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(54) Title of the Invention: **Method of applying a substantially planar member to a substrate**  
Abstract Title: **Method of applying a substantially planar member to a substrate**

(57) Methods of applying a substantially planar member to a substrate are disclosed, the method comprises providing an adhesive comprising one or more selected from the group consisting of: a substantially water free adhesive and a polymer modified cement adhesive. The substrate may be a salt-impregnated wall surface arising from damp penetration, or a salt-impregnated wall covered by a salt barrier. The water-free adhesive may be a silane-modified polyether or poly acrylate, or a urethane foam adhesive. The salt barrier composition comprises one or more selected from the group consisting of a silane and a siloxane.

METHOD OF APPLYING A SUBSTANTIALLY PLANAR MEMBER TO A  
SUBSTRATE

5 This invention relates to methods of applying substantially planar members to substrates, such as building walls. More particularly, but not exclusively, this invention relates to methods of re-plastering walls.

10 Rising damp is a problem in many buildings. Not only can it make rooms feel cold, damp and inhospitable, the upward flow of water into the fabric of the building can result in ground water contaminants being retained in the wall, even after the problem of rising damp itself has been cured by the application of a new damp course. The contaminants comprise salts, such as sodium chloride, sodium sulphate and potassium nitrate. The salts can crystallise on the surface of the wall rendering it unsightly and causing deterioration of any painted surface.

15 According to one aspect of this invention, there is provided a method of applying a substantially planar member to a substrate, the method comprising providing an adhesive capable of reacting with water, applying the adhesive to the substrate and/or the substantially planar member, and thereafter adhering the substantially  
20 planar member to the substrate by means of the adhesive.

The adhesive may be applied either to the substrate or to the substantially planar member before the substrate and the substantially planar member are adhered to one another.

25 According to another aspect of this invention, there is provided a method of applying a substantially planar member to a substrate, the method comprising: providing an adhesive comprising one or more selected from the group consisting of a substantially water free adhesive and a polymer modified cement adhesive; applying  
30 the adhesive to the substrate or the substantially planar member; and thereafter adhering the substantially planar member to the substrate by means of the adhesive.

According to another aspect of this invention, there is provided an adhesive arrangement for applying a substantially planar member to a substrate, the adhesive

arrangement comprising: an adhesive comprising one or more selected from the group consisting of a substantially water free adhesive and a polymer modified cement adhesive; and a substantially planar member, wherein the substantially planar member can be adhered to the substrate by means of the adhesive.

5

The substrate may comprise a wall, such as a building wall. The substrate may contain one or more salts, and may contain more than 0.18 wt.% salt. The substrate may contain more than 0.03 wt.% of a chloride salt, and/or more than 0.05 wt.% of a nitrate salt, and/or more than 0.1 wt.% of a sulphate salt.

10

The substrate may contain a total or aggregate amount of salts of up to 20 wt.%. Desirably, the total or aggregate amount of salts in the substrate may be up to 10 wt.%

15 The substantially water free adhesive may be one or more selected from the group consisting of a silane modified polymer adhesive and a urethane adhesive.

The silane modified polymer adhesive may comprise a silane modified polymer, which may be a silane modified polyether or a silane modified polyacrylate.

20

In one embodiment, where the water free adhesive comprises the silane modified polymer adhesive, the adhesive may comprise at least 20 wt.% of the silane modified polymer. The adhesive may comprise between 20 wt.% and 40 wt.% of the silane modified polymer. Desirably, the adhesive comprises between 25 wt.% and 25 35 wt.% of the silane modified polymer.

The silane modified polymer adhesive may include an alkoxy silane, such as an alkenyl alkoxy silane. The adhesive may include less than 5 wt.% of the alkoxy silane. The adhesive may include between 0.2 wt.% and 5 wt.% of the alkoxy silane. 30 Desirably, the adhesive may include between 0.3 wt.% and 1 wt.% of the alkoxy silane.

The alkoxy silane may comprise a trialkoxy silane, such as vinyl trimethoxy silane.

The silane modified polymer adhesive may also include a filler to provide bulk thereto. The adhesive may include between at least 10 wt.% of the filler. The adhesive may include between 10 wt.% and 75 wt.% of the filler. More preferably, the adhesive may include between 30 wt.% and 50 wt.% of the filler.

5

The filler may comprise calcium carbonate or silica. The calcium carbonate may be in the form of small particle sized calcium carbonate. The silica may be in the form of silica flour. The filler may include a lightweight filler component, having a density of less than 1000 kg/m<sup>3</sup> to reduce the thermal conductivity of the adhesive.

10

The silane modified polymer adhesive may include a thixotropic agent to increase viscosity at low shear rate. The filler may include the thixotropic agent.

