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SELF-ADHESIVE WATER-ACTIVABLE GLASS WEB

The present invention relates to a repositionable self-adhesive wall covering, based on glass fibers, the definitive adhesion of which to the wall may be obtained, after hanging, by applying water or a water-based paint composition.

Wall coverings based on glass fibers have been known for very many years. They are easy to apply and relatively good value, can be painted with water-based paints, are washable after painting, and have better tear resistance, fire resistance and moisture resistance than wallpapers. Hanging a conventional wall covering based on glass fibers typically comprises the following successive steps:

- pasting the wall and/or the wall covering (approx. 5 hours),
- applying the wall covering to the wall (approx. 5 hours),
- drying of the adhesive (approx. 24 hours),
- applying a first coat of paint (approx. 4 hours),
- drying of the first coat of paint (approx. 24 hours),
- applying a second coat of paint (approx. 4 hours), and
- drying of the second coat of paint (approx. 24 hours),

the indications of time being those estimated for a 15 m² room with 35 m² of walls.

The objective of the present invention is to substantially shorten and facilitate the bonding phase (steps 1 - 3). It proposes a wall covering based on glass fibers that is pre-pasted with a particular adhesive system.

Various pre-pasted wall coverings based on glass fibers have already been described and placed on the market.

Thus, the Applicant sells, under the name EasyGlue®, a glass cloth pre-pasted with a conventional starch-based adhesive. The user must activate the adhesive by wetting it before hanging the wall covering. The 5 pasting step is thus replaced by the wetting step, which is slightly faster. The step of applying to the wall is not however substantially facilitated.

Furthermore, more recently a self-adhesive glass cloth 10 has been offered, under the trade name EasyFix®. It is a glass textile with an open structure that comprises, on one of its faces, a repositionable self-adhesive coating also referred to as a pressure-sensitive adhesive (PSA). This adhesive enables easy application 15 of the glass textile to the wall without prior pasting or wetting. The definitive attachment then takes place when paint is applied. Specifically, this paint penetrates via the openings of the glass textile and, after drying, bonds it firmly to the wall. The user is 20 thus spared the pasting step and the adhesive drying step.

However, this system has, as main drawbacks, the fact 25 that such a textile with an open structure is, for esthetic reasons, unsuitable as a ceiling cover, and the fact that this mechanism of adhesion via the paint renders the wall covering very difficult to remove.

Furthermore, there are a certain number of documents 30 that disclose, on the one hand, self-adhesive wallpapers (see for example WO 95/17312, WO 93/06301, US 5 441 778, US 5 412 829, EP 1 707 667 and WO 00/31201) and, on the other hand, water-activated pre-pasted wallpapers (see for example WO 2004/003286, 35 US 4 714 723 and EP 1 162 306). To the Applicant's knowledge, there is no description of wallpapers that are both self-adhesive and water-activatable.

Thus, there is no completely satisfactory system that makes it possible to easily and rapidly hang a textile covering based on glass fibers on the wall and to bond it definitively without pasting the wall or the 5 covering, while retaining a certain ease of removal after wetting of the wall covering.

The present invention is based on the idea of trying to combine, on one and the same wall covering, both the 10 self-adhesive/repositionable function (EasyFix[®]) and the function of definitive bonding by wetting (activation) of a latent adhesive (EasyGlue[®]).

This combination appears *a priori* impossible. Indeed, 15 it is well known that PSAs generally only function on dry supports and that the presence of water at the interface is incompatible with a self-adhesiveness of PSA type.

20 The idea that has enabled this unfavorable technical prejudice to be overcome is to activate the latent adhesive only after correct positioning of the wall covering on the wall/ceiling. The PSA function is then weakened or even inactivated by water, but immediately 25 replaced by the conventional adhesivity function of the water-activatable latent adhesive. This activation of the latent adhesive could, certainly, be carried out by simple application of water after hanging, but it would be even more advantageous to provide this activation 30 water in the form of an aqueous paint composition. Two steps (activation + painting) would thus be combined in a single step.

35 Two apparently incompatible desires are then again faced: wanting to use the water from a paint composition for the activation of an adhesive interface while preventing said paint composition from

penetrating through the glass textile to said interface.

5 The solution to this problem lies in the choice of a glass textile having a closed structure which, unlike that used for the EasyFix® product, is impermeable to the paint and which, in the manner of a filter, only lets through the aqueous phase of this paint.

10 Consequently, one subject of the present invention is a self-adhesive wall covering comprising:

(A) a glass textile with a closed structure, consisting of glass fibers and of a water-permeable polymer binder, and

15 (B) an adhesive coating comprising both a pressure-sensitive adhesive (PSA) and a water-activatable latent adhesive.

