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(54) ROOFING LAMINATED STRUCTURE

(71) We, W.R. GRACE LIMITED, a British Company of Elveden Road, Park Royal, London N.W. 10, England, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-

This invention relates to a laminated structure particularly, though not exclusively for roofing.

It is known from British Patent Specification No. 1,230,753 to seal surfaces with a structure comprising a sheet like support such as a polymeric film carrying a pressure sensitive adhesive membrane. Although many types of polymeric film and other polymeric materials have been used for the sheet like support they mostly have the disadvantages that when used for sealing roofing decks their resistance to ultraviolet radiation is rather poor.

According to the present invention there is provided a laminated structure including, in this order, a first layer of a bituminous rubber pressure sensitive adhesive composition, a polymeric support layer, a second layer of a bituminous rubber pressure sensitive adhesive composition and a layer of a roofing material as defined herein.

By the term "roofing material" we mean conventional roofing felts such as have a base of, for example, paper, felt or fabric with a bituminous layer on one or both faces and usually also impregnated in the base. We also mean metal foil and polymer films with a bituminous layer on one or both faces. The films are not, of course, impregnated.

The structure of the present invention is better able to withstand ultraviolet radiation and can be very simply and easily applied to a roofing deck without the need for the separate time consuming operation of applying an adhesive which in any case is a

process which is vulnerable to poor workmanship.

In use, the laminate is placed on a roofing deck, or other surface to be covered, with the first bituminous rubber layer in contact therewith.

If desired, the roofing material can have a mineral aggregate finish. This provides still further protection for the polymeric support from ultraviolet radiation and also enables a flat roof to accept light foot traffic.

Roofs which have already been covered with roofing felt, asphalt, bituminous coatings and other types of roofing finish often suffer breakdown as far as their ultraviolet ray resistance is concerned, and this difficulty can be overcome by applying to the existing finish a structure according to the invention in order to waterproof further such roofs, particularly where the waterproofing has become inefficient, and also to provide further protection for the existing roof coverings.

The first and second layers of the adhesive compositions, which can be the same or different, can comprise the adhesive composition alone or they can contain reinforcing material. If desired each layer can contain a plurality of sub-layers of the adhesive composition (the adhesive composition being the same or different in the different layers), and the layers can be separated by reinforcing material in the form of a sheet

The widths of the structures can vary widely, e.g. from 1 to 48 inches (2.5 to 120 cm) and even more. Generally they will be at least 2 inches (5 cm.) wide, e.g. 6 to 36 inch (15 to 91 cm) wide, with widths in the upper part of this range, e.g. 24 to 36 inch (60 to 91 cm.), being preferred.

A variety of bituminous-rubber adhesive compositions can be used successfully but the first layer of adhesive composition must be such that it will stick to the required surface without the use of heat or additional

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bonding agents; thus for application to surfaces of concrete, which are comparatively rough and dusty, the layer of adhesive composition must be at least 0.01 inch (0.025 cm) thick, preferably 0.025 to 0.2 inch (0.063 to 0.5 cm.); the thicker the layer of adhesive, the better the waterproofing effect, but in general a layer 0.025 to 0.15 inch (0.063 to 0.4 cm.) is satisfactory, with thicknesses at the upper end of this range being preferred.

The adhesive compositions can be 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 from 80:20 to 95:5, especially about 90:10. Generally, suitable compositions have softening points (measured by the Ring and Ball method) of 60 to 110°C. and penetration values of 150–300 at 25°C. (100 g. 5 secs – Institute of Petroleum method).

The first layer of adhesive composition can carry a protective coating on its outer surface to prevent the structures adhering to other things before use.

A wide variety of materials can be used to provide the protective coating. 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.

A wide variety of materials can be used as the polymeric support layer. It is generally desirable that the support should be substantially impermeable to water. For many purposes it is desirable that the support should be such that after application to the surface it is capable of stretching with movement of the roofing deck or other surface on which it is applied e.g. as a result of shrinkage, with maintenance of a moisture and moisture-vapour proof seal.

The preferred supports are films of natural rubber or a synthetic organic polymer such as polyethylene, which is preferred, e.g. that commercially available under the trade name Polythene, polypropylene or other polyolefin, a polyamide, a polyester, e.g. that commercially available under the polyurethane, polyvinyl chloride, a copolymer of vinyl chloride and vinylidene chloride, or a synthetic rubber such as polychloroprene or butyl rubber.

While cellular films can be used as supports, the supports will generally be substantially incompressible and have a thickness of at most 0.25 inch (0.6 cm).

Other possible supports include polymeric woven or non-woven fabrics made of for

instance staple fibres of continuous fibres.

The structures of the invention can be prepared without difficulty by techniques known per se. It is preferred to use adhesive compositions which are not solvent-based and are thus applied hot. Thus the adhesive composition may be applied hot, with aid of a suitable device to ensure a uniform layer, to the support. If it is desired to incorporate a reinforcing laying in an adhesive composition layer, this can be achieved, for example by pressing a scrim into the layer of the adhesive composition layer, this can be achieved, for example by pressing a scrim into the layer of the adhesive composition.

WHAT WE CLAIM IS:-

1. A laminated structure including, in this order, a first layer of a bituminous rubber pressure sensitive adhesive composition, a polymeric support layer, a second layer of a bituminous rubber pressure sensitive adhesive composition and a layer of roofing material as defined herein.

2. A structure according to claim 1 wherein the adhesive composition in the first and second layers are the same.

3. A structure according to claim 1 wherein the compositions in the first and second layers are different.

4. A structure according to claim 1, 2 or 3 wherein the roofing material has a mineral aggregate finish on its outer surface.

5. A structure according to any preceding claim wherein at least one of the layers of adhesive composition contains reinforcing material.

6. A structure according to any preceding claim wherein at least one of the layers of adhesive composition contains a plurality of sub-layers.

7. A structure according to claim 5 and claim 6 wherein the reinforcing material is between adjacent sub-layers.

8. A structure according to any preceding claim wherein the first layer of adhesive composition is at least 0.025 cm thick.

9. A structure according to any preceding claim with a protective coating on the outer surface of the first layer of adhesive composition.

10. A structure according to any preceding claim wherein the polymeric support layer is a film.

11. Laminated structures according to claim 1 and substantially as hereinbefore described.

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bonding agents; thus for application to surfaces of concrete, which are comparatively rough and dusty, the layer of adhesive composition must be at least 0.01 inch (0.025 cm) thick, preferably 0.025 to 0.2 inch (0.063 to 0.5 cm.); the thicker the layer of adhesive, the better the waterproofing effect, but in general a layer 0.025 to 0.15 inch (0.063 to 0.4 cm.) is satisfactory, with thicknesses at the upper end of this range being preferred.

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