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(54) **METHOD FOR THE MAKING OF SELF-PLUGGING AND/OR NON-DRIPPING ROOFING CONSTRUCTION.**

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Description

The invention relates to the making of self-plugging and/or non-dripping roofing construction.

A modern roof design normally includes a structure to carry loads, insulation to control heat flow, a barrier to control air and vapour flow, and a roofing element to prevent water penetration.

Problems connected with leaks and dripping are known to occur with more or less all types of roofs, but are more prevalent with some roof designs than with others. There are such factors as roof angle, type of insulation or no insulation, type of roofing material and obviously the climate outside and inside which have significant bearing on the tendency for leaks and dripping from condensation of a particular building.

Buildings with flat or low-angle roofs in climates with snow during winter or with heavy rains and high humidity are particularly prone to develop leaks. Industrial buildings with a production process entailing high humidity are particularly prone to dripping from condensation.

On buildings with flat low-angle the roofs so called "built-up roofing" is the most common roofing type used. Built-up roofing is a continuous membrane covering manufactures on site from alternate layers of bitumen, bitumen-saturated felts or asphalt-impregnated glass mats, saturated and coated felts, and surfacings.

New materials have lately led to roofing materials of single-ply or limited-ply membranes consisting of e.g. a single-ply sheet of an elastomeric or plastic material.

Roofing membranes can also be liquid-applied as a single or two-component system with polymeric fabrics or glass-fibre reinforcements.

Whatever the type of roof and roofing construction and material used, water leaks and condensation can occur, particularly in the spring in cold climates when the snow on the roof is melting, or during so heavy rain falls that the roof-gutters cannot cope with the amount of water on the roof.

Water leakage and dripping for roofing constructions can have considerable economic consequences, even when the amount of water is small, for instance because the leakage site is of very small size, perhaps only a small nail hole. It is also extremely difficult to locate such leakage sites, the more difficult the smaller the leak.

Similar problems can also be caused by condensation as a result of not sufficiently effective insulation or ventilation.

An example of a prior arrangement is found in DE 2740275 which discloses a rigid moisture-impervious panel for inclusion in a roof structure, containing a water-swellable material which absorbs leaking water and helps to block the leak.

An object of the invention is to provide a method which makes it possible to achieve a self-plugging, i.e. a self acting leak-stopping and/or non-dripping roofing construction.

This object is achieved by a method in which a continuous second membrane is included with the basically waterproof roofing membrane, which second membrane comprises viscosity-increasing and aqueous-gel forming material chosen from the group consisting of the aqueous-gel forming natural and synthetic hydrophilic polymers and inorganic hydrophilic substances that form gels with water, whereby holes made by nails and cracks that may form upon weathering are self-plugged by the second membrane and dripping is prevented by water absorption and swelling of the second membrane. The invention also relates to a basically waterproof roofing membrane provided with a second membrane of the above type.

The present invention solves these problems in a simple and economic way by making use of the special properties which hydrophilic polymers and/or certain hydrophilic inorganic substances possess for increasing the viscosity of water to such an extent that it will not drip from the roofing construction and/or to bind the water in the form and consistency of a gel. Such polymers and inorganic substances can also by water be brought to swell to such an extent that a leakage is stopped by itself.

The hydrophilic polymers which can be used with the method, can either be water-soluble or water-swellable, or a combination of both. The same applies for the inorganic substances. Water-soluble polymers and/or water-soluble inorganic substances of the mention type can be made non water-soluble through partial cross-linking, i.e. cross-linking which leaves a number of hydrophilic groups free to bind water molecules.

The hydrophilic polymers and/or inorganic hydrophilic substances can be incorporated in many different ways in the roofing construction,

1) applied as a coat on the overside or the underside of the membrane, e.g. organic felt, asbestos ply felt, fiber-glass mats or base sheets, shingles, elastomeric or plastic film and sheeting etc., or on another component of the roofing construction, or

2) in the form of a film, sheet or mat, laid out over or under another component of the roofing construction, or

3) be applied on or in other ways attached to other components which are part of the roofing construction.

As an example of hydrophilic polymers which can be used for the method can be mentioned natural hydrophilic polymers such as gum arabic, traganth and karaya, semi-synthetic hydrophilic polymers such as carboxymethylcellulose, methylcellulose and other cellulose ethers, lignin derivatives, various kinds of modified starches (ethers and acetates), and synthetic hydrophilic polymers such as polyacrylic acids, polyacrylamides, and polyethylenoxide, polyvinyl pyrrolidone, polyethylenimine and others, as well as combinations of such polymers or with other substances.

