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(54) Benævnelse: **Fremgangsmåde til udsprøjtning af et skummateriale og beklædning opnået ved en sådan fremgangsmåde**

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WO-A1-01/70647
WO-A1-96/25475
WO-A1-2009/025861
WO-A2-02/20423
FR-A1- 2 930 257
GB-A- 749 002
US-A- 4 441 944
MOORFIELD G: "FILLING A GAP IN THE MARKET", CONCRETE, THE CONCRETE SOCIETY, GB, vol. 28, no. 3, 1 mai 1994 (1994-05-01), pages 12-14, XP000444051, ISSN: 0010-5317

METHOD FOR SPRAYING FOAM MATERIAL, AND COATING OBTAINED FROM SUCH A METHOD

The present invention relates to a process for spraying a foamed material, and to a building wall coating capable of being obtained by employing such a process.

Such a process is mainly intended to cover, in particular by insulating, and to renovate the exterior or interior walls of buildings. It can also be used to fill in surface cracks of building materials.

Currently, in new construction and in renovation, building professionals are on the look out for lightweight and/or insulating cementitious materials compatible with use in spraying, for example as a facade. This type of application by spraying makes it possible to deposit in particular thin layers (from at least one millimetre to several centimetres), makes it possible to perfectly match the geometry of the support and makes it possible to save time while reducing the costs in comparison with the conventional (manual) methods. Furthermore, the cementitious materials (concrete, mortar, cement, and the like) with lightening of the load are particularly prized, given that, being less dense, they in fact exert fewer stresses on the support on which they are applied, indeed even over the whole of the structure. It is important in conjunction for the lightweight material to have thermal insulation properties in conformity with the specifications of the building works, indeed even for these properties to be improved, and for them to show good mechanical properties in terms of mechanical strength, of impact strength over time and of resistance to the various mechanical stresses.

Conventional insulating or lightweight mortars with normal additives (expanded polystyrene (EPS), cork,

vermiculite, and the like) exhibit the disadvantage of turning dense when they are applied to the substrate, in particular by spraying, due in particular to the reduction in the volume of air entrained in the tempered mortar.

This implies that these standard lightweight mortars do not exhibit the optimum properties after spraying, in particular in terms of thermal insulation. In particular, the air-entraining additives known to a person skilled in the art do not make possible satisfactory control of the density with regard to the sprayed mortar.

For application in spraying, the mortar as a pretempered slurry is subjected to a certain number of stresses which limit such a method of application:

- shear stress during mixing,
- shear stress under high pressure in the pump of the spraying device (from 1 to 20 bar),
- flow (transportation) stress under pressure in a pipe often of great length (in particular from 10 to 50 m).

It is also known that the entire process of applying by spraying has the effect of densifying the mortar slurry, this being due to the discharge of a greater or lesser amount of air initially present in the slurry. This problem is all the more exacerbated in the context of the spraying of mortar slurries having low densities (in particular for the problems of thermal insulation or of rendering light), in particular in the case of the use of a mortar incorporating a foam, known as cementitious foam.

Application CN101439950 discloses the use of a concrete with foam by spraying; however, the densities of the sprayed material obtained remain very high since they

reach at best 1.1×10^3 kg/m^3.

The document WO01/70647 discloses foams of hydraulic binders prepared by mixing a pre-formed foam with an hydraulic binder. Theses foams are then formed into the desired form by casting or pouring.

The present invention is targeted at overcoming all or some of these disadvantages and should in particular combine the following advantages:

- to have, after spraying, a foamed material which responds to the stresses imposed during the spraying in terms of rheological properties, that is to say a foamed material which remains stable and sufficiently aerated while flowing easily and withstanding the stresses in the pipes of the spraying device;
- the foamed material must not flow or slide from the wall once sprayed and it must be able to be worked by the operator, that is to say be spread, smoothed and homogeneously distributed over the surface of the support, this being particularly the case for the deposition of high thicknesses (ideally up to 10 cm), and must adhere well to the support over which it is sprayed during the hardening thereof; and
- it must be possible to obtain, after spraying and then drying, a coating having a well aerated lightweight structure, with good thermal properties, without cracking or shrinking at high thickness, while retaining a satisfactory mechanical strength, in particular for withstanding occasional crushing actions or impacts.