The viscosity of the silane modified polymer adhesive may be above 1000 Pa.s, when measured at a low shear rate of 0.1 seconds. Preferably, the viscosity of the silane modified long chain hydrocarbon adhesive may be between 1000 Pa.s and 200,000 Pa.s, when measured at a low shear rate of 0.1 seconds. More preferably the viscosity of the silane modified long chain hydrocarbon adhesive may be between 10,000 Pa.s and 100,000 Pa.s, when measured at a low shear rate of 0.1 seconds.

20

Where the water free adhesive comprises the urethane adhesive, the adhesive may comprise a urethane foam adhesive. The adhesive may be based upon a methylene di-isocyanate and polyol prepolymer. The adhesive may include 40 wt.% to 60 wt.% of the prepolymer. The adhesive may be a single component, moisture-cured polyurethane adhesive, which may be substantially solvent free. A suitable such adhesive is sold under the trade mark INSTA STIK.

25

Where the adhesive comprises a polymer modified cement adhesive, the adhesive may comprise a base preparation and water, the base preparation being dispersible in, and reactive with, the water to provide the adhesive.

30

The base preparation may comprise a polymer. The base preparation may further comprise a cement component and a sand component.

The polymer may comprise a powdered latex polymer. Preferably, the polymer may comprise a dispersible hydrophobic polymer, such as Vinnapas 8034H or Vinnapas SAF54 supplied by Wacker Chemie AG.

5

The base preparation may include at least 10 wt.% of the polymer. Desirably, the base preparation comprises 10 wt.% to 40 wt.% of the polymer. More desirably, the base preparation comprises 20 wt.% to 30 wt.% of the polymer.

10 The base preparation may comprise at least 15 wt.% of the cement component. Desirably, the base preparation comprises between 15 wt.% and 35 wt.% of the cement component. More desirably, the base preparation comprises between 15 wt.% and 25 wt.% of the cement component.

15 The base preparation may comprise at least 15 wt.% of the sand component. Desirably, the base preparation comprises between 30 wt.% and 70 wt.% of the sand component. More desirably, the base preparation comprises between 55 wt.% and 65 wt.% of the sand component.

20 The sand component may comprise substantially 100% sand. Alternatively, the sand component may comprise a major proportion of sand and a minor proportion of lightweight aggregate particles, to reduce the thermal conductivity of the adhesive.

The polymer modified cement adhesive may include a thickener, which may  
25 comprise one or more selected from the group consisting of: a cellulosic ether such as hydroxyethyl cellulose ether and/or hydroxymethyl cellulose ether; bentonite and/or modified bentonite; agar and/or guar gum; polyvinyl alcohol; and polyacrylamide. A suitable thickener is a bentonite thickener, such as Optigel supplied by the company Rockwood Additives Limited.

30

The polymer modified cement adhesive may comprise at least 0.1 wt.% of the thickener. Desirably, the polymer modified cement adhesive comprises between 0.1 wt.% and 1 wt.% of the thickener.

The arrangement may comprise a salt barrier composition. The method may comprise applying the salt barrier composition to the substrate before applying the adhesive thereto. The salt barrier composition may comprise a silane and/or a siloxane. The salt barrier composition may further include water and a surfactant,  
5 which may be used in the emulsification process used in the manufacture of said salt barrier composition.

The salt barrier composition may further include at least one viscosity modifying additive and may include a surfactant, such as a non-ionic ethoxylated surfactant.  
10 The salt barrier composition may comprise between 5 wt.% and 80 wt.% of the silane and/or siloxane.

In one embodiment, the silane may comprise one or more alkoxy silanes, such as octyl triethoxysilane, propyl ethoxysilane, butyl ethoxysilane and/or hexyl  
15 ethoxysilane.

In one embodiment, the siloxane may comprise a polyalkylsiloxane, an oligomeric alkyl siloxanes and/or an aminosiloxane.

20 The salt barrier composition may be a thixotropic composition, and may be in the form of a cream. Where the salt barrier composition includes substantially 80 wt.% the silane and/or siloxane the salt barrier composition may be thixotropic. The salt barrier composition may be an emulsion.

25 The salt barrier composition may include substantially 80 wt.% of the silane. Alternatively, the salt barrier composition may include substantially 80 wt.% of the siloxane. Alternatively, the salt barrier composition may include an aggregate amount of 80 wt.% of the silane and siloxane, such as 40 wt.% silane and 40 wt.% siloxane.

30

Where the salt barrier composition is thixotropic, the embodiments described herein have the advantage that a coating of said composition, having a weight of 200 g/m<sup>2</sup> may maintain position and penetrate the salt-containing brickwork rather than slumping from the vertical wall.

Where the salt barrier composition includes substantially 40 wt.% of the silane and/or siloxane a high viscosity may be achieved by the addition of hydrophobic solvent thereof. A biocide may be added to the salt barrier composition to prevent mould growth occurring after application to the treated substrate. Suitable examples of biocides are those with fungicidal activity such as Acticide MKX and Acticide MBL manufactured by Thor Group Limited.

