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(57)

ABSTRACT

In a coating material that hardens reactively without solvent evaporation and with an evaporation of maximal 15 mass % water, composed of at least two components, the first component contains a 60-70% mixture of bitumen and water in a quantity of 50 to 100 partial mass %, 0 to 50 partial mass % synthetic latex or natural latex, polyvinyl acetate emulsion, or acrylate emulsion, paraffin emulsion or wax emulsion and 0 to 10 partial mass % viscosity control agent, thixotropic additives and adhesion improving additives and that the second component contains 20 to 50 partial mass % filling material, 40 to 80 partial mass % softening, non-volatile oil and 0 to 10% by weight viscosity control agent, dispersing aids and wetting agents for oily phases and that the first component and the second component are mixed in a ratio of 100:10 up to 50 mass %. The coating material can be used for a moisture insulating coating of surfaces in every alignment and/or for the sealing of joints and gaps. The first and the second component are separately conveyed to a mixer and mixed in it and the mixture of the components is sprayed on the surface by a spray nozzle.

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COATING MATERIAL AND ITS APPLICATION IN THE COATING OF SUR

[0001] The invention relates to a coating material that hardens reactively without solvent evaporation and with an evaporation of maximal 15 mass % water as well as the use thereof and a method for applying the same to all types of buildings. According to the invention vertical surfaces (like walls, (trapezoid) plates for industrial halls, cladding elements) can be coated as well as horizontal surfaces (like ceilings, flat roofs, floors, parts of bridges and roads), inclined surfaces (like dams, gutters, channels) and the transition parts of different construction sites (like connections of walls with the floor plate).

[0002] In structural engineering buildings made of concrete or other building materials as e.g. road asphalt are generally coated in various ways to avoid the penetration of water. Concrete, asphalt and suchlike used as a construction body which is to a large extent rigid, are generally vulnerable to the creation of cracks (subsidence cracks and tension cracks, for static or thermal reasons) or holes or potholes. Such cracks promote the penetration of water. In order to avoid this, permanently plastic or elastic-viscous coatings are applied to the side of the construction body which faces the penetrating water. Buildings composed of other building materials as wood, clinker, clay can be sealed in the same or in a similar way.

[0003] According to prior art such sealing coatings are produced in the following different ways:

[0004] a. gluing on or melting on of sheets or foils, e.g. roof sheets, bitumen sheets, self-adhesive bitumen- or polymer modified bitumen sheets et al. The application of layers demands preparatory works like the application of a primer, work on scaffolding, handling of open flames, cutting and overlapping of the sheets, etc. If the work has to be carried out outdoors, the wind might significantly complicate it. Passages, corners and edges significantly complicate working with sheets and foils and often are weak spots for leakages. The working teams have to be technically skilled, adequately trained and be good team workers to carry out impeccable work.

[0005] b. laying on or spraying on of hot liquid thermoplastic substances like bitumen, polymer modified bitumen, plastics. Apart from a very complex heat-spraying technology these works require dry, warm weather, dry bases and cause high work effort and involve risks for the construction staff, high energy consumption, etc.

[0006] c. laying on or spraying on of substances containing solvents. During the last years this method was practically no longer applied or was limited to very small construction sections due to environmental protection issues (evaporation of solvents contained in the coating which are harmful to the environment).

[0007] d. laying on or spraying on of liquids, mainly bitumen emulsions, polymer modified bitumen emulsions, synthetic dispersions or natural rubber dispersions. This type of coating can also be applied to lightly moist bases, although only thin layers can be applied in one working cycle, as on the one hand the draining off on horizontal surfaces does not allow thicker layers and

on the other hand water has to evaporate while the layers are drying. Binder systems generally contain about 30% of water. Enclosed water leads to bubble formations and sealing damages. The layers generally contain foam bubbles due to the foam emulsifiers in the emulsions and consequently not completely free of imperfections. At least 3 to 4 layers have to be applied one upon the other and have to be dried thoroughly in between, which results in a high work effort and expenditure of time. The temperature of the base has to be high enough to allow an efficient evaporation of water and a formation of a film enfolding the erosion particles, which generally means at least +15° C. If rain falls soon after the coating, the not yet completely dried layers can be damaged partially or washed away completely, which leads to further work effort and to highly disturbing contaminations at the construction side. The result can also be highly affected by frost, even short night frosts. Very hot weather (sunny side) often causes the formation of a skin, thus water remains enclosed in the layer and bubbles might be formed. In order to avoid these disadvantages, two-component spraying systems were developed, also spraying a precipitant (generally on aqueous basis), which quickly leads to a breaking of the emulsions. Thereby draining and washing off during rain fall can be avoided to a large extent, but the drying times have to be respected all the same and the minimum film formation temperatures are necessary. These coating systems do not qualify either for the cooler construction season.