20 Another subject of the present invention is a method of hanging such a self-adhesive wall covering.

25 The expression "wall covering" is understood to mean a flat product in the form of a strip having a width generally between a few tens of centimeters and around 1 meter, stored and sold in the form of a roll. This covering is intended to be bonded to the walls of a room or of a building or else to other surfaces such as the ceiling, with the exclusion of floors.

30 In the present invention, the expression "glass textile having a closed structure" is understood to mean a woven or nonwoven textile having a permeability to the flow of air, measured according to the standard ISO 9237 at 200 Pa, at most equal to $50 \text{ l}/(\text{m}^2 \cdot \text{s})$.

35

Such a glass textile does not comprise openings that are visible to the naked eye and consequently has a closed, uniform and more or less structured appearance.

Such a textile may be a glass cloth (woven structure) or a glass veil (nonwoven structure). It is preferably a glass cloth. Its cohesion is provided in a known 5 manner by a polymer binder. This polymer binder must be both insoluble in water, but sufficiently hydrophilic to allow through the water needed for the activation of the latent adhesive applied to one face of the glass textile.

10

Such water-permeable polymer binders are known in the art and are generally based on hydrolyzed starches, hydrophilic acrylic resins, in particular anionic styrene/acrylic resins, and/or styrene-butadiene rubber 15 (SBR).

Glass textiles that can be used for the present invention are available on the market and are sold by the Applicant, for example under the name Novelio®.

20

Their surface density (grammage) is advantageously between 80 and 450 g/m², preferably between 100 and 300 g/m² and in particular between 150 and 250 g/m².

25

The adhesive coating is applied to only one face of the glass textile. It may have a structure of monolayer type, that is to say the adhesive composition that has been used for its formation may contain both the pressure-sensitive adhesive (PSA) and the water- 30 activable latent adhesive. In this embodiment, the water-activable latent adhesive is then present in the adhesive coating (B) in an amount of from 5 to 150 g/m², preferably from 50 to 120 g/m², in particular from 80 to 100 g/m², and the PSA in an amount of from 5 to 80 g/m², 35 preferably from 10 to 50 g/m², in particular from 25 to 40 g/m².

In one preferred embodiment, the adhesive coating has a bilayer or multilayer structure, in which the PSA and the water-activable latent adhesive are present in the form of two distinct adhesive layers, applied 5 separately from two different adhesive compositions.

Each of these layers may, independently of the other, be continuous or discontinuous, the term "discontinuous" encompassing both the layers consisting 10 of a plurality of separate elements and the layers comprising a plurality of openings distributed more or less evenly over the entire surface of the layer.

In this embodiment where the adhesive coating has a 15 two-layer structure, the layer containing the water-activable latent adhesive is preferably that deposited directly on the glass textile, and the layer containing the PSA component is deposited, subsequently, on the latent adhesive layer.

20

In one preferred embodiment of the invention, the adhesive coating (B) consequently comprises

(B1) a first, continuous or discontinuous, adhesive 25 layer formed by the water-activable latent adhesive, said first layer being deposited directly onto the glass textile, and

(B2) a second, continuous or discontinuous, layer 30 formed by a PSA, said second layer being deposited onto the first layer (B1) and/or next to the latter.

35

When the first layer (B1) is a discontinuous layer, the second layer (B2) may of course extend beyond the first layer and be in contact directly with the glass textile in the zones between the discrete elements or in the 35 zones corresponding to the openings of the first layer. Mention may be made, by way of example, of a pattern where the first layer is formed by a first set of straight lines, parallel to one another, and the second

layer is formed by another set of straight lines, parallel to one another, but perpendicular to the first lines.

5 The deposition of two discontinuous layers deposited next to one another, for example in the style of the squares of a chessboard, could also be envisaged.

10 In one particularly advantageous embodiment of the present invention, the first adhesive layer (B1), that is to say the one formed by the water-activatable latent adhesive, is a continuous layer deposited on the whole of one face of the glass textile (A). This continuity of the water-activatable adhesive actively provides a 15 definitive, satisfactory and even adhesion, without the formation of blisters or zones of lower adhesion.

20 On this first continuous layer, a second discontinuous adhesive layer (B2) consisting of separate elements is then advantageously laid. The ratio of the area of the surface B2 to the area of the surface B1 is preferably less than 0.5, in particular less than 0.3 and ideally less than 0.1. This embodiment may be advantageous, for example, when the presence of PSA risks weakening the 25 adhesion of the water-activatable adhesive of the first layer.

