

STUDDED WEB FOR BUILDING PURPOSES

The invention relates to a studded web for building purposes of a sheet or plate of impact material, preferably high density polyethylene (HDPE) with studs shaped out of the sheet or plate, the studded web having at least one studless marginal strip running substantially parallel to one edge of the studded web. Such studded webs are preferably used for protecting against mechanical effects and moisture influences, as well as for ventilating and thermally insulating the structure to be protected, and also for surface drainage purposes.

Studded webs for building purposes have long been known, e.g. from Norwegian patent 107 188 and are successfully used for building purposes in place of conventional moisture protection bitumen coatings or in addition thereto. The studs which act as spacers form an air layer between the outer surface of the structure to be protected and the sheet surface bounding the surrounding soil. The fixing to the structure can take place by means of specially shaped fixing parts, which engage with one or more projections into the said studs and are fixed to the structure by shot bolts or nails driven into said structure through the fixing parts and the studded web.

Studded webs for building purposes are known having at least one studless marginal strip running substantially parallel to one edge of the studded web. Such a marginal strip essentially has two functions. It firstly facilitates the partial overlapping arrangement of adjacent studded webs, which is necessary when used on larger structural surfaces. Secondly it makes more difficult the penetration of moisture or soil into the area between the sheet and the outer surface of the structure to be protected, particularly on the upper border of the studded web. The marginal strip is fixed to the structure by suitable fixing means such as nails, shot bolts, etc., which in spaced manner are driven through the marginal strip into the upper layer of the structure.

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However, in practice the problem exists that in many cases on the laid studded web act high mechanical forces exerted by the surrounding soil and in particular during the gradual stabilization of the initially loose soil. These forces often have a strong component directed parallel to the outer surface of the structure, particularly if the initially loose soil (i.e. after filling the trench) gradually stabilizes and "settles". The hitherto known studded webs with studless marginal strip or their fastenings to the brickwork are not generally in a position to absorb these forces. This has led to easy tearing of the studless marginal strip in such areas, unless use is additionally made of the aforementioned, specially shaped fixing parts.

The problem is therefore to avoid the aforementioned disadvantages of the prior art, in that without significant extra costs a much more highly loadable fixing of the studded web to the structure is obtained, without needing separate accessories such as the separate fixing parts.

According to the invention this problem is solved in that the marginal strip is at least partly reinforced with reinforcing means fixed to the marginal strip.

If suitable reinforcing means are chosen, the solution according to the invention leads to a significant increase in the tear-out resistance of the reinforced marginal strip. Therefore the marginal strip material is able to absorb much higher forces acting in the area surrounding the fixing means without the marginal strip being torn. As a rule this makes it possible to obviate the use of specially shaped fixing parts, which engage with one or more projections into the studs.

The reinforcing means can be wholly or partly placed on at least one of the surfaces of the marginal strip. In this case the fitting of the reinforcing means to the marginal strip is very

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simple and can also take place subsequently, in principle even on the building site. Preferably the reinforcing means are placed on the marginal strip surface facing the structure to be protected. The arrangement on this surface offers manufacturing advantages, which will become clear in the subsequent part of the description. This additionally leads in the installed state to an even higher tearing out force, a further improved sealing action with respect to penetrating soil and moisture and an optical-esthetically more pleasing appearance of the installed studded web.

However, it is also possible to place the reinforcing means wholly or partly within the marginal strip material, i.e. sink or embed the same in said marginal strip material. In this case the reinforcements are particularly well protected against external influences, such as e.g. damage during transportation or possible corrosion by moisture. It is also possible to have a combination of the arrangement on the surface and within the marginal strip material.

The reinforcing means can comprise reinforcing wires, threads or tapes, said reinforcing wires, threads or tapes preferably being metal wires or plastic threads or plastic tapes and in particular high-tenacity plastic threads or plastic tapes. In this further development of the invention the aim is to embed the reinforcing wires, threads or tapes during the studded web production process, whereby said web is preferably made from HDPE, in the marginal strip when it is still hot or warm. This leads to a particularly strong connection of the reinforcing means to the marginal strip material.

Tests have shown that a particularly high tearing out strength of the reinforced marginal strip is obtained if the reinforcing wires, threads or tapes are arranged substantially parallel to the studded web edge.