In this regard, a subject-matter of the present invention is a process for spraying a foamed material, comprising the following stages:

a) preparing a foamed material by mixing with water, in the mixer of a spraying device, at least the following ingredients:

i) at least a hydraulic binder,
ii) a latex; and
iii) an aqueous foam;

b) transferring the said foamed material into the pump of the said spraying device;

c) spraying over a support; and

d) optionally making uniform in thickness, levelling and smoothing with a straightedge the said foamed material sprayed over the said support.

The inventors have demonstrated unexpectedly that, by virtue of this foamed material system, the mixture is sufficiently fluid to be sprayed, passing in particular through the pumping circuit. Furthermore, the foamed material, once sprayed over a wall, does not flow, even when a very thick layer (typically from 1 up to 10 cm) is deposited. The density of the mortar obtained after drying remains low and the slurry sprayed can subsequently be easily smoothed.

Such a foamed material can be easily sprayed with a conventional spraying device equipped with a hose. The mortar obtained is also sufficiently aerated to guarantee very satisfactory thermal properties and it has good mechanical strength. Consequently, a very effective coating compatible with a sprayed use is obtained.

The term "foamed material" denotes, in the context of the invention, for example, a cementitious foam, that is to say a foamed concrete, a foamed mortar or else a foam comprising a cement slurry (foamed cement slurry).

For the mixtures comprising at least one hydraulic binder prepared in stage a) of the process according to the invention, it is possible to use, on the one hand, without distinction, any mixed cement as defined in Standard EN 197, such as Portland cement mixtures or

pozzolanic mixed cements which can comprise, alone or in combination, fly ash, blast furnace slags and natural or calcined pozzolanas, but also, on the other hand, high-alumina cements or sulphoaluminate cements.

All the combinations of the abovementioned cements are also possible in preparing the foamed material in the context of the present invention.

In stage a), i) of the spraying process described above, use will be made of at least one hydraulic binder (cement); advantageously, it will be a Portland cement and more preferably a Portland CEM I 52.5 cement (Standard EN 197).

Preferably, use will be made only of a hydraulic binder (cement), advantageously a Portland cement and most preferably a Portland CEM I 52.5 cement.

A source of calcium sulphate which can participate in the composition of the foamed material in the context of the invention is, for example, gypsum, hemihydrate, phosphogypsum and/or anhydrite.

The lime used to prepare the foamed material in the context of the present invention is, for example, hydraulic lime, quick lime or slaked lime.

The term "filler", in the context of the present invention, defines in particular a calcareous filler, a siliceous filler or a clay (talc, kaolin, and the like). The filler is preferably a calcareous filler.

The calcareous or siliceous fillers are generally provided in the form of a powder with a particle size in particular of less than or equal to 120 µm.

The term "latex" denotes, within the meaning of the

present invention, in particular the latex polymers used generally in building materials. Mention may be made, among the polymers which can come within this category, of, for example, elastomeric latexes, thermoplastic latexes and thermosetting latexes.

Preferably, in the context of the present invention, the term "latex" is understood to mean an aqueous emulsion or dispersion of one or more natural or synthetic and generally thermoplastic polymeric substances. The polymer or polymers can be self-emulsifiable or else, in the contrary case, the emulsion or the dispersion is stabilized by appropriate surface-active agents. A latex of use in the context of the present invention advantageously has a glass transition temperature Tg of less than 50°C. Ideally, the Tg should be between -30°C and 50°C, preferably between -10°C and 30°C, advantageously between 5°C and 25°C, indeed even be substantially 15°C.

The mechanical properties of the foamed material can be adjusted by the combination of several latexes, at least one of which has a Tg within the range defined above.

It is preferable to use polymers with a Tg at the most slightly lower than ambient temperature in order to ensure the formation of a polymer film which confers appropriate properties of the polymer in the hardened cementitious material. Preference is also given to polymers having Tg values which are not excessively low in order for the polymer not to be too soft, which would give an excessively flexible cementitious material.

