United States Patent [19]

Bresson et al.

[11] **3,885,068**

[45] **May 20, 1975**

[54] **EMULSIFIED ASPHALT EMULSION FORTIFIED WITH ASBESTOS FIBERS**

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[22] Filed: **Nov. 22, 1972**

[21] Appl. No.: **308,697**

[52] **U.S. Cl.** **427/394;** 106/282; 106/283; 428/283; 428/287; 428/288; 428/291

[51] **Int. Cl.** **B44d 1/02;** C08h 13/00

[58] **Field of Search**... 117/138.8 R, 138.8 E, 138.8 N, 117/168, 138.8 F; 106/282, 283

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[57] **ABSTRACT**

A method for coating a fabric with an asphalt emulsion containing asbestos fibers, the fibers having been pretreated with a non-ionic surface active agent to yield a stable emulsion containing asphalt and fortifying asbestos fibers, useful as a sealant composition which will not extrude from the fabric under elevated hydralic or fluid pressures. Stable emulsions containing asbestos fibers which have been pretreated with a non-ionic surface active agent are disclosed.

9 Claims, No Drawings

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EMULSIFIED ASPHALT EMULSION FORTIFIED WITH ASBESTOS FIBERS

This invention relates to an impervious cover structure. In one of its aspects, it relates to a cover structure comprising a fabric e.g. non-woven fabric, e.g. a polyolefin fabric, asphalt and asbestos fibers. In another of its aspects, the invention comprises a surface, structure, or object to which has been applied an impervious cover structure comprising, say, a polyolefin, for example, a non-woven polyolefin fabric, mat, or web the polyolefin being impregnated with a mixture containing asphalt and asbestos fibers. It also relates to a method for producing covers or coatings as described herein. Further, in a specific aspect, the invention relates to an improved reservoir or pond or other container or object, say, roofing, which is rendered fluid retentive by applying thereto an impervious cover structure according to the invention.

In one of its concepts the invention provides a cover structure which is produced from a polyolefin or other fabric, mat, or web, laying said fabric, mat, or web against an object, surface or ground to be rendered impervious, and then coating said fabric, mat, or web with an emulsion mixture containing asphalt and asbestos fibers, which has been prepared with asbestos fibers which have been pretreated by coating said fibers with a nonionic, surface-active substance.

In another of its concepts the invention provides a reservoir, container or pond having a liner or structure applied to the surface thereof as herein described.

Various liners have been provided for covering objects or surfaces or the ground to render these impervious to fluids, for example, to water, or other liquids. In places at which the fluid or liquid exerts considerable pressure against the covering structure or liner, leakage is often observed. This leakage occurs at so-called pin hole openings in the coating or covering structure. These leaks have been observed, particularly with non-woven fabrics which have been coated with various sealants. Thus, in fairly deep pond liner applications, it has been observed that asphalt sealed non-woven polypropylene fabric can develop pin hole leaks which may be due to cold flow or pressure extrusion.

We have now conceived of an improved cover structure. Thus, we have conceived that if the non-woven fabric is provided with at least one coat of an emulsion, mixture containing asphalt, preferably an anionic asphalt emulsion and a fibrous material e.g. asbestos, especially for high pressure uses of the coated fabric, the resulting structure will not develop leaks due to pressure extrusion.

An object of the invention is to provide a cover structure. A further object of the invention is to provide a fluid or liquid impervious cover structure suitable for application to objects to be protected against fluid or liquid. A further object of the invention is to provide a liner for liquid storage ponds. A still further object of the invention is to provide a cover structure of improved character in that it will withstand liquid pressure of considerable magnitude, yet not develop leaks due to pressure extrusion. A further object of the invention is to provide a cover structure comprising a non-woven fabric covered with asphalt which will not flow, once cured, due to cold flow through "windows" in the non-woven fabric.

Other aspects, concepts, objects and the several advantages of this invention are apparent from this disclosure and the appended claims.

According to the invention, there is provided an impervious cover structure which comprises a non-woven polyolefin fabric, mat, or web, the fabric, etc., being coated with an emulsion mixture containing asphalt and asbestos fibers to which there has been preapplied a nonionic emulsifier or surface active agent.

The emulsifier surface active agent can be applied to the asbestos fibers in a variety of ways. Presently an aqueous solution of the agent is applied to the fibers and any excess solution removed. This solution can be applied by dipping, spraying or other means. If desired the surface active agent can be directly applied to the asbestos fibers without water or other solvents. This method of treatment of the asbestos fibers prior to mixing them with the emulsion containing asphalt is not now preferred.