According to a particularly preferred further development of the invention the reinforcing means can also comprise a woven wire cloth. In the case of a relatively wide-meshed woven wire cloth it is possible to embed said cloth wholly or partly in the marginal strip material in order to achieve a particularly intimate connection.

A further preferred development of the invention is constituted by a reinforcing layer, which is placed as the reinforcing means on at least one surface of the marginal strip. In particularly preferred manner the reinforcing layer is formed by a fabric strip, because the latter can be made particularly flexible and at the same time tear-resistant. The fabric strip is preferably constituted by plastic, because plastic is chemically highly resistant to corrosion and rotting, light and tear-resistant.

The preferred fabric strip is advantageously provided on at least one side with a coating surface-connectable to the studded web material by welding, bonding, etc. Thus, it is possible in this case to apply the fabric strip during the manufacturing process of the preferably HDPE studded web, to the marginal strip when the latter is in the hot or warm state. The surface connection ensures a particularly intimate connection of the fabric strip to the studded web.

If, in preferred manner, the fabric strip is made from HDPE and the coating of the fabric strip, is in preferred manner of low density polyethylene (LDPE), then the fabric strip coating can be welded without difficulty to the marginal strip surface. Alternatively it is also possible for the marginal strip of the studded web to be provided on at least one side at least partly with a corresponding coating. Thus, during the manufacturing process of the studded web the fabric strip can be applied simply, reliably and economically to the marginal strip. In addition, the studded web, fabric strip and their connecting means in the form of a LDPE coating in this preferred further development, are all made from the same, weldable and ground

water-compatible basic material, namely polyethylene (PE), so that the entire protection and sealing system can, if necessary, be easily recycled.

As tests have revealed, a high-tenacity tape cross fabric can be used with particular advantage as the fabric for the fabric strip, particularly if the fabric strip is arranged with longitudinal tapes running substantially parallel to the edge of the studded web. In this case tests have revealed that there is a particularly high tearing out force for a studded web with nails fixed in the reinforced marginal strip. The tearing out resistance is also favourably influenced by an adequate number of transverse tapes, which are substantially at right angles to the edge of the marginal strip in the fabric strip and an adequate thickness of the fabric strip tapes.

A combination of different reinforcing means for the marginal strip is also easily possible. For uses where the studded web is subject to particularly strong mechanical forces, it is e.g. possible to combine a reinforcement by metal wires pressed into the marginal strip material, e.g. by means of a roller, with a reinforcement by a LDPE-coated, HDPE fabric strip welded to the marginal strip. This leads to a particularly effective marginal strip reinforcement, which can still be easily and economically manufactured, the surface LDPE coating of the fabric strip also protecting the metal of the reinforcing wires against corrosion at the possibly not completely embedded points.

The marginal strip is preferably constructed in one piece with the remaining areas of the studded web. For this purpose it is merely necessary for the studded web not to be provided over its entire width or length with studs during its manufacturing process.

The marginal strip is preferably fixable by means of fixing means such as nails, shot bolts, etc. to the structure to be

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protected. Advantageously fixing is facilitated if the marginal strip has markings and/or openings for the fixing points, in order to facilitate the arrangement of the fixing means at regular intervals on the building site. This ensures a correct fitting of the studded web in accordance with building rules.

Installation on the brickwork can advantageously be facilitated or improved in that the marginal strip is bendable along a bending line running substantially parallel to the edge. Preferably the bending line is constructed in such a way that the marginal strip can be applied resiliently from the bent position to the structure to be protected.

The invention is described in greater detail hereinafter relative to two embodiments and the attached drawings, wherein show:

Fig. 1        A view of part of a first preferred embodiment of the studded web according to the invention.

Fig. 2        A cross-sectional view of a second, preferred embodiment of the studded web according to the invention during the installation on the structure.

Fig. 1 shows a first embodiment of the studded web 1 according to the invention. The studded web 1 has a studless marginal strip 3 and a studded surface 4 provided with studs 2. In this embodiment the stud height is 8 mm, the marginal strip 3 has a width of about 70 mm and the studded web thickness is 0.6 mm.

The studded web 1 can be manufactured in that a HDPE sheet is passed in the warm state over a spiked roller, whose spikes shape the studs 2. The edge of the spiked roller is not provided with spikes, or the outer marginal area of the HDPE sheet is not passed over the spiked roller, so that a studless marginal area is obtained.