The arrangement may comprise a damp proof course. The method may comprise applying the damp proof course to the substrate before applying the adhesive composition and/or the salt barrier composition. The damp proof course may be a chemical damp proof course, for example as described in published European patent application No. EP1106590.

Old or salt-damaged plaster may first be removed from the substrate by mechanical means and the damp proof course provided. The damp proof course may be a physical damp proof course, such as a membrane, or a chemical damp proof course.

The barrier cream may be applied to the wall and allowed to penetrate into the substrate. The adhesive may be applied to the substrate or substantially planar member in a series of regularly spaced deposits. The substantially planar member may then be presented to the substrate to apply the substantially planar member thereto.

It may, but not necessarily, be beneficial to use mechanical plugs to aid in positioning of the planar member on the substrate, especially when the substrate is uneven. The plugs are desirably of sufficient length to allow mechanical bonding into a drilled hole in the substrate and provide a space between the substantially planar member and substrate.

The substantially planar member may comprise an internal lining board for a building wall, for example, plaster board, insulation board or a moisture resistance board. The insulation board may include a vapour permeable membrane layer to control moisture vapour flow. Examples of suitable boards are: gypsum plasterboard,

cement surfaced polystyrene insulation board and combination boards such as those comprising rigid insulation (PIR) and plasterboard. Boards in this last category have good thermal insulation properties and are helpful for heat-saving. Various thicknesses of boards can be applied using the method.

5

Substrates having a salt content of more than 0.03 wt.% of a chloride salt, more than 0.05 wt.% of a nitrate salt, or more than 0.1 wt.% of a sulphate salt may be suitable for a method comprising applying the adhesive to the substrate without applying a salt barrier composition.

10

Substrates having a salt content of more than 0.1 wt.% of a chloride salt, more than 0.15 wt.% of a nitrate salt, or more than 0.25 wt.% of a sulphate salt may be suitable for a method comprising applying the salt barrier composition prior to applying the adhesive.

15

According to another aspect of this invention, there is provided an article comprising a substrate, to which substrate a method as claimed in any preceding claim has been applied.

20

Embodiments of the invention will now be described by way of example only.

### Example 1

The following steps were taken in this Example.

25

A. A building wall having a salt content of more than 0.03 wt.% of a chloride salt, more than 0.05 wt.% of a nitrate salt, and more than 0.1 wt.% of a sulphate salt was provided, and a polymer modified cement having the composition set out in Table 1 was applied to the wall:

30



Table 1: Polymer Modified Cement Adhesive

<b>Ingredient</b>	<b>Amount in Wt. %</b>
White Portland cement	15.8
Hanson W60 sand	51.6
Optigel Bentonite Thickener	1.0
Vinnapas 8034H	31.6
<b>Total</b>	<b>100</b>

5 B. A substantially planar member, in the form of plaster board was adhered to the wall by means of the adhesive.

C. After the adhesive had been allowed to dry, a thin layer of plaster was applied over the plaster board.

10 Example 2

A. The steps taken in Example 1 were repeated in this Example for the silane modified polymer adhesive set out in Table 2 below replacing the polymer modified cement adhesive used in Example 1.

15

Table 2: Silane Modified Polymer Adhesive

<b>Ingredient</b>	<b>Amount in Wt. %</b>
MS Polymer S303H - Kaneka	32.8
Plasticiser DINP from Exxon	16.4
Carbonate filler Queensfil from WhitChem Limited	48.0
Thixotropy modifier Cray Valley SLX	1.6
Vinyl trimethoxy silane	0.6
Catalyst TIB KAT 223	0.6
<b>Total</b>	<b>100</b>

### Example 3

5 The following steps were taken in this example.

A. A wall having a salt content of content of more than 0.1 wt.% of a chloride salt, more than 0.15 wt.% of a nitrate salt, and more than 0.25 wt.% of a sulphate salt was provided and a salt barrier composition in the form of a cream, having the  
10 ingredients set out in Table 3, was applied to one face of the wall.

Table 3: Salt Barrier Cream

<b>Ingredient</b>	<b>Amount in Wt. %</b>
Emulsion comprising 80 wt.% octyl triethoxysilane as the active ingredient (supplied by Wacker Chemie AG as Silres Creme C)	99.2 wt.%
Biocide (supplied by Thor Group Limited as Acticide MKX)	0.8 wt.%

15

B. After the salt barrier cream had been applied to the wall, an adhesive having a composition as set out in Table 1 was then applied to the wall.

C. A substantially planar member, in the form of plaster board, was adhered to  
20 the wall by means of the adhesive.

D. After the plaster board has been applied to the wall, a thin layer of plaster was then applied over the plaster board.

