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(54) Substructure construction for an artificial grass field and artificial grass field having such a substructure construction.

(57) Substructure construction for an artificial grass field consisting of a sand bed with provided thereon a layer which contributes towards the damping, said layer besides lava grains containing rubber particles in which the layer contributing towards the damping is built up of 85 - 92 per cent by weight of lava grains and 8 - 15 per cent by weight of rubber grains, said lava grains and said rubber grains having a comparable size and shape.

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Substructure construction for an artificial grass field and artificial grass field having such a substructure construction.

The invention relates to a substructure construction for an artificial grass field consisting of a sand bed with provided thereon a layer which contributes towards the damping, said layer besides lava grains comprises rubber particles. The invention furthermore relates to an artificial grass field having such a substructure construction.

Such a substructure construction is known from the German "Offenlegungsschrift" 3,535,432, said substructure construction being built up of lava grains having a grain size of 0 - 16 mm and fibres or a product obtained by cutting rubber, said product hereinafter being indicated as rubber particles having a length of 20 - 50 mm and a thickness of 2 - 5 mm. In said German patent application no information is provided as to the ratio between the quantity by weight of the rubber particles and the quantity by weight of the lava grains. It has now been found that by using different rubber particles in a certain weight ratio with respect to the lava grains a better damping can be achieved.

In the European patent application 260.769 the state of the art, as it was in 1986, is presented as follows. The last few years the interest in artificial grass has constantly increased, as it is possible on these fields to practise sport in practically all weather conditions, without having to be afraid that the grass will be rejected. Also it is possible to use an artificial grass field much more intensively than a natural grass field. An artificial grass field strewn in with sand can be used for about 2000 hours per year without any problems, whereas a natural grass field can be used for an average of 250-300 hours per year. Also the cost of maintenance is considerably lower for an artificial, grass field as it amounts to approximately Dfl. 3000.- per field per year, whereas for a natural grass field the average cost is Dfl. 20,000.- per field per year. Because of these advantages more and more artificial grass fields are being laid, which fields are used especially for playing hockey. Such artificial grass fields are also known in the patent literature, especially since the publication of the US patent specification 3,995,079, published in 1976. At that time a great deal of attention was paid to the providing of a filling material between the fibres forming the artificial grass, so that on the one hand the artificial grass fields could be laid down cheaper because less fibre material was required and on the other hand the field was given properties which were better comparable with those of a natural field. For playing hockey on an artificial grass field it is especially important that the field is level and furthermore the damping or softness is important. For a soccer field, on the other hand, the damping is the most important factor because when playing soccer the players make more movements, e.g. they jump and make slidings, than when playing hockey. It has been tried to vary the damping of artificial grass by partly substituting the layer of sand which was strewn between the fibres for another material such as rubber particles being interconnected by means of a binding agent, as described in US patent 4,396,653. On said rubber grains interconnected by means of a binding agent there was strewn a layer of sand. In practice, however, such a construction proved to be unsatisfactory because the layers strewn in were too resilient. Furthermore an artificial grass field is described in the US patent 4,497,853 in which a substructure construction is applied with a layer of coir fibres present therein, said layer being protected by a layer impervious to water. Said construction is costly because it is built up from a substructure construction comprising at least three different layers and, moreover, the artificial grass field thus obtained does not have the desired damping. An improved substructure construction for an artificial grass field which can be used especially for soccer, because a better damping is obtained, is mentioned in the European patent specification 0,136,747. The substructure construction described therein is composed of unbroken sand which is mixed with at least 1 per cent by weight of a fibrous material, for which purpose polypropylene fibres, Nylon fibres or glass fibres were mentioned. Then European patent application 204,381 was published, wherein the substructure construction was based on a mixture of sand and shreds or fibres of an elastomeric material, the shreds or fibres constituting 10 - 50 per cent of the mixture. Preferably the shreds or fibres are made of rubber, with an elongated shape as is obtained by cutting car tyres. Furthermore it has become apparent that with the passage of time the substructure construction is better able to retain its original structure yet, and thus the original damping capacity or resilience can also be maintained if the substructure construction is given a certain structure when being built up. This is accomplished by a substructure construction such as described in the European patent application 260,769, whereby a skeleton of rubber granules is built up, with a certain quantity of sand provided therein, so that a structure is obtained consisting of 30 - 40 per cent by weight of rubber granulate and 60 - 70 per cent by weight of sand. With this construction it appeared to be very well possible to obtain a sub-

structure for an artificial grass field for playing soccer. Because of its relatively high damping capacity the substructure construction such as described in the European patent application 260,769 is very well suitable for playing soccer, but it is less suitable for playing hockey. The fact is that not only demands are made of the damping capacity, but also of the stability and the permanent levelness of the field.