Advantageously, the latex comprises a polymer or copolymer of vinyl type, of acrylic type and/or derived from carboxylic acid. Preference is very particularly

given to latexes of vinyl type, in particular comprising pendant ester functional groups or based on copolymer of vinyl chloride and of olefin, which may or may not be silanized. Mention may in particular be made of latexes based on vinyl acetate, in particular based on polyvinyl acetate homopolymer or on copolymer of vinyl acetate and in particular of (meth)acrylic acid and/or ester, of maleic ester, of olefin and/or vinyl chloride, or based on vinyl chloride/ethylene copolymer. Other advantageous latexes can be chosen from those including a polymer of acrylic type, in particular a copolymer of acrylonitrile and acrylic ester or a copolymer of styrene and acrylic acid or ester which is silanized (that is to say, copolymerized with a monomer comprising ethylenic unsaturation carrying at least one silane or silanol functional group).

Use will advantageously be made of the latexes sold by Hexion®, of the styrene/acrylic copolymer type, such as Axilat® 4204 or any component of the Axilat® L or Axilat® DS range, for example Axilat® DS 805. However, the use of the products comprising antifoaming agents will be avoided.

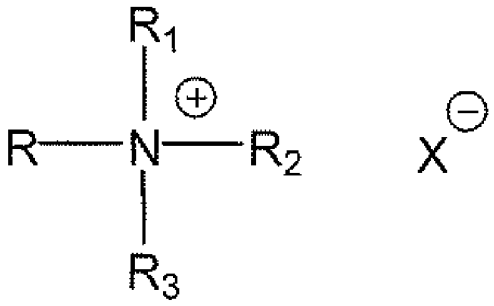
The latex can also be chosen from other styrene/acrylic copolymers or an entirely acrylic copolymer (resulting from different acrylic monomers) obtained by radical emulsion or dispersion polymerization. These latexes are stabilized by acrylic acid and/or acrylonitrile. Such polymers are also found sold by BASF in the range referenced by the name Acronal®, in particular Acronal® S 400. Use may also be made, alternatively or in combination, of any latex (just one or several) of this Acronal® range.

The term "aqueous foam" defines, within the meaning of the invention, any type of foam obtained by a

disorganized pile of gas bubbles in an aqueous phase, in particular in a liquid having a soapy appearance. Such a liquid having a soapy appearance comprises water and at least one surface-active compound.

Preferably, the aqueous foam of stage a) of the process described above comprises the mixture of the following compounds:

- at least one cationic surfactant salt selected from one of the following compounds of general formula:



(I)

for which R is an aliphatic chain of 8 to 24 carbon atoms, R_1 is a group selected from alkyls comprising from 1 to 16 carbon atoms, hydroxyalkyls comprising from 1 to 16 carbon atoms, a benzyl group or a group which, taken together with the nitrogen of the formula (I), gives a heterocycle optionally substituted by at least one fluorine atom, R_2 and R_3 are selected from groups composed of an alkyl group comprising from 1 to 6 carbon atoms, hydroxyalkyls comprising from 1 to 6 carbon atoms, a hydrogen atom, a benzyl group or a group which, taken together with the nitrogen of the formula (I), gives a heterocycle optionally substituted by at least one fluorine atom, and X^- is a counteranion;

- at least one anionic surfactant salt selected from one of the following compounds of general formula (II):

$$R\text{-}X^{-}\ Y^{+}\quad (II)$$

for which R is an aliphatic chain of 10 to 24 carbon atoms, X^- is a group carrying a negative charge selected from carboxylate, sulphate and phosphate groups, and Y^+ is a countercation selected from ammonium, sodium, potassium, calcium and magnesium groups;

such that the ratio of the content by weight of the cationic surfactant salt to the content by weight of the anionic surfactant salt varies from 0.05:1 to 15:1, preferably from 0.2:1 to 5:1, indeed even from 0.4:1 to 2.5:1.

In the context of the invention, "ionic surfactant salt" defines a surfactant taken together with the counterion which is associated with it.

Advantageously, the cationic surfactant salt of the aqueous foam used in stage a) of the process of the invention is selected from alkyltrimethylammonium salts comprising an alkyl group comprising from 10 to 22 carbon atoms and is preferably selected from at least one of the following compounds: dodecyltrimethylammonium bromide (or chloride), tetradecyltrimethylammonium bromide (or chloride), hexadecyltrimethylammonium bromide (or chloride), octadecyltrimethylammonium bromide (or chloride), cetyltrimethylammonium bromide (or chloride), cetylbenzyldimethylammonium chloride, cetyltriethylammonium bromide and tallowtrimethyl-ammonium chloride. More preferably, the cationic surfactant salt is tallowtrimethylammonium chloride.