The marginal strip 3 is provided on the side which will subsequently face the structure 10 and on which the studs 2 are located with a fabric strip 8 of a cross fabric of HDPE tapes. The HDPE cross fabric is provided on one side with a coating of low density polyethylene (LDPE). Alternatively it is possible to apply the LDPE coating to the marginal strip 3. The coating makes it possible to weld the fabric strip 8 during the manufacturing process of the studded web 1 to the still hot or warm surface of the marginal strip 3, so that there is no need for an additional connection or joining by bonding or a further heating of the marginal strip 3 for welding. In this way the fabric strip 8 can be applied in a simple and economic manner. The fabric strip 8 is positioned in such a way that the longitudinal tapes 9 run parallel to the edge 5 of the studded web 1. As has been revealed by tests, this leads to a particularly high tear out force. In addition, an adequate number of transverse tapes, which are substantially at right angles to the edge 5 in the fabric strip 8 and an adequate thickness of the tapes have a favourable influence on the tearing out force, which would be necessary in order to tear the fabric strip 8, including the marginal strip 3 by a force acting at right angles to the edge 5. Such a force is exerted in practice by a fixing means such as e.g. a nail 7 on the material of the marginal strip 3 and the fabric strip 8, when the marginal strip 3 is applied to the structure 10 to be protected and external forces act on the studded web 1.

In order to be able to weld the HDPE fabric strip 8 to the HDPE marginal strip 3, it is merely necessary to have a one-sided coating of the fabric strip 8 with LDPE (alternatively a coating of the marginal strip 3). However, it is also possible to provide both sides of the fabric strip 8 with a LDPE coating. As tests have shown, in the case of an only one-sided coating of the fabric strip 8 a particularly high tearing out force is obtained, whereas the two-sided coating offers the advantage

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that no importance is attached to the orientation of the fabric strip 8 (which facilitates production) and also a possibility is provided of welding together two studded webs 1 by means of such a two-sided coated fabric strip 8, preferably along the studless marginal strip 3 of the two studded webs 1.

The first embodiment of the studded web 1 has at regular intervals openings 12 in the marginal strip 3, which are essentially located on a line parallel to the edge 5. The openings 12 are produced by a punch during the production process of the studded web 1. They serve as marking points for the fixing means in order to facilitate the placing of the fixing means at regular intervals along the brickwork surface.

Fig. 2 shows a second embodiment of the studded web 1 according to the invention in a cross-sectional view during installation on the structure. In this second embodiment of the studded web 1 according to the invention the marginal strip 3 is once again provided on the side facing the structure 10 with a fabric strip 8 of HDPE tapes. However, the studded web 1 additionally has a studless area 11 adjacent to the marginal strip 3 and which is provided with a through fabric strip 8. The boundary between the marginal strip 3 and the adjacent studless area 11 is formed by a bending line 6, along which the marginal strip 3 is bendable substantially parallel to the edge 5. This leads to a particularly good and reliable sealing of the area between the sheet surface and the structure 10, because the bending line 6 can be constructed in such a way that the marginal strip 3 can be applied from the bent position in resilient manner to the structure 10. In this embodiment the fastening or fixing means is constituted by a hardened disk head nail 7, which is driven through the studless area 11 of the studded web 1 into the structure 10. However, particularly in the case of concrete structures it is possible to use other commercial fastening means such as screws, in conjunction with percussion dowels or shot bolts. Alternatively the disk head nail 7 can additionally or

exclusively be driven through the marginal strip 3 in this embodiment.

Fig. 2 clearly shows which forces must be absorbed by the material of the marginal strip 3 at the point surrounding the disk head nail 7 if soil acts on the studded web 1. In many cases, these forces have a strong component parallel to the outer surface of the structure 10, particularly if the initially loose soil (i.e. after filling the trench) gradually stabilizes and "settles". The construction according to the invention of a studless marginal strip 3 reinforced with a reinforcing layer brings about, particularly in the preferred further developments, a marked increase in the tearing out strength of the fixing of the studded web 1 and therefore to much higher security reserves, which generally makes it possible to avoid the use of specially shaped fixing parts.

