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

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**EP-A- 0 136 747**  
**EP-A- 0 204 381**  
**EP-A- 0 260 769**  
**DE-A- 3 535 432**

(73) Proprietor : **Wegenbouwmaatschappij J. Heijmans B.V.**  
**Graafsebaan 13**  
**NL-5248 JR Rosmalen (NL)**

(72) Inventor : **Heerkens, Josephus Cornelis**  
**Baroniehoeve 32**  
**NL-5244 HZ Rosmalen (NL)**

(74) Representative : **Van kan, Johan Joseph**  
**Hubert, Ir. et al**  
**Algemeen Octrooibureau P.O. Box 645**  
**Boschdijk 155**  
**NL-5600 AP Eindhoven (NL)**

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## Description

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 DE-A-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 EP-A-0,260,769 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. 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 US-A-3,995,079, published in 1976. At that time a great deal of attention was paid to the provision of a filling material between the fibres forming the artificial grass, so that on the one hand the artificial grass fields could be laid 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 by

another material such as rubber particles being interconnected by means of a binding agent, as described in US-A-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 US-A- 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 EP-A-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 EP-A-0,204,381 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 EP-A-0,260,769, 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 substructure for an artificial grass field for playing soccer. Because of its relatively high damping capacity the substructure construction such as described in EP-A-0,260,769 is very well suitable for playing soccer, but it is less suitable for playing hockey. The fact is that not only requirements regarding the damping capacity, but also in respect of the stability and the permanent levelness of the field have to be fulfilled.

Now it is desired to use artificial grass fields for several sports, such as soccer, hockey, korfbal 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 korfbal, 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 2-20 mm, more preferably a particle size of 2 - 15 mm, and the lava grains preferably have a size of 2-20 mm, more preferably 2 - 16 mm. The substructure construction according to the invention consists preferably of 90-92 wt.% lava, having a particle size of 11-16 mm and 8-10 wt.% rubber grains having a particle size of 7-15 mm, especially it consists of 85-87 wt.% lava grains having a particle size of 2-11 mm and 13-15 wt.% rubber grains having a particle size of 2-15. In the following examples there are described substructure constructions for artificial grass fields containing 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 korfbal.

#### 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.

#### Patentansprüche

1. Unterbau für einen Kunstrasenplatz, bestehend aus einem Sandbett mit einer darauf aufgebracht-

- ten Dämpfungsschicht, wobei die Schicht neben Lavakörnern Kautschukteilchen enthält, **dadurch gekennzeichnet**, daß die Dämpfungsschicht aus 85 bis 92 Gew.-% Lavakörnern und 8 bis 15 Gew.-% Kautschukkörnern aufgebaut ist, wobei die Lavakörner und die Kautschukkörner vergleichbare Größe und Form besitzen.
2. Unterbau nach Anspruch 1, **dadurch gekennzeichnet**, daß die Kautschukkörner Abmessungen zwischen 2 und 20 mm besitzen.
3. Unterbau nach den Ansprüchen 1 bis 2, **dadurch gekennzeichnet**, daß die Lavakörner Abmessungen zwischen 2 und 20 mm besitzen.
4. Unterbau nach den Ansprüchen 1 bis 3, **dadurch gekennzeichnet**, daß das Gemisch für den Unterbau aus 90 bis 92 Gew.-% Lava mit einer Teilchengröße von 11 bis 16 mm und 8 bis 10 Gew.-% Kautschukkörnern mit einer Teilchengröße von 7 bis 15 mm besteht.
5. Unterbau nach Anspruch 1, **dadurch gekennzeichnet**, daß das Gemisch für den Unterbau aus 85 bis 87 Gew.-% Lavakörnern mit einer Teilchengröße von 2 bis 11 mm und 13 bis 15 Gew.-% Kautschukkörnern mit einer Teilchengröße von 2 bis 15 mm besteht.
6. Kunstrasenplatz bestehend aus einem Unterbau mit einer darauf aufgebracht, möglicherweise sandhaltigen Auflage, **dadurch gekennzeichnet**, daß ein gemäß Ansprüchen 1 bis 5 beschriebener Unterbau verwendet wird.
- des dimensions comprises entre 2 et 20 mm.
4. Substructure selon les revendications 1 -3, caractérisée en ce que le mélange pour la substructure comprend 90-92 pour cent en poids de lave, avec des particules d'une taille de 11-16 mm, et 8-10 pour cent en poids de grains de caoutchouc avec des particules d'une taille de 7-15 mm.
5. Substructure selon la revendication 1, caractérisée en ce que le mélange pour la substructure est constitué de 85-87 % en poids de grains de lave, avec des particules d'une taille de 2-11 mm, et par 13-15 pour cent en poids de grains de caoutchouc, avec une taille de particules de 2-15 mm.
6. Terrain en gazon artificiel constitué par une substructure sur laquelle est disposé un tapis contenant éventuellement du sable, caractérisé en ce qu'on utilise une substructure telle que décrite dans les revendications 1-5.

## Revendications

1. Substructure pour un terrain en gazon artificiel constitué par un lit de sable sur lequel est disposée une couche qui contribue à produire l'effet d'amortissement, ladite couche contenant des particules de caoutchouc en plus de grains de lave, caractérisée en ce que la couche contribuant à fournir l'effet d'amortissement est constituée par 85-92 pour cent en poids de grains de lave et par 8-15 pour cent en poids de grains de caoutchouc, lesdits grains de lave et lesdits grains de caoutchouc possédant des tailles et formes comparables.
2. Substructure selon la revendication 1, caractérisée en ce que les grains de caoutchouc possèdent des dimensions comprises entre 2 et 20 mm.
3. Substructure selon les revendications 1-2, caractérisée en ce que les grains de lave possèdent