25 The salt barrier composition is a thixotropic emulsion, and may be formed by mixing 80 wt.% of the silane active ingredient with 20 wt.% of a mixture of water and a surfactant. A suitable composition is prepared by adding octyl triethoxy silane into the mixture of water and the surfactant and thereafter stirring with a high shear

mixer. A suitable surfactant is a non-ionic ethoxylated type, such as that supplied by the company Lankem Ltd under the trade mark Lansurf AE320W

5 The ratio of surfactant to water may be 1 to 10%, desirably 2 to 6%. The technique for mixing the ingredients would be immediately apparent to the skilled person. After forming the thixotropic emulsion, the biocide is added.

10 In each of Examples 1, 2 and 3, the salt content of the wall is above the level at which prior plastering methods, or prior methods of applying plaster board to walls, are efficacious. With the above described examples, however, the plasterboard remains adhered to the wall to allow redecorating to take place.

Other examples of the invention are set out below.

15 Example 4

A. Bricks were partially immersed end on to a depth of 3 cm in a salt solution containing 0.5 wt.% NaCl, 0.5 wt.% KNO<sub>3</sub> and 2.0 wt.% Na<sub>2</sub>SO<sub>4</sub>. The bricks remained immersed in the salt solution for a period of two days.

20

B. The bricks were then removed from the salt solution and allowed to dry, and any surface salt crystals then wiped off. The salt concentration in the bricks was determined to be 1.0 wt.% soluble chloride, 0.5 wt.% soluble nitrate, and 3.2 wt.% soluble sulphate.

25

C. Pieces of cut plaster board, being substantially the size of the bricks, were provided and a respective piece of plaster board was adhered to each brick with a polymer modified cement adhesive selected from the three adhesives, S1, S2 and S46 set out in Table 4 below.

30

Table 4

Ingredient	Amount in Wt. %		
	S1	S2	S46
White Portland Cement	15.8	18.1	31.1
Hanson W60 sand	51.6	59	52.8
Optigel bentonite thickener	1.0	1.1	3.2
Vinnapas 8034H	31.6	21.7	12.9

5

D. In addition to the above polymer modified cement adhesives, the steps below were also carried out using plaster board adhered to bricks with the following adhesives:

10 Urethane foam adhesive – an adhesive sold under the trade mark: Dow Insta-stick;

Silane modified polyether – adhesives sold under the trade marks: Bostick Serious Stuff; Everbuild Stix All; Vandex Uniflex.

15 E. The bricks having the pieces of plaster board adhered thereto were then placed in a salt solution as above for three days.

20 F. The bricks were then removed from the salt solution and immersed in a bath of water up to a depth of 3 centimetres for seven days, such that the board was not in direct contact with the salt solution.

G. After the seven day immersion in water, the bricks were removed and left to dry to allow the salt to crystallise on the surface.

25 H. After the crystallisation of the salt, the bricks were then immersed in a water bath up to a depth of 3 centimetres for a further seven days.

I. At the end of this period, the bond strength of the adhesive and the moisture content of the plaster board were checked.

J. In addition, the extent of downward movement of the pieces of plaster board was also measured (a “slip test”). It is desirable that the adhesive allows little or no downward movement, but some downward movement is acceptable. All of the tests shown in Table 5 below show an acceptable level of downward movement.

Table 5 includes the results of the above test carried out for Example 4.

10

Table 5

<b>Adhesive Type</b>	<b>Example of Adhesive Tested</b>	<b>Slip Test (cm)</b>	<b>Salt Test Result</b>
Polymer modified cement	S1 (in-house recipe; see Table 4 above)	< 0.5 cm	No salt transfer visible
Polymer modified cement	S2 (in-house recipe; see Table 4 above)	5 cm	No salt transfer visible
Polymer modified cement	S46 (in-house recipe; see Table 4 above)	< 0.5 cm	No salt transfer visible
Urethane foam	Dow Insta-stick	0.5	No salt transfer visible
Silane modified polyether	Bostick Serious Stuff	2.3 cm	No salt transfer visible
Silane modified polyether	Everbuild Stix All	2.4 cm	No salt transfer visible
Silane modified polyether	Vandex Uniflex	1 cm	No salt transfer visible

15 In comparison a gypsum based plaster adhesive showed a value of < 0.5 cm in the slip test but significant transfer of salt.

### Example 5

- The above testing process was repeated with fresh bricks. After Stage A, a salt barrier cream having a silane/siloxane content as set out below in Table 6 was applied to one face of each of the bricks, which were then left for two hours. At the end of this two hour period, the above process was continued at Stage B above. The adhesive is applied to the face of each brick having the salt barrier cream thereon.
- The amount of moisture transferred from the bricks to the plaster board was measured. A sample with no salt barrier cream, i.e. according to Example 4 above was also tested in this example. In addition to showing the silane/siloxane content of the salt barrier cream, Table 6 also shows the extent of moisture transfer.
- As a comparison, bricks having plasterboard adhered thereto according to steps A to G above, but using gypsum to adhere the plasterboard to the bricks, were also tested.

