

SPECIFICATION

Sheet like structure

5 This invention relates to sheet like structures.

Already known are preformed sheet like structures comprising a substrate for instance in the form of a film of a water impermeable plastics material, and a waterproofing pressure sensitive adhesive

10 membrane, such as of a bituminous composition, in particular a rubber-bitumen mixture. Such substrates are supplied in rolls with a width of 1 m. or so and can be laid side by side, for instance on concrete, to provide a waterproof layer thereon.

15 While it is also known to use such structures with aluminium as a substrate, it has hitherto been necessary to limit the thickness of the aluminium to very thin foils in order that the structure should not have excessive rigidity. Such excessive rigidity
20 would give rise to arching and creasing of the aluminium based structure upon laying, and result in the formation of channels which would permit the entry of water.

To avoid this problem, the structures employing
25 an aluminium substrate and a bituminous adhesive that are known to date have been limited to widths of about 25 cm at most and employ only a thin aluminium foil, of a thickness between 0.009 mm and 0.075 mm, mostly in the region of 0.009 mm to
30 0.050 mm. However, structures of this nature suffer from the disadvantages that the thin aluminium substrates have low tensile strength, tear easily and also possess only limited resistance to atmospheric corrosion, so limited, in fact, that it is known for such
35 structures to be supplied with a protective coat of paint over the aluminium in order to improve the resistance to weathering.

As have found that a metal backed adhesive preformed sheet like structure, particularly one
40 employing aluminium, which displays hitherto un-achieved flexibility for a useful metal thickness can be obtained by impressing the metal so that it is formed with an array of projections on one side with corresponding depressions on the other before
45 laminating with the adhesive compound.

We have found that this arrangement allows the structure, using relatively thick metal to be laid flat while still possessing easy bending or moulding properties so as to achieve a particular shape if
50 required. For instance, to take one simple example, the structure can be turned through a right angle, such as must be formed between the upper surface of a flat roof and the internal vertical surface of a parapet wall, and also when tucking the structure at
55 right angles into rebates.

Thus the invention provides a sheet like structure comprising an impressed metal substrate with an array of projections on one side and corresponding depressions on the other, the substrate being
60 flexible and having an adhesive membrane contiguous thereto on one side. The metal is preferably aluminium, and the adhesive preferably waterproofing, preferably bituminous and preferably a bitumen-rubber mix.

65 To provide a useful thickness of metal, while still

allowing the additional flexibility offered as a result of the invention, a metal thickness of 0.125 to 0.25 mm, typically 0.15 mm is preferably employed. The depths of the depressions introduced by impressing
70 can be from 0.1 to 0.8 mm, preferably 0.50 mm. The adhesive should generally be thick enough to fill the depressions (or the gaps between the projections) and offer a smooth surface for overall adhesion to a surface to be covered. It's minimum overall

75 thickness should therefore preferably be 1.5 mm, that is when the maximum projection height is employed, so that over the structure its smallest thickness will be approaching 1.0 mm. However, a minimum thickness of 1.8 mm, preferably 2.5 mm is
80 better as it increases the assurance of adhesion.

The structure of the invention may find many applications, and can be provided in a variety of widths. The structures are particularly useful for application to concrete surfaces, and for this
85 application the membranes are preferably pressure sensitive, that is to say they enable the structures when pressed with normal hand pressure against a concrete surface, without any prior treatment of the surface or membrane, to adhere to the concrete.

90 Thus, while priming and/or initial heating may with advantage be performed, they are not essential in order to adhere the membrane to concrete.

The membrane can be a layer of the adhesive alone or the adhesive can contain reinforcing
95 material, for example a scrim of glass fibres or an organic polymer, particularly to give the membrane mechanical strength; if desired the membrane can contain a plurality of layers of waterproofing pressure-sensitive adhesive (the adhesive being the
100 same or different in the different layers), and the layers can be separate by reinforcing material in the form of a sheet.

The structures as produced in a factory, stored, and brought to the site for use are in the form of
105 laminates comprising the metal, the adhesive and, usually a removable protective coating such as a siliconised paper, and are conveniently in the form of rolls.

On the one hand, the structures may be up to
110 120 cm, typically 1 m wide when for use in covering large surfaces. On the other hand, structures of as little as 65 cms in width may be provided.

Particularly when a waterproofing facility is desired, bituminous adhesives are generally suitable
115 except where their colour is a disadvantage. If a bituminous adhesive is used, it is preferably formed of natural or synthetic rubber, virgin or reclaimed, blended into bitumen to provide a smooth mix. The ratio by weight of bitumen to rubber is preferably
120 from 80:20 to 95:5, especially about 90:10. Other types of contact adhesive composition may include polychloroprene, butyl rubber, oil-based mastics or compositions containing rosins or rosin derivatives. Generally, suitable compositions have softening
125 points (measured by the Ring and Ball method) or 60 to 110°C and penetration values of 150-300 at 25°C (100 g. 5 secs., - Institute of Petroleum method).

A wide variety of materials can be used to provide protective coatings in the structures of the invention.
130 Paper having a release coating thereon, e.g.

siliconised paper or paper having a coating thereon of a vinyl chloride polymer, is satisfactory. Other materials include films of organic polymers, particularly vinyl chloride polymers.

5 The structures of the invention can be prepared without difficulty by techniques known per se. It is preferred to use adhesives which are not solvent-based and which are heated. Thus the adhesive may be bonded to the substrate to form a
10 uniform layer contiguous to the substrate. If it is desired to incorporate a sheet-like reinforcing layer in the membrane, this can be achieved, for example by pressing a scrim into the layer of adhesive.