Now it is desired to use artificial grass fields for several sports, such as soccer, hockey, korfball or other sports. The requirement for the damping capacity of a comparatively soft field is set at 2400 N at repetitive loads. The damping capacity of a hockey field must not be less than 30 per cent after repetitive loads. On the basis of further research a substructure construction for an artificial grass field has been found which is suitable for hockey as well as for soccer and possibly other sports, such as korfball, and the substructure construction according to the invention is characterized in that the layer determining the damping is built up of 85 - 92 per cent by weight of lava grains and 8 - 15 per cent by weight of rubber grains, said lava grains and rubber grains having a comparable size and shape.

Thus a substructure construction has been obtained consisting of a stable lava skeleton in which the lava grains have been replaced by rubber grains. The lava thus provides the stability and the rubber provides the damping. When the mixture of lava and rubber contains less than 8 per cent by weight of rubber grains the damping capacity will decrease more than is desirable after repetitive loads, although this can be slightly compensated for by a more optimal distribution of the particle size. It has namely become apparent that the rubber grains preferably have a particle size of 2 - 15 mm, and the lava grains a particle size of 2 - 16 mm. That is the reason why in the following examples there are described substructure constructions for artificial grass fields containing more than 8 per cent by weight of rubber grains.

EXAMPLE I

A mixture of lava grains having a particle size between 11 and 16 mm was mixed with rubber grains having a particle size of 7 - 15 mm, in a ratio such that the mixture contained 91 per cent by weight of lava and 9 per cent by weight of rubber. With this mixture a substructure construction was produced for an artificial grass field for playing hockey. From further measurements it became apparent that this field had a permanent damping capacity of 31%. The mixtures of lava and rubber had a specific weight of 1.2 - 1.3, calculated on the basis of the dry material.

EXAMPLE II

For a hockey/soccer field a substructure construction was designed consisting of 86 per cent by weight of lava grains having a particle size of 11 - 16 mm and 14 per cent by weight of rubber grains having a particle size of 7 - 15 mm. With such a substructure construction a permanent damping capacity of 38% could be obtained, so that this field could be used successfully as a soccer field and as a hockey field.

EXAMPLE III

A multifunctional artificial grass field was provided with a substructure construction consisting of 86 per cent by weight of lava grains having a grain size of 2 - 11 mm and 14 per cent by weight of rubber grains having a particle size of 2 - 15 mm. This field had a permanent damping capacity of 44%, and could be used successfully for playing hockey, soccer and korfball.

Claims

1. Substructure construction for an artificial grass field consisting of a sand bed with provided thereon a layer which contributes towards the damping, said layer besides lava grains containing rubber particles, characterized in that the layer contributing towards the damping is built up of 85 - 92 per cent by weight of lava grains and 8 -15 per cent by weight of rubber grains, said lava grains and said rubber grains having a comparable size and shape.

2. Substructure construction according to claim 1, characterized in that the rubber grains have dimensions between 2 and 20 mm.

3. Substructure construction according to claims 1 - 2, characterized in that the lava grains have dimensions between 2 and 20 mm.

4. Substructure construction according to claims 1 - 3, characterized in that the mixture for the substructure construction consists of 90 - 92 per cent by weight of lava, with a particle size of 11 - 16 mm, and 8 - 10 per cent by weight of rubber grains with a particle size of 7 - 15 mm.

5. Substructure construction according to claim 1, characterized in that the mixture for the substructure construction is composed of 85 - 87 per cent by weight of lava grains, with a particle size of 2 - 11 mm, and 13 - 15 per cent by weight of rubber grains, with a particle size of 2 - 15 mm.

6. Artificial grass field consisting of a substructure construction with a carpet, possibly containing sand, provided thereon, characterized in that a substructure construction is used as described in the claims 1 - 5.

7. Artificial grass field consisting of a substructure construction with a carpet, possibly containing sand, provided thereon, characterized in that a substructure construction is used as described in the claims 1 - 6.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 89 20 2586

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A,D	DE-A-3 535 432 (WINKELMAN) * The whole document *	1,2,6	E 01 C 13/00
A,D	EP-A-0 260 769 (WEGENB. HEYMANS) * The whole document *	1	
A,D	EP-A-0 136 747 (WEGENB. HEYMANS) * The whole document *	1	
A,D	EP-A-0 204 381 (H.B.G.) * The whole document *	1	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

E 01 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	25-01-1990	DIJKSTRA G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
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