30 For easy hanging of the covering, the latter must have a sufficient initial tack to adhere by simple contact/pressure to a clean and dry wall and to not peel off under the effect of its own weight. In a known manner, this tack must not however exceed a certain value so that the wall covering remains easily peelable and repositionable as long as it has not been wetted.

35

The adhesive coating (B), whether it is in monolayer or multilayer form, advantageously has an initial adhesive strength of between 0.2 and 2 N. This adhesive strength

is measured in the manner described in the examples below.

5 The tack is exclusively due to the pressure-sensitive adhesive and the adjustment of this adhesive strength is part of the general knowledge of the person skilled in the art who will know how to choose the nature and the concentrations of the various ingredients of the pressure-sensitive adhesive (such as polymers, 10 tackifying agent, fillers, etc.) or else the geometry or thickness of the PSA layer.

The pressure-sensitive adhesives that can be used in the present invention are known.

15 They may be deposited in the form of a liquid composition based on an organic solvent or water (latex) or else they may be thermofusible polymers, that is to say polymers of low molecular weight which, 20 in the melt state, have a low enough viscosity to spread out in a suitable manner.

The PSAs are generally based on an elastomer resin that may contain an agent that increases the tack 25 (tackifying agent).

The polymer resin is conventionally selected from acrylic resins, butyl rubber, ethylene/vinyl acetate (EVA) copolymers, natural rubber, vinyl ethers, and 30 styrene-based block copolymers such as styrene-butadiene-styrene (SBS), styrene-ethylene/butylene-styrene (SEBS), styrene-ethylene/propylene (SEP) and styrene-isoprene-styrene (SIS) copolymers.

35 EVA and styrene-based block copolymers have the advantage of being thermofusible elastomers and can therefore be applied in the form of a solvent-free composition.

The second adhesive layer, that is to say the one formed by the PSA, advantageously has a dry surface density of between 1 and 80 g/m², preferably of between 5 2 and 50 g/m², and in particular of between 4 and 40 g/m².

This second pressure-sensitive adhesive layer is deposited on and/or next to a first layer formed by the 10 water-activable latent adhesive. This latent adhesive, when it is in the dry state, is completely inactive, that is to say devoid of bonding nature.

In principle, it is possible to use any adhesive 15 conventionally used for bonding wallpapers and other wall coverings, such as for example adhesives based on starches, in particular potato, maize or wheat starches, starches modified by hydrolysis or cooking, dextrins, cyclodextrins, monosaccharides and 20 oligosaccharides, cellulose alkyl ethers and cellulose hydroxyl ethers, polyethylene glycol, hydrophilic polyurethanes, polyacrylamides, aqueous vinyl adhesives such as homopolymers of preferably plasticized polyvinyl acetate (PVAC), partially hydrolyzed 25 polyvinyl acetate, polyvinyl alcohol, polyvinylpyrrolidone, vinylpyrrolidone/vinyl acetate copolymers, maleic anhydride/methyl vinyl ether copolymers or copolymers of vinyl acetate and maleates or acrylates. Of course, the water-activable latent 30 adhesive may be a mixture of these natural and synthetic polymers, as long as the mixture is not tacky in the dry state and becomes a viscous and sticky fluid only after coming into contact with water.

35 Such a water-activable latent adhesive may contain, in a known manner, salts intended to increase its affinity for water.

The addition of such salts reduces however the water resistance of the adhesive layer and must therefore be limited as much as possible.

5 Mention may be made, as examples of commercial products that can be used as water-activable latent adhesive, of the product Craymul® 4366, based on polyvinyl acetate homopolymer and dextrin, sold by Arkema, or the product Luvitec® VA64W from BASF.

10

This adhesive is used in standard amounts, generally of between 5 and 150 g/m², preferably of between 50 and 120 g/m², in particular of between 80 and 100 g/m², these indications corresponding to the dry surface density.

15

The wall covering of the present invention enables the implementation of an extremely simple and rapid method that is made possible owing to the dual functionality of the adhesive layer containing both a pressure-sensitive adhesive and a water-activable latent adhesive.

20

The method for hanging the wall covering comprises the following successive steps:

25

- applying a strip of said wall covering to a support, so that the adhesive coating is in contact with said support,
- if necessary, repositioning said strip of wall covering,
- applying water or an aqueous composition to the wall covering.

30

The support, preferably a wall or a ceiling, must be clean and dry in order to guarantee good initial adhesivity of the covering.

When the strip of covering is correctly placed, it is possible to apply pressure, for example using a smoothing blade or a roller in order to make it adhere to the support before the water activation step.