Advantageously, the anionic surfactant salt(s) mentioned above is (are) selected from at least one of

the following compounds: ammonium stearate, potassium stearate, sodium stearate, calcium stearate and magnesium stearate.

Use may also be made, alternatively or complementarily, of the anionic surfactants composed of an alkali metal salt of an organic acid carrying an aliphatic chain comprising from 12 to 24 carbon atoms, advantageously a sodium, potassium or ammonium (optionally substituted) salt.

The X^- group of the general formula (II) can be a carboxylate, sulphate or sulfonate group. Mention may be made of salts of carboxylates comprising from 12 to 24 carbon atoms selected, for example, from salts of myristate, of palmitate, of stearate, of oleate or of the conjugate base of behenic acid and in particular the selected anions which are derived from salt by triglyceride hydrolysis (saponification). Mention may also be made of other carboxylates, such as those resulting from the treatment of tallow fatty acids comprising in particular palmitate, stearate and oleate. Other conjugate bases of fatty acids can also be used, such as, for example, the soaps/shower gels comprising fatty acids resulting from natural sources, such as tallow, coconut oil or alternatively palm oil.

Preferably, the cationic and anionic surfactants of the aqueous foam used in stage a) of the process which is a subject-matter of the present invention are included in two separate aqueous phases and are mixed in the contents indicated above in order to form the foam. The preparation of such an aqueous foam is described in Application WO96/25475.

The inventors have shown that these aqueous foams comprising a cationic surfactant and an anionic surfactant have the advantage of remaining particularly stable during spraying and even after, in particular

during the drying and/or the hardening.

Preferably, the cationic and anionic surfactants of the aqueous foam used in stage a) of the process which is a subject-matter of the present invention are included in one and the same aqueous phase which is vigorously stirred in order to bring about foaming.

Provision can also be made to add other ingredients in stage a) of the process according to the invention: for example, additives or adjuvants which confer specific properties, for example rheological agents, water-retaining agents, air-entraining agents, fibres having a rheological and/or mechanical functionality, thickening agents, biocidal and/or fungicidal protective agents, water repellents, dispersing agents, air-detraining agents, pigments (in particular inorganic pigments), accelerators, retarders or agents for improving the setting and/or the hardening and also the stability of the mortar after application. Use may also be made of agents which change the colour and/or the processability of the mortar, and the like.

All the combinations of the abovementioned ingredients in addition in the mixture in stage a) of the process according to the invention are also possible.

Preferably, sand is added in stage a) of the process according to the invention: to add sand makes it possible to prepare foamed mortars, in particular when the binder is a hydraulic binder.

Preferably, aggregates are also added with the sand in stage a) of the process according to the invention: to add sand and aggregates makes it possible to prepare foamed concretes, in particular when the binder is a hydraulic binder.

The sands used in the context of the invention preferably exhibit a particle size varying from 50 µm to 4 mm and advantageously from 50 µm to 500 µm.

The foamed material obtained in stage a) is preferably transferred into the pump of the spraying device and a pressure of from 1 to 20 bar, preferably of 1 to 5 bar or advantageously of 2 bar is applied to the mixture.

The spraying device used in the context of the invention is preferably a device sold by Putzmeister of P11 or S5 type. It has a spraying hose (or pipe) preferably with a length ideally of between 10 and 50 m, for example 12 m, for a cross section having a diameter preferably varying from 20 to 40 mm, for example 25 mm.

Another subject-matter of the present invention is a coating, in particular for façades and/or for interior walls, capable of being obtained by the spraying process as defined above in the context of the invention. The coating obtained corresponds to the sprayed foamed material dried and hardened on its support (wall, façade or other surfaces).

The coatings obtained in this context after drying and hardening have demonstrated excellent thermal performances since the thermal conductivity of the coating obtained according to the invention is typically less than or equal to 250 mW/m.K and is advantageously less than or equal to 200 mW/m.K; particularly preferably, it is less than or equal to 170 mW/m.K, indeed even less than or equal to 150 mW/m.K.