Thus according to the invention there is provided a stable asphalt/-asbestos emulsion and a method for sealing with an asphalt a fabric material suitable for use in which loss of asphalt from the fabric is to be avoided, as where the fabric is used as a liner capable of withstanding fluid or hydraulic pressure tending to cause the asphalt to extrude from the fabric, which method comprises preapplying or prewetting asbestos fibers with a nonionic surface active agent, blending the thus treated asbestos fibers with an asphalt emulsion obtaining a stable emulsion mixture containing the asbestos fibers and asphalt, applying such stable emulsion mixtures to said fabric and curing the coating thus obtained.

Although various asphaltic emulsions such as those selected from cationic, anionic and nonionic asphalt emulsions as these are described in the art for example in STANDARD SPECIFICATIONS FOR EMULSIFIED ASPHALT, ASTM D 977-57, can be used according to the invention there is now definitely preferred to be used anionic asphalt emulsions, especially when hydraulic barrier systems involving relatively elevated pressures are involved. The other systems that is cationic and nonionic asphalt emulsions are suitable for roofs, roads and decking where there is no substantial pressure head.

The asbestos fiber is added to the asphalt emulsion in amounts from about 4–15 parts/100 parts by weight of asphalt emulsion. It can have a fiber length of about 0.01–0.1 in., preferably about 0.03–0.06 in. While the presence of longer fibers can be tolerated, the preferred range is more readily handled by the usual equipment and best improves the desirable properties of the asphalt, such as the penetration values.

It has been found that using an approximately 4 oz-/yd^2 fabric, an asbestos fiber content of about 6–8, or more, parts/100 parts of asphalt emulsion is preferred, while for a 5 oz. web a fiber content of about 5–6 in the asphalt emulsion is sufficient.

The fabric is made from about 2–20 denier, preferably about 3–8 denier crimped staple about ½ to about 3 in. long; a batt of these fibers is needle punched by conventional means and the needle punched fabric is then passed through a pair of nip rolls, one of which is heated above the melting point of the fibers to heat-fuse the fibers on one side. The amount of fusion is adjusted to give the final product a tensile strength of from about 10 lbs. to about 75 lbs/inch of width, the

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strength depending both on the amount of fusion, weight of fabric and denier of the fiber. The fabric is about 1–5 mm thick under no compression and ordinarily less than about 10% of the thickness of the fabric fused.

The polypropylene fabric should have a weight of at least about 3.5–4 oz/yd² and is usually fused on one side only. A heavier fabric weighing about 5–6 and up to about 8 oz/yd² is now preferred over the lighter weight material. Much heavier fabrics become uneconomical and heavy to handle.

A capped product, e.g., a light fabric fused on both sides, having a "cap" of 1–2 oz/yd² of additional fiber, e.g., nylon, attached to one side thereof by an added needle punch operation and having a total weight between about 4.0 and about 5.5 oz/sq yard is now preferred for hydraulic applications over uncapped fabric. The added fiber now acts as a retention aid for the asphalt/asbestos composition while the water, upon breaking or curing of the emulsion takes place, to pass through, say, to the ground. Thus, the capped side is the one to which the asphalt/asbestos emulsion mixture is applied.

The materials used for capping can be the same as those of the fabric or different.

It is obvious that there are a number of variables which coact to provide an effective leak-proof liner. These variables can be determined by mere routine testing by one skilled in the art in possession of this disclosure.

The composition is an anionic asphalt emulsion based on petroleum asphalt with penetration at 77°F. of 40–100, preferably 70–95, a ductility about 40–50 and a ring and ball softening temperature of at least 120°F., emulsified in accordance to specifications of ASTM D977.

A typical recipe for preparing the asphalt emulsion is as follows:

UC CMC-P75-XH (carboxymethylcellulose thickener)	3 lbs.
Flake Caustic (NaOH)	26 lbs.
Rosen - Hercules Vinsol	138 lbs.
Soya Flour	50 lbs.
Biocide - Dowcide "G" - Dow Chemical	1.5 lbs.

Water to make 587 gallons of solution. Add sufficient asphalt to make 1,500 gallons of emulsion after homogenization in a colloid mill. The solids content is about 61% (50–65).

5–10 parts by weight of asbestos fibers, as herein described, based on asphalt emulsion, are prewetted with 30–60 parts water containing about .01–5% nonionic surfactant such as an alkylarylpolyether alcohol, specifically octyl-phenoxypolyethoxyethanol (Triton X-305).

EXAMPLE

Petroleum asphalt, penetration 94, R & B softening temperature 120°F., and meeting specification of ASTM D-977 was emulsified using the above set forth typical recipe.