5

The activation of the latent adhesive is carried out by applying water over the whole of the surface of the wall covering. This application of water may be carried out by any suitable means, for example by spraying or 10 using a roller.

In one particularly advantageous embodiment, at least one coat of water-based paint is applied, preferably using a paint roller, to the wall covering brought into 15 contact with the support and optionally smoothed.

It may be necessary to dilute the paint composition beforehand with water, typically between 10% and 30% water.

20

Examples

Adhesive coating comprising two separate layers of adhesive

25 Applied to a Novelio® closed glass cloth having a surface density of 180 g/m² and a permeability to the flow of air of 10 l/(m².s) is a continuous layer of a water-activatable latent adhesive based on a homopolymer of vinyl acetate and dextrin sold by Arkema under the 30 name Craymul® 4366. This layer is applied in an amount of 80 - 90 g/m². Applied to this layer, after complete drying of this first layer in an oven at 70°C, is a second continuous layer of a pressure-sensitive adhesive based on acrylic resin (Craymul® 4508) sold by 35 Arkema. The grammage of this layer after drying is around 30 g/m².

The double adhesive layer obtained in this manner has an initial adhesivity of around 0.47 N, sufficient to attach the wall covering to the wall by simple manual pressure. It can be repositioned several times. After 5 applying a coat of water-based acrylic paint (SilverPro AS-60) and drying, a satisfactory definitive attachment is obtained.

All the coverings received two coats of acrylic paint.

10

The table below shows the various adhesivity values (initial adhesivity, adhesivity after one and two repositionings, definitive adhesivity after water activation) of the wall covering according to the 15 invention in comparison with

- a standard glass cloth bonded to the wall by a standard vinyl adhesive (Ovalit® U),
- an EasyGlue® glass cloth,
- an EasyFix® glass cloth.

20

These various adhesivities (resistance to peeling) were measured in the following manner:

A sample of the glass cloth was bonded to a 25 plasterboard (5 cm × 10 cm) attached to a support. For the self-adhesivity tests (initial adhesive strength, after first repositioning and after second repositioning), a controlled pressure of 2500 kg is exerted. For the test after painting, the pressure is 30 manual (paint roller). A strip having a width of 2 cm (length 10 cm) is cut, with a cutter, from the cloth sample and this strip is subjected to a 90°C peel test on a tensile testing machine sold by Zwick. The peel rate is 20 mm/minute. The results from the table below 35 correspond to the mean value ± standard deviation, calculated over three tests.

	Glass cloth	Standard	EasyGlue®	EasyFix®
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	according to the invention	glass cloth		
Initial A.S.	0.47 ± 0.05	-	0	0.22 ± 0.05
First repositioning A.S.	0.20 ± 0.05	-	0	0.21 ± 0.05
Second repositioning A.S.	0.21 ± 0.08	-	0	0.22 ± 0.03
A.S. after water activation	5.2 ± 1.5	4.3 ± 0.1	4.7 ± 0.5	4.9 ± 0.1
Total hanging time estimated for 35 m ²	69 hours	103 hours	100 hours	69 hours

A.S. = adhesive strength in newtons (N)

The total hanging time of the wall covering was
estimated on the basis of the various steps mentioned
5 in the introduction.

It can be seen that the glass cloth according to the
invention has satisfactory self-adhesivity properties,
comparable to those of the EasyFix® glass cloth having
10 an open structure. The application of two coats of
acrylic paint makes it possible to bond the glass cloth
according to the invention definitively to the wall
with an adhesive strength slightly greater than that of
the comparative products (standard, EasyGlue® and
15 EasyFix® glass cloth).

Examination of the adhesive joint of the glass cloth
according to the invention shows that the particles of
20 latex and the pigments of the acrylic paint have not
penetrated the glass cloth. The latter can be removed
from the wall with the same ease as the standard glass
cloth and the EasyGlue® product.

The glass cloth according to the invention thus
25 combines the advantages of the products from the prior

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art, namely rapid and easy hanging, absence of pasting of the walls and of the covering, and a relatively easy removal.