The thermal conductivity of the coatings obtained in the context of the invention is advantageously less than or equal to 110 mW/m.K; preferably, it is less

than or equal to 90 mW/m.K; more preferably, it is less than or equal to 75 mW/m.K and it is advantageously less than or equal to 55 mW/m.K, indeed even less than or equal to 45 mW/m.K and even less than or equal to 35 mW/m.K.

The density of the cementitious coating obtained according to the invention after drying and hardening is less than or equal to 800 kg/m^3, it is advantageously less than or equal to 400 kg/m^3 and it is more preferably less than or equal to 200 kg/m^3.

More preferably, the density of the insulating material according to the invention is less than or equal to 190 kg/m^3, it is advantageously less than or equal to 170 kg/m^3 and it is indeed even less than or equal to 150 kg/m^3.

All the combinations of the ranges of thermal conductivity values and of the ranges of density defined above are also possible.

A better understanding of the present invention and its advantages will be obtained on reading the following examples, which are given solely by way of illustration and cannot under any circumstances be regarded as limiting.

EXAMPLES

Compositions and preparation of the aqueous foams used in the manufacture of foamed cement slurries (Samples 1 and 2 of Table 1)

The amounts are given as % by weight, expressed either with respect to the total weight of each component (Foam 1) or with respect to the total weight of the foam (Foam 2).

Foam 1 (foam sold by Allied Foam)

Component 1 with the commercial reference 425A:

- Mixture of cationic surfactant belonging to the category of the long-chain alkyls: 50-60%
- Mixture of nonionic phenoxyl cationic surfactant: 10-20%
- Ethanol: 5-8%
- Water: 12-35%

Component 2 with the commercial reference 510B:

- Mixture of acrylic polymers: 25-35%
- Mixture of anionic surfactant belonging to the category of the fatty acids: 15-30%
- Water: 35-65%

The foam is generated by a foam generator sold by Allied Foam.
Component 1 is diluted at 136 g per 1 L of water.
Component 2 is introduced directly into the tank provided for this purpose.

Foam 2

The composition of the foam is as follows:

- 100 g of water
- 3.3 g of Arquad® T50 (49% of propylene glycol and 51% of tallowtrimethylammonium chloride (64% of C_{18} alkyl, 31% of C_{16} alkyl, 4% of C_{14} alkyl and 1% of C_{12} alkyl) in solution in propylene glycol)
- 0.67 g of Triton® X-405 (70% of octylphenol ethoxylate)
- 20 g of a 5.3% potassium stearate solution
- 30 g of Axilat® DS805 latex (57% of styrene/acrylic copolymer in suspension in water).

The products of the Arquad® range are sold by Akzo Nobel, those referenced under the Triton® name are sold by Dow Chemical and those referenced under the Axilat® name are sold by Hexion.

The foam is generated from a mixture of all of these components in one stage using a conventional foam generator at an air pressure of 8 bar.

Cementitious composition used for the manufacture of the foamed cement slurries (Samples 1 and 2 of Table 1)

The cementitious powders used for the preparation of Samples 1 and 2 have the following composition: 85% Portland CEM I 52.5 cement + 14.5% lime + 0.5% additives consisting of water-retaining agents and water repellents.

Manufacture of the two samples described in Table 1

The spraying tests are carried out using a spraying device from Putzmeister of S5 type.
First, the water is incorporated in the cementitious powder. The mixing for tempering lasts 30 seconds. With regard to Sample 1, the latex is added during the tempering (for Sample 2, the latex is already present in the composition of Foam 2).

The foam, furthermore produced as explained above, is subsequently introduced into the mixture in the proportions described in Table 1; the duration of the mixing of the cement slurry and of the foam is approximately 1 minute 30 seconds.
This then results in a homogeneous foamed cement slurry.

The foamed cement slurry is subsequently transferred

into the pump of the spraying device in order to spray over a vertical wall while adjusting the pressure to 2 bar (the latter can vary from 1 to 20 bar); the foamed cement slurry flows in a pipe with a length of 12 m (possibility of a length of up to 25 m) and with a diameter of 25 mm (it is also possible to use a pipe with a diameter of less than or equal to 1 cm).