As examples of inorganic substances, which can either be used alone to bind water in the form of a gel or a highly viscous fluid, can be men-

tioned water glass, alumina, magnesia, betonite etc. and mixtures of such inorganic hydrophilic substances or mixtures of these and hydrophilic polymers.

The mentioned hydrophilic polymers and/or hydrophilic inorganic substances can eventually be cross-linked, either in the form of a pre-crosslinked film or sheet or similar or a layer cross-linked in situ. As an example of the former can be mentioned "Dow Water Absorbent Laminate" and of the latter a mixture of lignosulfonate and dichromate.

There is an extensive patent and other literature treating viscosity-increasing or gel-forming polymers and inorganic substances, partially within the fields of grouting and oil drilling. The may be major part of such polymers and inorganic substances could find application with the method of the present invention with the necessary adjustments.

Claims

1. A method for making a basically waterproof roofing membrane self-plugging and non-dripping, comprising the step of including with the already basically waterproof membrane a continuous second membrane comprising viscosity-increasing and aqueous-gel forming material chosen from the group consisting of the aqueous-gel forming natural and synthetic hydrophilic polymers and inorganic hydrophilic substances that form gels with water, whereby holes made by nails and cracks that may form upon weathering are self-plugged by the second membrane and dripping is prevented by water absorption and swelling of the second membrane.

2. A method according to claim 1 wherein the second membrane is a continuous coating.

3. A basically waterproof roofing membrane characterised by the inclusion of a second membrane comprising viscosity-increasing and aqueous-gel forming material chosen from the group consisting of the aqueous-gel forming natural and synthetic hydrophilic polymers and inorganic hydrophilic substances that form gels with water, whereby holes made by nails and cracks that may form upon weathering are self-plugged by the second membrane and dripping is prevented by water absorption and swelling of the second membrane.

Patentansprüche

1. Verfahren zum Herstellen einer im wesentlichen wasserdichten, selbstdichtenden und nicht tropfenden Dachmembran, bei dem bei einer bereits im wesentlichen wasserdichten Membran eine durchgehende zweite Membran vorgesehen wird, die ein die Viskosität erhöhendes und ein wässriges Gel bildendes Material umfaßt, das aus der Gruppe gewählt ist, die aus ein wässriges Gel bildenden hydrophilen Natur- und Kunstpolymerisaten und hydrophilen anorganischen Stoffen besteht, die mit Wasser ein Gel bilden, wodurch Löcher, die durch Nägel gebildet sind, und Risse, die sich durch Verwittern bilden können, selbtständig durch die zweite Membran verstopft werden und durch Wasserabsorption und Quellen der zweiten Membran ein Tropfen verhindert wird.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die zweite Membran ein durchgehender Überzug ist.

3. Im wesentliche wasserdichte Dachmembran, gekennzeichnet durch eine zweite Membran, die ein die Viskosität erhöhendes und ein wässriges Gel bildendes Material umfaßt, das aus der Gruppe gewählt ist, die ein wässriges Gel bildende hydrophile Natur- und Kunstpolymerisate und hydrophile anorganische Stoffe umfaßt, die mit Wasser ein Gel bilden, wodurch Löcher, die durch Nägel gebildet sind, und Risse, die durch Verwittern gebildet werden können, selbsttätig durch die zweite Membran verstopft werden, und ein tropfen durch Wasserabsorption und Quellen der zweiten Membran verhindert wird.

Revendications

1. Procédé de fabrication d'une membrane de couverture pour toiture essentiellement imperméable, auto-isolante et non-suintante, comportant l'étape d'introduction avec la membrane déjà essentiellement imperméable d'une seconde membrane continue comprenant une matière augmentant la viscosité et formant un gel aqueux choisie dans le groupe comprenant les polymères hydrophiles naturels et synthétiques formant un gel aqueux et les substances inorganiques hydrophiles qui forment un gel avec l'eau, grâce à quoi les trous faits par les clous et les fissures qui peuvent se former du fait des intempéries sont auto-isolés par la seconde membrane et le suintement est empêché par l'absorption de l'eau et le gonflement de la seconde membrane.

2. Procédé selon la revendication 1, selon lequel la seconde membrane est un revêtement continu.

3. Membrane de couverture pour toiture essentiellement imperméable caractérisée par l'inclusion d'une seconde membrane comportant une matière augmentant la viscosité et formant un gel aqueux choisie dans le groupe comprenant les polymères hydrophiles naturels et synthétiques formant un gel aqueux et les substances inorganiques hydrophiles qui forment un gel avec l'eau, grâce à quoi les trous faits par les clous et les fissures qui peuvent se former du fait des intempéries sont autoisolés par la seconde membrane et le suintement est empêché par l'absorption de l'eau et le gonflement de la seconde membrane.