P A T E N T K R A V

1. Selvklæbende vægbeklædning omfattende
 - (A) et glastekstil med lukket struktur, bestående af glasfibre og et vandpermeabelt polymert bindemiddel og
 - 5 (B) en klæbebeklædning omfattende både et trykfølsomt klæbemiddel (PSA) og et vandaktiverbart latent klæbemiddel.
2. Vægbeklædning ifølge krav 1, kendtegenet ved, at PSA'et og det vandaktiverbare latente klæbemiddel er til stede i klæbebeklædningen i form af to kontinuerte eller diskontinuerte særskilte klæbelag.
- 10 3. Vægbeklædning ifølge krav 2, kendtegenet ved, at klæbebeklædningen (B) omfatter
 - (B1) et første klæbelag, kontinuert eller diskontinuert, dannet af det vandaktiverbare latente klæbemiddel, hvilket første lag er anbragt direkte på glastekstilet og
 - (B2) et andet lag, kontinuert eller diskontinuert, dannet af et PSA, hvilket andet lag 15 er anbragt på det første lag (B1) og/eller ved siden af dette.
4. Vægbeklædning ifølge krav 3, kendtegenet ved, at det første klæbelag (B1) er et kontinuert lag anbragt på helheden af en side af glastekstilet (A).
5. Vægbeklædning ifølge krav 4, kendtegenet ved, at det andet klæbelag (B2) er et diskontinuert lag bestående af særskilte elementer anbragt på det første klæbelag (B1), og forholdet mellem overfladerne B2/B1 er fortrinsvis mindre end 0,5, især mindre end 0,3 og mest fortrinsvis mindre end 0,1.
- 20 6. Vægbeklædning ifølge et hvilket som helst af de foregående krav, kendtegenet ved, at glastekstilet er et filt (FR: voile) af glas eller et væv (FR: toile) af glas, fortrinsvis et væv af glas.
7. Vægbeklædning ifølge et hvilket som helst af de foregående krav, 25 kendtegenet ved, at det vandaktiverbare klæbemiddel omfatter en eller flere organiske polymerer valgt blandt stivelser, stivelser modificeret ved hydrolyse eller kogning, dextriner og cyclodextriner, mono- eller oligosaccharider, alkyletherne af cellulose og hydroxyalkylether af cellulose, polyethylenglycol, polyvinylpyrrolidon, copolymerer af vinylpyrrolidon og af vinylacetat, hydrophile polyurethaner, polyacrylamider, copolymerer af maleinanhydrid og methylvinylether, poly(vinylacetat) (PVAC), delvist hydrolyseret poly(vinylacetat), poly(vinylalkohol) og copolymerer af vinylacetat og maleater eller acrylater, fortrinsvis en blanding af poly(vinylacetat) og dextriner.
8. Vægbeklædning ifølge et hvilket som helst af kravene 3 til 7, kendtegenet 35 ved, at det første klæbelag har en tør overfladetæthed omfattet mellem 5 og 150 g/m², fortrinsvis mellem 50 og 120 g/m², især mellem 80 og 100 g/m².
9. Vægbeklædning ifølge et hvilket som helst af de foregående krav, kendtegenet ved, at det trykfølsomme klæbemiddel er valgt blandt acrylklæbemidler og elastomere resiner.

10. Vægbeklædning ifølge et hvilket som helst af kravene 3 til 9, kendtegenet ved, at det andet klæbelag har en tør overfladetæthed omfattet mellem 1 og 80 g/m², fortrinsvis mellem 2 og 50 g/m², især mellem 4 og 40 g/m².

11. Vægbeklædning ifølge et hvilket som helst af de foregående krav, kendtegenet ved, at glastekstilet (A) har en fladewægt omfattet mellem 80 og 450 g/m², fortrinsvis mellem 100 og 300 g/m² og især mellem 150 og 250 g/m².

12. Vægbeklædning ifølge krav 1, kendtegenet ved, at klæbebeklædningen (B) har en struktur af enkeltlagtype.

13. Vægbeklædning ifølge krav 12, kendtegenet ved, at det vandaktiverbare latente klæbemiddel er til stede i klæbebeklædningen (B) i forholdet 5 til 150 g/m², fortrinsvis 50 til 120 g/m², især 80 til 100 g/m², og ved at PSA'et er til stede i klæbebeklædningen (B) i forholdet 5 og 80 g/m², fortrinsvis i forholdet 10 til 50 g/m², især 25 til 40 g/m².

14. Fremgangsmåde til montering af en vægbeklædning, omfattende følgende successive trin:

- påføring af en strib af vægbeklædningen ifølge et hvilket som helst af de foregående krav på et bæremateriale, fortrinsvis en væg eller et loft, således at klæbebeklædningen bringes i kontakt med bærematerialet,
- om nødvendigt, repositionering af striben af vægbeklædning,
- påføring af vand eller af en vandig sammensætning på vægbeklædningen.

15. Fremgangsmåde ifølge krav 14, kendtegenet ved, at den vandige sammensætning er en vandbaseret maling.