The support used for the spraying is a wall composed of bricks coated with a smooth coating of mortar, thus simulating the coating of a precoated facade.
The foamed cement slurry is sprayed over this wall using a gun with a nozzle with an internal diameter of 15 mm at the outlet; a very thick layer, typically of 4 cm, of foamed cement slurry is sprayed over the wall.
The foamed cement slurry is subsequently smoothed over the wall with a straightedge in order to have a homogeneous thickness.

Measurement protocols

The density of the fresh foamed cement slurry

It is determined by measuring the weight of the foamed cement slurry in a 1 litre metal container (mortar conventional protocol). The standard deviation of the measurement is approximately 3%.

- Measurement on the cementitious foam before spraying: the latter is withdrawn after the mixing stage, immediately before transferring it into the pump for actual spraying.
- Measurement on the cementitious foam after spraying: the latter is withdrawn with a trowel from the wall directly after spraying.

The density of the hardened foamed cement slurry (facade coating)

28 days after spraying, the density is measured after having cut a 20 × 20 × 3 cm sample of the cementitious coating from the wall.
The density is determined by the ratio of the weight of the sample to its volume.
The accuracy of this measurement is estimated at 3%.

The measurement of the thermal conductivity

28 days after spraying, the thermal conductivity is determined using a Netzsch HFM 436/3/1 conductivity meter according to Standard EN NF 12664 from the samples used for the density measurement (see above).
The accuracy of the measurement is estimated at 3%.

The results obtained are summarized in the following Table 1.

Table 1 (*)

	Sample 1	Sample 2
Foam (with or without latex)	Foam 1 - 34.2%	Foam 2 - 22.7%
Cementitious composition	27.4%	45.5%
Latex	Axilat DS805 - 9.6%	
K1 glass microspheres from 3M	8.20%	
Water	20.50%	31.80%
Density of the fresh foamed cement slurry before spraying	183 g/l	217 g/l
Density of the fresh foamed cement slurry directly after spraying (onto the wall)	212 g/l	239 g/l
Behaviour of the foamed cement slurry on the wall	Satisfactory. Good maintenance, does not slide for a thickness of 4 cm and is easy to smooth.	Satisfactory. Good maintenance, does not slide for a thickness of 4 cm and is easy to smooth.
Density of the hardened foamed cement slurry (28 days after spraying)	161 g/l	187 g/l
Thermal conductivity of the hardened foamed cement slurry (28 days after spraying)	43 mW/m.K	51 mW/m.K

(*) The amounts are expressed as % by weight with respect to the total weight of the foamed cement

slurry.

P A T E N T K R A V

1. Fremgangsmåde til udsprøjtning af et skummateriale, hvilken fremgangsmåde omfatter følgende trin:

a) at fremstille et skummateriale ved blanding af vand med mindst følgende bestanddele i en udsprøjtningsanordnings blander:

i) mindst et hydraulisk bindemiddel,

ii) en latex; og

iii) et vandigt skum

b) at overføre skummaterialet til en pumpe i udsprøjtningsanordningen;

c) at udsprøjte på et underlag; og

d) eventuelt at tykkelsesudjævne, afrette og udglatte det på underlaget udsprøjtede skummateriale med retholt.

2. Fremgangsmåde ifølge krav 1, k e n d e t e g n e t ved, at der i trin a) anvendes en Portland-cement, fortrinsvis en Portland-cement CEM I 52.5.

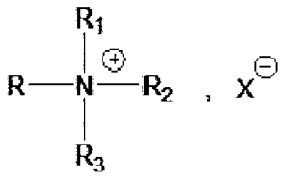
3. Fremgangsmåde ifølge et af kravene 1 eller 2, k e n d e t e g n e t ved, at der i trin a) desuden anvendes en kilde til calciumsulfat, kalk og/eller et fyldstof.

4. Fremgangsmåde ifølge et af kravene 1 til 3, k e n d e t e g n e t ved, at latexen, der anvendes i trin a), omfatter mindst et element udvalgt blandt en vinylpolymer, en akrylpolymer, en polymer omfattende carboxylsyrederivatfunktioner, en vinyl-copolymer, en akryl-copolymer og en copolymer omfattende carboxylsyrederivatfunktioner.

5. Fremgangsmåde ifølge et hvilket som helst af de foregående krav, k e n d e t e g n e t ved, at latexen omfatter en styren-akryl-copolymer.