Table 6

	Moisture content of plaster board at completion of tests (weight %)			
Adhesive Type [Example Tested]	No Barrier Cream	80% Silane Cream	40% Silane/ 40% Siloxane Cream	Diluted BS4004
Polymer Modified Cement (S2 –see Table 4 above)	1.2%	0.5%	0.5%	0.4%
Gypsum [Hardwall]	14.5%	3.5%	6.9%	3.4%
Silane modified polyether	2.2%	0.6%	0.6%	1.3%

Table 6 shows that there is a significant decrease in moisture transfer into the bricks when the salt barrier cream is used

5 Table 6 also shows a decrease in moisture transfer when compared with gypsum by the use of an adhesive according to the invention without the use of salt barrier cream.

10 The above results show that the use of the adhesives according to the invention provides salt resistant bonds despite the severity of the test conditions. The inventor believes that this is a surprising result bearing in mind that crystallisation of the salts would occur at the bond surface between adhesive and substrate.

15 Various modifications can be made without departing from the scope of the invention, for example other water free adhesives can be used to bond the substantially planar member to the wall.

## CLAIMS

1. A method of applying a substantially planar member to a substrate, the method comprising:  
5 providing an adhesive comprising one or more selected from the group consisting of: a substantially water free adhesive and a polymer modified cement adhesive;  
applying the adhesive to the substrate or the substantially planar member; and  
10 thereafter adhering the substantially planar member to the substrate by means of the adhesive.
2. A method according to claim 1, wherein the substrate contains one or more  
15 salts.
3. A method according to claim 2, wherein the substrate contains more than 0.18 wt.% salt.
- 20 4. A method according to claim 1, 2 or 3, wherein the substrate contains more than 0.03 wt.% of a chloride salt, and/or more than 0.05 wt.% of a nitrate salt, and/or more than 0.1 wt.% of a sulphate salt.
- 25 5. A method according to any preceding claim, wherein the substantially water free adhesive comprises one or more selected from the group consisting of a silane modified polymer adhesive and/or a urethane adhesive.
- 30 6. A method according to claim 5, wherein the silane modified polymer adhesive comprises a silane modified polymer comprising one or more selected from the group consisting of a silane modified polyether and/or a silane modified polyacrylate.
7. A method according to claim 6, wherein the silane modified polymer adhesive comprises at least 20 wt.% of the silane modified polymer.
- 35 8. A method according to claim 7, wherein the silane modified polymer adhesive comprises between 20 wt.% and 40 wt.% of the silane modified polymer.



9. A method according to claim 7 or 8, wherein the silane modified polymer adhesive comprises between 25 wt.% and 35 wt.% of the silane modified polymer.
- 5 10. A method according to any of claims 7, 8 or 9, wherein the silane modified polymer adhesive includes an alkoxy silane.
11. A method according to claim 10, wherein the alkoxy silane comprises an alkenyl alkoxy silane.
- 10 12. A method according to claim 10 or 11, wherein the silane modified polymer adhesive includes less than 5 wt.% of the alkoxy silane.
13. A method according to any of claims 10, 11 or 12, wherein the adhesive  
15 includes between 0.2 wt.% and 5 wt.% of the alkoxy silane.
14. A method according to any of claims 10 to 13, wherein the adhesive includes between 0.3 wt.% and 1 wt.% of the alkoxy silane.
- 20 15. A method according to any of claims 10 to 14, wherein the alkoxy silane comprises a trialkoxy silane.
16. A method according to claim 15, wherein the alkoxy silane comprises vinyl trimethoxy silane.
- 25 17. A method according to any of claims 6 to 16, wherein the silane modified polymer adhesive includes a thixotropic agent to increase viscosity at low shear rate.
18. A method according to any of claims 6 to 17, wherein the viscosity of the  
30 silane modified polymer adhesive is above 1000 Pa.s, when measured at a low shear rate of 0.1 seconds.
19. A method according to any of claims 6 to 18, wherein the viscosity of the silane modified long chain hydrocarbon adhesive is between 1000 Pa.s and 200,000  
35 Pa.s, when measured at a low shear rate of 0.1 seconds.

20. A method according to any of claims 6 to 19, wherein the viscosity of the silane modified long chain hydrocarbon adhesive is between 10,000 Pa.s and 100,000 Pa.s, when measured at a low shear rate of 0.1 seconds.
- 5 21. A method according to any of claims 5 to 20, wherein the urethane adhesive comprises a urethane foam adhesive.
22. A method according to claim 21, wherein the urethane foam adhesive comprise a methylene di-isocyanate and polyol prepolymer.
- 10 23. A method according to claim 22, wherein the urethane foam adhesive includes 40 wt.% to 60 wt.% of the polyol prepolymer.
24. A method according to claim 23, wherein the urethane foam adhesive is a  
15 single component, moisture-cured polyurethane adhesive, which is substantially solvent free.
25. A method according to any preceding claim, wherein the polymer modified cement adhesive comprises a base preparation and water, the base preparation  
20 being dispersible in, and reactive with, the water to provide the adhesive.
26. A method according to claim 25, wherein the base preparation comprises a polymer, a cement component and a sand component.
- 25 27. A method according to claim 26, wherein the polymer comprises a powdered latex polymer.
28. A method according to claim 27, wherein the polymer comprises a dispersible hydrophobic polymer.
- 30 29. A method according to claim 26, 27 or 28, wherein the base preparation includes at least 10 wt.% of the polymer.
30. A method according to any of claims 26 to 29, wherein the base preparation  
35 comprises 10 wt.% to 40 wt.% of the polymer.