The impression of the metal, which can be
15 performed using a solid metal roller cut with suitable profiles and a resilient backing roller is preferably such that the projections and depressions, which may be generally rectangular, are regularly arranged in rows and columns. This is found to allow notable
20 flexibility and the facility to bend the structure so that it keeps its shape. The projections are preferably from 1 cm to 3 cm long and from 0.25 to 1 cm wide, most preferably being 2.2 by 0.5 cms. The margins between the depressions are preferably from 0.5 to
25 1 cm, most preferably 0.7 cm wide.

One application for structures of the invention is as a roofing material. The structures can be unrolled and adhered to such roofing undersurfaces as wood, concrete or previously applied roofing felts and can
30 give absolute water tightness. Moreover, they are particularly resistant to the action of sunlight, in particular the ultraviolet component thereof, thus offering much improved weathering to conventional roofing materials. Moreover, the metallic surface
35 acts as a reflectant, assisting therefore in keeping the building below cool when used in hot climates.

The "bendability" imparted by the impressing of the metal means that the structure can be used as a vehicle for installing a metallic layer of significant
40 thickness in those positions, which has not readily been possible hitherto except when lead has been used.

Further, structures according to the invention can be employed in such structures where the initially
45 mentioned waterproofing membranes are used at present, that is in providing waterproofing membranes in concrete structures, in particular underground structures or roof or bridge decks where the structures are then covered, either by
50 more concrete or by a roofing or surfacing material. There is, in fact, a particular advantage offered in the case of road and bridge building, namely that hot asphalt can be poured directly out the structure without deleterious effect on the waterproof seal and
55 the asphalt will be most satisfactory keyed to the impressed surface of the structure thus reducing slipping between the road surface and the underlying structure.

Where a waterproofing property is desired, as in
60 many of the applications envisaged, a waterproofing, preferably rubber-bitumen membrane should be employed. The thicker the membrane, the better the waterproofing properties, and a thickness of up to 0.4 cm can usefully be
65 employed.

CLAIMS

1. A sheet like structure comprising an impressed metal substrate with an array of
70 projections on one side and corresponding depressions on the other, the substrate being flexible and having an adhesive membrane contiguous thereto on one side.
2. A structure according to claim 1, wherein the
75 metal is aluminium.
3. A structure according to claim 1 or 2, wherein the membrane is a waterproofing membrane.
4. A structure according to claim 3, wherein the membrane is bituminous.
- 80 5. A structure according to claim 4, wherein the membrane is a bitumen - rubber mix.
6. A structure according to any preceding claim, wherein the metal is of a thickness of from 0.125 to 0.25 mm.
- 85 7. A structure according to claim 6, wherein the metal thickness is 0.15 mm.
8. A structure according to any preceding claim, wherein the depths of the depressions introduced by impression are from 0.1 to 0.8 mm.
- 90 9. A structure according to claim 8, wherein the depths of the depressions are 0.5 mm.
10. A structure according to any preceding claim, wherein the membrane is of a thickness of at least 1.5 mm.
- 95 11. A structure according to any preceding claim, wherein the membrane is of a thickness of at least 1.8 mm.
12. A structure according to any preceding claim, wherein the membrane is of a thickness of at least
100 2.5 mm.
13. A structure according to any preceding claim, wherein the membrane is of a thickness of no more than 4 mm.
14. A sheet like structure according to any
105 preceding claim, wherein the adhesive membrane is a pressure sensitive adhesive.
15. A structure according to any preceding claim, wherein the adhesive membrane is reinforced.
16. A structure according to any preceding claim,
110 having a release sheet on the side of the membrane remote from the substrate.
17. A structure according to any preceding claim of a width of at least 1 metre.
18. A structure according to any preceding claim
115 in the form of roll.
19. A structure according to any preceding claim, wherein the depressions are rectangular and arranged in rows and columns.
20. A structure according to claim 19, wherein
120 the depressions are 1 to 3 cm long and from 0.25 to 1 cm wide.
21. A structure according to claim 20, wherein the depressions are 2.2 by 0.5 cms.
22. A structure according to claim 20 or 21,
125 wherein the margins between the depressions are from 0.5 to 1 cm in width.



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12. A structure according to any preceding claim, wherein the membrane is of a thickness of at least 2.5 mm.
- 100 13. A structure according to any preceding claim, wherein the membrane is of a thickness of no more than 4 mm.
14. A sheet like structure according to any preceding claim, wherein the adhesive membrane is a pressure sensitive adhesive.
- 105 15. A structure according to any preceding claim, wherein the adhesive membrane is reinforced.
16. A structure according to any preceding claim, having a release sheet on the side of the membrane remote from the substrate.
- 110 17. A structure according to any preceding claim of a width of at least 1 metre.
18. A structure according to any preceding claim in the form of roll.
- 115 19. A structure according to any preceding claim, wherein the depressions are rectangular and arranged in rows and columns.
20. A structure according to claim 19, wherein the depressions are 1 to 3 cm long and from 0.25 to 1 cm wide.
- 120 21. A structure according to claim 20, wherein the depressions are 2.2 by 0.5 cms.
22. A structure according to claim 20 or 21, wherein the margins between the depressions are from 0.5 to 1 cm in width.
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23. A structure according to claim 22, wherein the margins between the depressions are 0.7 cm wide.

24. A sheet like structure according to claim 1
5 and substantially as hereinbefore described.

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