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CLAIMS

1. Studded web for building purposes of a sheet or plate made from a high-tenacity material, preferably high density polyethylene (HDPE) with studs shaped out of the sheet or plate, the studded web having at least one studless marginal strip running substantially parallel to one edge of the studded web, characterized in that the marginal strip (3) is at least partly reinforced with reinforcing means fixed to the marginal strip (3).
2. Studded web according to claim 1, characterized in that the reinforcing means are wholly or partly placed on at least one of the surfaces of the marginal strip (3).
3. Studded web according to claim 2, characterized in that the reinforcing means are placed on the surface of the marginal strip (3) facing the structure (10) to be protected.
4. Studded web according to claim 1, characterized in that the reinforcing means are wholly or partly placed within the material of the marginal strip (3), namely being embedded e.g. in the material of the marginal strip (3).
5. Studded web according to one or more of the preceding claims, characterized in that the reinforcing means comprise reinforcing wires, threads or tapes.
6. Studded web according to claim 5, characterized in that the reinforcing wires, threads or tapes are metal wires or plastic threads or plastic tapes, preferably high-tenacity plastic threads or plastic tapes.
7. Studded web according to claim 5 or 6, characterized in that the reinforcing wires, threads or tapes are arranged substantially parallel to the edge (5) of the studded web (1).

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8. Studded web according to one or more of the claims 1 to 4, characterized in that the reinforcing means comprise a woven wire cloth.
9. Studded web according to one or more of the claims 1 to 4, characterized in that the reinforcing means comprise a reinforcing layer placed on at least one surface of the marginal strip (3).
10. Studded web according to claim 9, characterized in that the reinforcing layer is a fabric strip (8).
11. Studded web according to claim 10, characterized in that the fabric strip (8) is made from plastic, preferably HDPE.
12. Studded web according to claim 10 or 11, characterized in that the fabric strip (8) is provided on at least one side with a coating surface-connectable to the material of the studded web (1) by welding, bonding, etc.
13. Studded web according to claim 12, characterized in that the coating is of low density polyethylene (LDPE) and can be welded to the surface of the marginal strip (3).
14. Studded web according to one or more of the claims 10 to 13, characterized in that the fabric of the fabric strip (8) is a high-tenacity tape cross fabric.
15. Studded web according to claim 14, characterized in that the fabric strip (8) is arranged with longitudinal tapes (9) running substantially parallel to the edge (5) of the studded web (1).
16. Studded web according to one or more of the preceding claims, characterized in that the marginal strip (3) is constructed in one piece with the remaining areas of the studded web (1).



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17. Studded web according to one or more of the preceding claims, characterized in that the marginal strip (3) can be installed on the structure (10) to be protected by fixing means, such as nails (7), screws or shot bolts.

18. Studded web according to claim 17, characterized in that the marginal strip (3) has markings and/or openings for fixing points (12).

19. Studded web according to one or more of the preceding claims, characterized in that the marginal strip (3) is bendable along a bending line (6) running substantially parallel to the edge (5).

20. Studded web according to claim 19, characterized in that the bending line (6) is constructed in such a way that the marginal strip (3) can be resiliently applied from the bent position to the structure (10) to be protected.



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## AMENDED CLAIMS

[received by the International Bureau  
on 04 August 1995 (04.08.95);  
original claim 1 amended;  
remaining claims unchanged (1 page)]

CLAIMS

1. Studded web for building purposes of a sheet or plate made from a high-tenacity material, preferably high density polyethylene (HDPE) with studs shaped out of the sheet or plate for purposes of protecting, ventilating and insulating a structure to be protected and of surface drainage, the studded web having at least one studless marginal strip running substantially parallel to one edge of the studded web, characterized in that the marginal strip (3) is at least partly reinforced with reinforcing means fixed to the marginal strip (3).
2. Studded web according to claim 1, characterized in that the reinforcing means are wholly or partly placed on at least one of the surfaces of the marginal strip (3).
3. Studded web according to claim 2, characterized in that the reinforcing means are placed on the surface of the marginal strip (3) facing the structure (10) to be protected.
4. Studded web according to claim 1, characterized in that the reinforcing means are wholly or partly placed within the material of the marginal strip (3), namely being embedded e.g. in the material of the marginal strip (3).
5. Studded web according to one or more of the preceding claims, characterized in that the reinforcing means comprise reinforcing wires, threads or tapes.
6. Studded web according to claim 5, characterized in that the reinforcing wires, threads or tapes are metal wires or plastic threads or plastic tapes, preferably high-tenacity plastic threads or plastic tapes.
7. Studded web according to claims 5 or 6, characterized in that the reinforcing wires, threads or tapes are arranged substantially parallel to the edge (5) of the studded web (1).