31. A method according to any of claims 26 to 30, wherein the base preparation comprises 20 wt.% to 30 wt.% of the polymer.
32. A method according to any of claims 26 to 31, wherein the base preparation  
5 comprise at least 15 wt.% of the cement component.
33. A method according to any of claims 26 to 32, wherein the base preparation comprises between 15 wt.% and 35 wt.% of the cement component.
- 10 34. A method according to any of claims 26 to 33, wherein the base preparation comprises between 15 wt.% and 25 wt.% of the cement component.
35. A method according to any of claims 26 to 34, wherein the base preparation  
15 comprise at least 15 wt.% of the sand component.
36. A method according to any of claims 26 to 35, wherein the base preparation  
comprises between 30 wt.% and 70 wt.% of the sand component.
37. A method according to any of claims 26 to 36, wherein the base preparation  
20 comprises between 55 wt.% and 65 wt.% of the sand component.
38. A method according to any of claims 26 to 37, wherein the sand component  
comprises substantially 100% sand.
- 25 39. A method according to any of claims 26 to 37, wherein the sand component  
comprise a major proportion of sand and a minor proportion of aggregate particles to  
reduce the thermal conductivity of the adhesive.
- 30 40. A method according to any preceding claim, comprising applying a salt barrier  
composition to the substrate before applying the adhesive thereto, the salt barrier  
composition comprising one or more selected from the group consisting of a silane  
and a siloxane.
- 35 41. A method according to claim 40, wherein the substrate contains more than 0.1  
wt.% of a chloride salt, more than 0.15 wt.% of a nitrate salt, and/or more than 0.25  
wt.% of a sulphate salt.

42. A method according to claim 40 or 41, wherein the salt barrier composition further includes water and a surfactant.
- 5 43. A method according to claim 42, wherein the salt barrier composition further includes at least one viscosity modifying additive
44. A method according to claim 42 or 43, wherein the surfactant comprises a non-ionic ethoxylated surfactant.
- 10 45. A method according to any of claims 40 to 44, wherein the salt barrier composition comprises between 5 wt.% and 80 wt.% of the silane and/or siloxane.
46. A method according to any of claims 40 to 45, wherein the silane comprises  
15 one or more alkoxysilanes.
47. A method according to claim 46, wherein the alkoxysilanes comprise one or more selected from the group consisting of octyl triethoxysilane, propyl ethoxysilane, butyl ethoxysilane and hexyl ethoxysilane.
- 20 48. A method according to any of claims 40 to 47, wherein the siloxane comprises one or more selected from the group consisting of a polyalkylsiloxane, an oligomeric alkyl siloxane and an aminosiloxane.
- 25 49. A method according to any of claims 40 to 48, wherein the salt barrier composition is a thixotropic composition in the form of a cream or an emulsion.
50. A method according to any of claims 40 to 49, wherein the salt barrier composition includes substantially 80 wt.% of the silane.
- 30 51. A method according to any of claims 40 to 49, wherein the salt barrier composition includes substantially 80 wt.% of the siloxane.
52. A method according to any of claims 40 to 49, wherein the salt barrier  
35 composition includes an aggregate amount of 80 wt.% of the silane and siloxane.

53. A method according to claim 52, wherein the salt barrier composition includes 40 wt.% silane and 40 wt.% siloxane.
54. A method according to any of claims 40 to 53, wherein a biocide is added to the salt barrier composition to prevent mould growth occurring after application of the substantially planar member to the substrate.
55. A method according to any of claims 40 to 54, comprising applying a damp proof course to the substrate before applying the adhesive composition and/or the salt barrier composition.
56. A method according to any preceding claim, substantially as herein described.
57. An adhesive arrangement for applying a substantially planar member to a substrate, the arrangement comprising: an adhesive comprising one or more selected from the group consisting of a substantially water free adhesive and a polymer modified cement adhesive; and a substantially planar member, wherein the substantially planar member can be adhered to the substrate by means of the adhesive.
58. An adhesive arrangement according to claim 57, wherein the substrate contains one or more salts.
59. An adhesive arrangement according to claim 58, wherein the substrate contains more than 0.18 wt.% salt.
60. An adhesive arrangement according to claim 57 or 58, wherein the substrate contains more than 0.03 wt.% of a chloride salt, and/or more than 0.05 wt.% of a nitrate salt, and/or more than 0.1 wt.% of a sulphate salt.
61. An adhesive arrangement according to any of claims 57 to 60, wherein the substantially water free adhesive comprises one or more selected from the group consisting of a silane modified polymer adhesive and/or a urethane adhesive.
62. An adhesive arrangement according to claim 61, wherein the silane modified polymer adhesive comprises a silane modified polymer comprising one or more

selected from the group consisting of a silane modified polyether and/or a silane modified polyacrylate.

