each loop has a loop base defined by the points where the pile fibre extends from a top surface of the backing layer. From the loop base, two loop sides extend between the backing layer and the playing surface. The playing surface is formed by the loop crest that connects the two loop sides. It will be understood that the loop is formed by a continuous fibre and that the definition of what a loop side and a loop crest is, may depend on the momentary shape of the loop. The loop shape is for instance dependent on the pressure currently and/or previously applied to the playing surface, but may also depend on other factors such as the degree of packing of adjacent loops.

[0010] Traditional sports surfaces typically use cut-fibres in the pile layer. In comparison to such traditional cut-fibre sports fields, the resistance at the playing surface is reduced. The loops provide a better support for the same pile fibre volume and consequently the ball does not sink into the field

as much. This may result in a smaller contact area between the pile fibres and the ball, which can reduce the friction between the ball or player's skin on the one hand, and the playing surface on the other hand. Less friction results in less deceleration of the ball and a lower risk of skin abrasive wounds when a player makes a sliding tackle. When a player slips or slides on a playing surface

and the absence of cut ends that may be prone to fraying and splitting, softer materials may be used that have been conventionally used in artificial turf.

[0033] In an embodiment, the pile fibres forming the loops are arranged in bundles. Preferably, each bundle comprises 3 to 30, preferably from 6 to 12 monofilaments, fibrillated tapes, or bundles of slit tapes. Application of the pile in bundles is efficient from a production standpoint and the skilled person will understand the trade-offs between bundle size and processability. In embodiments, the bundles of pile fibres have a linear density between 2000 dtex and 20000 dtex, preferably between 6000 dtex and 10000 dtex.

[0034] According to an embodiment of the invention, the fibres within the bundle have a linear density between 500 dtex and 2000 dtex, preferably between 800 dtex and 1200 dtex. It will be understood that this is not comparable with carpet materials e.g. for indoor use, which may also be formed with a loop pile but have dtex values far below 100 dtex.

[0035] In an embodiment, the pile layer further comprises texturized yarns. The texturized yarns may be formed as looped pile fibres or can be cut pile fibres. The texturized yarns may have the same pile height or be shorter and provided to form a resilient thatch layer.

[0036] In an embodiment, the pile fibres are tufted into the backing layer. The skilled person will be familiar with the procedure for tufting such loops. The tufts may be straight or may be arranged in a zig-zag fashion. It has been found that a slight zig-zag is useful in avoiding an overly linear pattern of the loops, which could lead to directionality in the playing surface. Alternatively, the pile fibres may be integrated in the backing layer in a different way such as by knitting, weaving, or needling.

[0037] In an embodiment, the loops have a pull-out strength of at least 35 N, preferably at least 50 N. The pull-out strength may be determined by the minimum withdrawal force as defined according to ISO norm 4919 for loops. Where the loop comprises a plurality of fibres in a bundle, this is the pull-out strength of the bundle. Such a strength is typically required by sports associations as a minimum. The sports field according to the invention can be configured to comply with norms set by sports associations.

[0038] In an embodiment, the pile fibres have a cross section with an aspect ratio (w/t) of not greater than 5, preferably not greater than 4. The person skilled in the art will understand that this is relatively thick for conventional artificial grass blades. In the present case however, the fibre is no longer functioning as an upstanding blade, intending to mimic grass. The shape instead provides the pile fibre with structural strength in the form of a bowed arch.

[0039] In an embodiment, the pile fibres may have a substantially circular, elliptical, oval, lenticular, diamond or rectangular cross-sectional shape.

[0040] In another embodiment, the pile fibres may have a plurality of elongated ribs extending along the elongated direction of the pile fibres. Disadvantageous to a smooth circumferential surface of the pile fibres is a potential glaring when the light is bright. Roughening the surface of the pile fibres by providing elongated ribs along the pile fibres can mitigate glare and provide a more natural appearance.