[0008] e. In addition to the application of the sealing binder film, it is often necessary in construction practice to apply insulating boards to the building structures and to permanently glue them. All methods described before require a gluing or doweling of the insulating boards in further complex work steps. Generally the latter method provokes mechanical damages to the seals which leads to a reduction of the leak-tightness, or the insulating boards enclose water from the gluing dispersions which results in an insufficient durability.

[0009] It is the object of the present invention to find a coating material, a use and a method for applying said coating material, which avoid the disadvantages mentioned above and which can be also used in late fall or winter climate, that means at temperatures close to the freezing point.

[0010] The object is solved by a coating material according to one or more of the claims 1 to 6, by a use according to one or more of the claims 7 to 9, as well as by a method according to one or more of the claims 10 to 12.

[0011] In contrast to the methods applied so far the coating material according to the invention can be used for the coating of building surfaces at a temperature from +1° C. onward, that means in a late fall or winter climate.

[0012] The following characteristics of the application and resulting advantages of the coating material according to the invention compared to prior art can therefore be deduced:

[0013] i. As the reactively hardening coating material for the coating consists of at least 85 to 100 percent active ingredient, up to a third of the material to be used can be spared compared to emulsion systems in order

to achieve the desired overall layer thickness. Furthermore the coating material qualifies as well for sealing or respectively filling of cracks, joints, gaps and for creating connections between different building bodies such as sheets, asphalt, curbstones, et al.

[0014] ii. The disadvantages caused by the evaporation of water from the layer and the compliance with the minimum film formation temperatures are small or completely avoided, the coatings are fully functional soon after the application (minutes to a few hours). The coating films are impervious and pressure resistant to water, as they do not contain any bubbles caused by emulsifiers.

[0015] iii. The weather influences are almost uncritical, as the water dilutability is only of short duration or nonexistent. The minimum film formation temperature is far below zero ° C., however. Therefore the coating material according to the invention can also be used at temperatures close to zero ° C. and in conditions of high air humidity, thus in the late fall and in warm winters in central European climatic zones.

[0016] iv. The material according to the invention and the method according to the invention do not require processing temperatures for the material that might lead to burns and therefore guarantee a very high occupational security standard for the executing construction staff.

[0017] v. The method according to the invention allows the seamless production of a liquid foil, therefore all complex cutting or overlapping procedures, necessary if sealing sheets are applied, can be omitted. Difficult building geometries as edges, corners, apertures can therefore be sealed against water in a functional and simple manner.

[0018] vi. The hardening reaction, that means the transformation from a consistency, capable of flowing and therefore processable when cold, corresponding to the consistency of highly fluid bees honey into a highly compact consistency which prevents the hardened product from draining off on vertical walls, takes place in such a short time that layers of a thickness of up to 4 mm can be sprayed on or spread with a float in one single working cycle.

[0019] vii. There are so few requirements as far the mixture ratio and the mixture intensity are concerned that both reactive components can be conveyed to the mixing spray nozzle by means of a simple pump system (e.g. gear pumps), can be combined there to a conjoint material stream and be spun on the base to be coated. Already during the free flight the viscosity starts to increase due to the beginning hardening reaction. For construction works with low material requirements, as for reparation purpose, the method also qualifies for packaging in cartouches, for example in 2 component cartouches with an adapter for a static mixer.

[0020] viii. Due to the to a large extent possible cold working and high pumpability of the two reactive components it is, as far as work procedures are concerned, possible to work with the lowest possible machine equipment, even in areas that are hard to access, as excavation pits often are. The material stor-

age containers, pumps and if necessary a compressed air compressor can be positioned in far distance to the working surface, in areas which are easy to access. The materials can be conveyed for up to 100 meters in thin, unheated tubes so that the staff only has to handle the simply constructed and light airgun (weight of a few kg only) with three tubes (compressed air and 2 material components). The construction work can therefore be executed in a very economical manner.

[0021] ix. Thanks to the excellent adhesive characteristics of the coating according to the invention during the hardening process, insulating boards or thermal blankets of all types, even with thermal sensitivity or solvent sensitivity like polystyrene foam boards can be glued together. It is not necessary to flash off substances under the insulating boards, as the coating hardens reactively, not by distillation.

[0022] x. Furthermore the coating according to the invention has anticorrosive characteristics which opens interesting application possibilities in particular regarding metal construction.