5 63. An adhesive arrangement according to claim 62, wherein the silane modified polymer adhesive comprises at least 20 wt.% of the silane modified polymer.

64. An adhesive arrangement according to claim 63, wherein the silane modified polymer adhesive comprises between 20 wt.% and 40 wt.% of the silane modified polymer.

10 65. An adhesive arrangement according to claim 63 or 64, wherein the silane modified polymer adhesive comprises between 25 wt.% and 35 wt.% of the silane modified polymer.

15 66. An adhesive arrangement according to any of claims 63, 64 or 65, wherein the silane modified polymer adhesive includes an alkoxy silane.

67. An adhesive arrangement according to claim 66, wherein the alkoxy silane comprises an alkenyl alkoxy silane.

20 68. An adhesive arrangement according to claim 66 or 67, wherein the silane modified polymer adhesive includes less than 5 wt.% of the alkoxy silane.

25 69. An adhesive arrangement according to any of claims 66, 67 or 68, wherein the adhesive includes between 0.2 wt.% and 5 wt.% of the alkoxy silane.

70. An adhesive arrangement according to any of claims 66 to 69, wherein the adhesive includes between 0.3 wt.% and 1 wt.% of the alkoxy silane.

30 71. An adhesive arrangement according to any of claims 66 to 70, wherein the alkoxy silane comprises a trialkoxy silane.

72. An adhesive arrangement according to claim 71, wherein the alkoxy silane comprises vinyl trimethoxy silane.

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73. An adhesive arrangement according to any of claims 62 to 72, wherein the silane modified polymer adhesive includes a thixotropic agent to increase viscosity at low shear rate.
- 5 74. An adhesive arrangement according to any of claims 62 to 73, wherein the viscosity of the silane modified polymer adhesive is above 1000 Pa.s, when measured at a low shear rate of 0.1 seconds.
75. An adhesive arrangement according to any of claims 62 to 74, wherein the  
10 viscosity of the silane modified long chain hydrocarbon adhesive is between 1000 Pa.s and 200,000 Pa.s, when measured at a low shear rate of 0.1 seconds.
76. An adhesive arrangement according to any of claims 62 to 75, wherein the  
15 viscosity of the silane modified long chain hydrocarbon adhesive is between 10,000 Pa.s and 100,000 Pa.s, when measured at a low shear rate of 0.1 seconds.
77. An adhesive arrangement according to any of claims 61 to 76, wherein the urethane adhesive comprises a urethane foam adhesive.
- 20 78. An adhesive arrangement according to claim 77, wherein the urethane foam adhesive comprise a methylene di-isocyanate and polyol prepolymer.
79. An adhesive arrangement according to claim 78, wherein the urethane foam adhesive includes 40 wt.% to 60 wt.% of the polyol prepolymer.
- 25 80. An adhesive arrangement according to claim 79, wherein the urethane foam adhesive is a single component, moisture-cured polyurethane adhesive, which is substantially solvent free.
- 30 81. An adhesive arrangement according to any of claims 56 to 80, wherein the polymer modified cement adhesive comprises a base preparation and water, the base preparation being dispersible in, and reactive with, the water to provide the adhesive.
- 35 82. An adhesive arrangement according to claim 81, wherein the base preparation comprises a polymer, a cement component and a sand component.

83. An adhesive arrangement according to claim 82, wherein the polymer comprises a powdered latex polymer.
- 5 84. An adhesive arrangement according to claim 83, wherein the polymer comprises a dispersible hydrophobic polymer.
85. An adhesive arrangement according to claim 82, 83 or 84, wherein the base preparation includes at least 10 wt.% of the polymer.
- 10 86. An adhesive arrangement according to any of claims 82 to 85, wherein the base preparation comprises 10 wt.% to 40 wt.% of the polymer.
87. An adhesive arrangement according to any of claims 82 to 86, wherein the  
15 base preparation comprises 20 wt.% to 30 wt.% of the polymer.
88. An adhesive arrangement according to any of claims 82 to 87, wherein the base preparation comprise at least 15 wt.% of the cement component.
- 20 89. An adhesive arrangement according to any of claims 82 to 88, wherein the base preparation comprises between 15 wt.% and 35 wt.% of the cement component.
90. An adhesive arrangement according to any of claims 82 to 89, wherein the  
25 base preparation comprises between 15 wt.% and 25 wt.% of the cement component.
91. An adhesive arrangement according to any of claims 82 to 90, wherein the base preparation comprise at least 15 wt.% of the sand component.
- 30 92. An adhesive arrangement according to any of claims 82 to 91, wherein the base preparation comprises between 30 wt.% and 70 wt.% of the sand component.
93. An adhesive arrangement according to any of claims 82 to 92, wherein the  
35 base preparation comprises between 55 wt.% and 65 wt.% of the sand component.