6. Fremgangsmåde ifølge et hvilket som helst af de foregående krav, k e n d e t e g n e t ved, at det vandige skum omfatter en blanding af følgende bestanddele:

- mindst et kationisk tensidsalt udvalgt blandt forbindelser med følgende almene formel:



(I)

hvor R er en alifatisk kæde med 8 til 24 carbonatomer ; R_1 er en guppe udvalgt blandt alkyler omfattende 1 til 16 carbonatomer, hydroxyalkyler omfattende 1 til 16 carbonatomer, en benzylgruppe, en gruppe, der, sammen med nitrogenet i formlen (I), giver en heterocykel, som eventuelt kan være substitueret med mindst et fluoratom ; R_2 og R_3 er udvalgt blandt grupper bestående af en alkylgruppe omfattende 1 til 6 carbonatomer, hydroxyalkyler omfattende 1 til 6 carbonatomer, et hydrogenatom, en benzylgruppe, en gruppe, der, sammen med nitrogenet i formlen (I), giver et heterocykel, der eventuelt kan være substitueret med mindst et fluroatom ; og X^- er en modanion ;

- mindst et anionisk tensidsalt udvalgt blandt følgende bestanddele med den almene

formel (II) :

$$R\text{-}X^-, Y^+ \qquad (II)$$

hvor R er en alifatisk kæde med 10 til 24 carbonatomer, X^- er en gruppe, der bærer en negativ ladning, udvalgt blandt carboxylat-, sulfat- og phosphatgrupper ; og Y^+ er en modkation udvalgt blandt ammonium-, natrium-, kalium-, calcium- og magnesiumgrupper ; således at forholdet mellem vægtindholdet af det kationiske tensidsalt og vægtindholdet af det anioniske tensidsalt varierer mellem 0,05 : 1 og 15 : 1, fortrinsvis mellem 0,2 : 1 og 5 : 1, især mellem 0,4 : 1 og 2,5 : 1.

7. Fremgangsmåde ifølge krav 6, kendetegnet ved, at det kationiske tensidsalt er udvalgt blandt mindst et af følgende stoffer : dodécyltriméthylammoniumbromid, dodécyltriméthylammoniumchlorid, tetradecyltriméthylammoniumbromid, tetradecyltriméthylammoniumchlorid, hexadecyltriméthylammoniumbromid, hexadecyltriméthylammoniumchlorid, octadécyltriméthylammoniumbromid, octadécyltriméthylammoniumchlorid, cétyltriméthylammoniumbromid, cétyltriméthylammoniumchlorid, cétylbenzyldimethylammoniumchlorid, cétyltriéthylammoniumbromid og tallowtriméthylammoniumchlorid.

8. Fremgangsmåde ifølge et hvilket som helst af kravene 6 eller 7, kendetegnet ved, at det kationiske tensidsalt er tallowtrimethylammoniumchlorid.

9. Fremgangsmåde ifølge et hvilket som helst af kravene 6il til 8, kendetegnet ved, at det anioniske tensidsalt er mindst et af følgende stoffer : ammoniumstearat, kaliumstearat, natriumstearat, calciumstearat og magnesiumstearat.

10. Fremgangsmåde ifølge et hvilket som helst af de foregående krav, kendetegnet ved, at der i fremgangsmådens trin a) yderligere tilsættes sand.

11. Fremgangsmåde ifølge krav 10, kendetegnet ved, at der i fremgangsmådens trin a) yderligere tilsættes granulater.

12. Beklædning til facade eller indervæg, hvilken beklædning kan opnås ved fremgangsmåden til udsprøjtning ifølge et af kravene 1 til 11.

13. Beklædning ifølge krav 12, kendetegnet ved, at den har en varmeledningsevne under eller lig 250 mW/m·K.

14. Beklædning ifølge et hvilket som helst af kravene 12 eller 13, kendetegnet ved, at den har en varmeledningsevne under eller lig 110 mW/m·K.

15. Beklædning ifølge et hvilket som helst af kravene 12 til 14, kendetegnet ved, at den har en varmeledningsevne under eller lig 55 mW/m·K.

16. Beklædning ifølge et hvilket som helst af kravene 12 til 15, kendetegnet ved, at den har en varmeledningsevne under eller lig 45 mW/m·K.