[0023] xi. Compared to pure reactively hardening plastic systems, as the long known acrylate systems, polyurethane systems or epoxy resin systems the method according to the invention, based on bituminous and mineral raw materials, stands out because of its significantly reduced price level, as well as the enormously crack bridging, elastic-viscous solid body characteristics. Furthermore these classical reactive artificial resin systems generally do not qualify for the application of layers in a thickness of up to 4 mm in one working cycle, as the hardening takes too long to be able to prevent the draining off on vertical surfaces with the low viscosities necessary for cold working.

[0024] For processing temperatures close to 0° C. the coating material according to the invention preferably consists of:

Component A:	
Mixture of bitumen and water, with a preferred ratio of 60 to 40 up to 70 to 30	50–100 m %
Synthetic latex or natural latex, polyvinyl acetate emulsion or acrylate emulsion or paraffin emulsion or wax emulsion	0–50 m %
Viscosity control agents, like polyethylene glycols, ether-alcohols or polyethers or higher boiling hydrocarbons	0–10 m %
thixotropic additives as fabrics, hollow glass microspheres, inorganic or organic silicon derivatives	
adhesion improving additives as fatty amines, adhesive resins, waxes	
Component B:	
Filling additives as rock meal, talc, cement, lime powder, gypsum, fly ash cement, scoria deriving from iron or steel production	20–50 m %
softening non-volatile oil, e.g. an adequate mineral oil, vegetable oil or a derivative thereof, or a synthetic oil, respectively able to start to dissolve the bitumen	40–80 m %
viscosity control agent, dispersing aids, wetting agent for oily phases	0–10 m %

Component A is mixed in a ratio of 100:10 up to 50 m % with component B and is afterward applied in a regular layer

thickness to the base to be coated by means of a scraper, squeegee, float. The mixture and applying can preferably also occur in a two component spray-on-method.

[0025] As an application example for construction works at lower temperatures two components are mixed as follows:

Component A:	
mixture of bitumen and water	50 m %
synthetic latex or natural latex	48 m %
viscosity control agent	2 m %
Component B:	
filling substances as rock meal, talc, cement	50 m %
linseed oil, tall oil or wood oil	45 m %
viscosity control agent	5 m %

[0026] The components were mixed in a ratio of 100:20 and displayed the desired characteristics.

1. A coating material that hardens reactively without solvent evaporation and with an evaporation of maximal 15 mass % water, composed of at least two components, characterized in that the first component contains a 60-70% mixture of bitumen and water in a quantity of 50 to 100 partial mass %, 0 to 50 partial mass % synthetic latex or natural latex, polyvinyl acetate emulsion, or acrylate emulsion, paraffin emulsion or wax emulsion and 0 to 10 partial mass % viscosity control agent, thixotropic additives and adhesion improving additives and that the second component contains 20 to 50 partial mass % filling material, 40 to 80 partial mass % softening, non-volatile oil and 0 to 10% by weight viscosity control agent, dispersing aids and wetting agents for oily phases and that the first component and the second component are mixed in a ratio of 100:10 up to 50 mass %.

2. The coating material according to claim 1 characterized in that the softening, non-volatile oil is a mineral oil, a vegetable oil or a derivative thereof or a synthetic oil.

3. The coating material according to claim 1 characterized in that the filling materials are selected from the group

consisting of rock meal, talc, cement, lime powder, gypsum, fly ash cement and scoria deriving from iron or steel production.

4. The coating material according to claim 1 characterized in that the thixotropic additives are selected from the group consisting of fabrics, hollow glass microspheres, inorganic or organic silicon derivatives.

5. The coating material according to claim 1 characterized in that the adhesion improving additives are selected from the group consisting of fatty amines, adhesive resins and waxes.

6. The coating material according to claim 1 characterized in that the viscosity control agents are selected from the group consisting of polyethylene glycols, ether-alcohols, polyethers and higher boiling hydrocarbons.

7. Use of the coating material according to claim 1 for moisture insulating coating of such surfaces as walls, ceilings, dams, channels, floors, bridges, roads or other traffic ways, metal sheets (e.g. cladding sheets), thermal protection elements or thermal blankets and/or sealing of joints and gaps.

8. The use according to claim 7 characterized in that the coating material is contemporaneously used as adhesive means for an insulating board that is to be applied to the surfaces.

9. The use according to claim 7 characterized in that the coating material is also used as an anticorrosive coating.

10. A method for the application of the coating material to a surface according to claim 1 characterized in that the first and the second component are separately conveyed to a mixer and are mixed in it and that the mixture of the components will be sprayed on the surface by means of a spray nozzle.

11. The method according to claim 10 characterized in that the mixer is part of the spray nozzle and that the components are mixed in the spray nozzle.

12. The method according to claim 10 characterized in that the components are taken from cartouches and conveyed to an adapter for a static mixer.

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