100 parts by weight of this asphalt emulsion was combined with 7.5 parts by weight asbestos fibers (Johns Manville 7M02) 45 parts by weight of water containing 0.5 wt. % of Triton X305, a nonionic detergent.

The resultant emulsion mixture was stable and did not run off when applied to a sloping surface (45°). The asphalt/asbestos blend had a Ball and Ring softening point above 220°F. (glycerin), a penetration value at 77°F. of 36 and 8.1 cm ductility after it was cured.

These properties make the composition exceptionally suitable for hydraulic seal barriers and sloping roof installations. The stable emulsion mixtures thus prepared were applied to various fabrics, some topcoated with the same or different materials e.g., non-woven polypropylene capped with polypropylene fibers needled thereon, having a weight of about 5.5 oz/sq. yd., was given two coats, the first having been allowed to cure for 24 hours, for a total weight of about 3 pounds/sq. yd., of the above specific emulsion.

Test procedure was as follows:

A sample of the non-woven fabric was spray-coated with the asphalt emulsion. The coated fabric had no pin holes and was an effective hydraulic barrier at 100°F. and 15 psig. The test was carried out in a static load apparatus in which a sample fabric is subjected to a static hydraulic load at a controlled temperature and the time measured to develop a leak. This sample was tested for 70 hours without failure when the test was discontinued.

Another test of a nylon capcoated polypropylene non-woven fabric base was made with two coats, totalling 3.3 lbs/sq. yd., the emulsion, this time, containing 10 parts of the now preferred pretreated asbestos. After 70 hours no failure appeared. The test was discontinued.

It is essential, however, that the asbestos fibers in the mixture be forced by the flow of the liquid through the mat into immediate contact with the surface of the mat where they become imbedded in the unconsolidated top surface of the fabric and lodge in the interstitial voids present therein. The fabric will be given two coats when elevated pressures are expected. This ensures filling of the interstices. After the first coat is substantially cured the second coat is applied to cover the overall surface.

It is within the scope of the invention to preheat the asbestos fibers to ensure better contact between their surfaces and interstices with the surface active agent. The agent can be applied to the fibers with or without heating by fluidizing them and passing the agent therethrough.

Reasonable variation and modification are possible within the scope of the foregoing disclosure and the appended claims of the invention the essence of which is that there has been provided an improved stable emulsion mixture for use for application to various fabrics, particularly in the preparation of hydraulic sealant fabrics as applied to ponds, etc., as herein described, wherein the emulsion mixture contains asphalt and asbestos which has been pretreated with a nonionic surface-active agent before it is blended into an asphalt emulsion to produce said stable emulsion and that a stable asphalt-asbestos emulsion mixture has been set forth, also as described herein.

We claim:

1. A method for preparing an asphalt impregnated non-woven polyolefin fabric material capable of withstanding fluid or hydraulic pressure tending to cause the asphalt to extrude from the fabric, which comprises prewetting asbestos fibers having a fiber length of about 0.01–0.1 inches with a nonionic surface-active agent, blending enough of the thus-treated asbestos fibers with an anionic asphalt emulsion to obtain a stable

emulsion mixture containing about 4–15 parts of asbestos fibers per 100 parts of asphalt emulsion, applying such stable emulsion mixture to said fabric in an amount sufficient to insure the filling of the interstices of the fabric, and curing the coating thus obtained.

2. A method according to claim **1** wherein the non-woven fabric is a capped fabric, the cap being a polyolefin or a nylon non-woven fabric.

3. The method of claim **1** wherein the polyolefin non-woven fabric is made from polyolefin staple fibers of 2–20 denier which have been formed into a batt and needle punched and passed through a pair of nip rolls one of which is heated to heat fuse the fibers on one side of the batt such that the final product has a temple strength of from about 10 pounds to about 75 pounds per inch of width.

4. The method according to claim **3** wherein the polyolefin non-woven fabric is about 1 to 5 mm thick under no compression and less than about 10 percent of the thickness of the fabric is fused.

5. A method according to claim **4** wherein the fabric has a weight of about 3.5 ounce/square yard to about 8 ounce/square yard.

6. A method according to claim **5** wherein the polyolefin fabric has a nylon cap attached to one side by a further needle punch operation, said capped product having a total weight of between about 4.0 and about 5.5 ounces/square yard.

7. A method according to claim **6** wherein the asphalt/asbestos emulsion mixture is applied to the capped side of the fabric.

8. The method according to claim **1** wherein the non-ionic surfactant is an alkylarylpolyether alcohol.

9. The method according to claim **8** wherein the alkylarylpolyether alcohol is octyl-phenoxypolyethoxyethanol.

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