94. An adhesive arrangement according to any of claims 82 to 93, wherein the sand component comprises substantially 100% sand.
95. An adhesive arrangement according to any of claims 82 to 93, wherein the sand component comprise a major proportion of sand and a minor proportion of aggregate particles to reduce the thermal conductivity of the adhesive.
96. An adhesive arrangement according to any of claims 56 to 95, comprising applying a salt barrier composition to the substrate before applying the adhesive thereto, the salt barrier composition comprising one or more selected from the group consisting of a silane and a siloxane.
97. An adhesive arrangement according to claim 96, wherein the substrate contains more than 0.1 wt.% of a chloride salt, more than 0.15 wt.% of a nitrate salt, and/or more than 0.25 wt.% of a sulphate salt.
98. An adhesive arrangement according to claim 96 or 97, wherein the salt barrier composition further includes water and a surfactant.
99. An adhesive arrangement according to claim 98, wherein the salt barrier composition further includes at least one viscosity modifying additive
100. An adhesive arrangement according to claim 98 or 99, wherein the surfactant comprises a non-ionic ethoxylated surfactant.
101. An adhesive arrangement according to any of claims 96 to 100, wherein the salt barrier composition comprises between 5 wt.% and 80 wt.% of the silane and/or siloxane.
102. An adhesive arrangement according to any of claims 96 to 101, wherein the silane comprises one or more alkoxysilanes.
103. An adhesive arrangement according to claim 102, wherein the alkoxysilanes comprise one or more selected from the group consisting of octyl triethoxysilane, propyl ethoxysilane, butyl ethoxysilane and hexyl ethoxysilane.

104. An adhesive arrangement according to any of claims 96 to 103, wherein the siloxane comprises one or more selected from the group consisting of a polyalkylsiloxane, an oligomeric alkyl siloxane and an aminosiloxane.

5 105. An adhesive arrangement according to any of claims 96 to 104, wherein the salt barrier composition is a thixotropic composition in the form of a cream or an emulsion.

10 106. An adhesive arrangement according to any of claims 96 to 105, wherein the salt barrier composition includes substantially 80 wt.% of the silane.

107. An adhesive arrangement according to any of claims 96 to 106, wherein the salt barrier composition includes substantially 80 wt.% of the siloxane.

15 108. An adhesive arrangement according to any of claims 40 to 49, wherein the salt barrier composition includes an aggregate amount of 80 wt.% of the silane and siloxane.

20 109. An adhesive arrangement according to claim 108, wherein the salt barrier composition includes 40 wt.% silane and 40 wt.% siloxane.

110. An adhesive arrangement according to any of claims 96 to 109, wherein a biocide is added to the salt barrier composition to prevent mould growth occurring after application of the substantially planar member to the substrate.

25 111. An article comprising a substrate, to which substrate a method as claimed in any of claims 1 to 56 has been applied.



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**Claims searched:** 1, 2-24, 57, 58-80 (in part) **Date of search:** 7 May 2014

### Patents Act 1977: Search Report under Section 17

**Documents considered to be relevant:**

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-5, 21-24, 57-61, 76-79	US 6130268 A (MURRAY) see whole document
X	1-5, 57-61	JP 2002105427 A (SAIDEN CHEMICAL IND) see esp. WPI abstract no. 2002-512065
X	1--20, 57-75	JP 2004060427 A (SEKISUI CHEM) see esp. WPI abstract no. 2003-430197)
X	1-5, 21-24, 57-61, 76-80	JP 01132675 A (SUNSTAR ENGINEERING) see esp. WPI abstract no. 1989-195710
X	1-5, 21-24, 57-61, 76-80	JP 09032239 A (MITSUI TOATSU CHEMICALS) see esp. WPI abstract no. 1997-162503
X	1-5, 21-24, 57-61, 76-80	JP 2003049153 A (AUTOKAGAKU) see esp. WPI abstract no. 2003-816696

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**Field of Search:**

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>X</sup>:

Worldwide search of patent documents classified in the following areas of the IPC

C04B; E04B; E04F

The following online and other databases have been used in the preparation of this search report

WPI EPODOC



**International Classification:**

<b>Subclass</b>	<b>Subgroup</b>	<b>Valid From</b>
E04F	0013/08	01/01/2006
C04B	0026/16	01/01/2006
C04B	0026/32	01/01/2006
C04B	0028/00	01/01/2006