VERIFICATION OF TRANSLATION

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do hereby declare that I am proficient in the English and the French languages, and that the attached is a true and accurate translation into the English language of the PCT patent application no. PCT/FR2003/03333 filed on 7 November 2003.

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JOINT COMPOUND COMPOSITION FOR BUILDING ELEMENTS AND METHOD OF PRODUCING A STRUCTURE

The present invention relates to a joint compound composition for building elements, particularly paper-faced plasterboards, and to a method of producing a structure such as a partition, a wall trim or a ceiling.

It is well known to use building panels such as plasterboards for producing partitions and trims for vertical or inclined elements or for producing suspended or non-suspended ceilings.

These plasterboards are generally formed from a core, essentially made of plaster, covered on each of its faces with a sheet serving both as reinforcement and as facing, which sheet may be formed from paper or from inorganic fibres.

European Patent Application published under the number 496 682 discloses a joint compound for filling the joints formed by the contiguous lateral edges of two plasterboards and for forming a tapeless joint. This joint compound comprises, in percentages by weight calculated with respect to all of the dry matter:

- 5 to 30% of hemihydrate plaster;
- 7 to 25% of polymer as a suspension in an aqueous phase and/or as a redispersible powder;
- if necessary, other additives for adjusting the setting time and/or for adjusting the quality of the paste and/or the adhesion of the joint compound; and
- at least one inner filler in an amount making up the composition to 100%.

Example 15 of that patent application discloses in particular a composition comprising, in parts by weight:

- 194 parts of alpha-plaster;
- 108 parts of a vinyl acetate/ethylene copolymer stabilized with polyvinyl alcohol and having a solids content of 55%;
- 6.6 parts of a vinyl acetate/ethylene copolymer as a redispersible powder;
- 0.67 parts of cellulose ether;
- 669.3 parts of limestone
- 2.25 parts of polyvinyl alcohol;
- 0.027 parts of polyacrylamide;
- 2.25 parts of clay;
- 0.045 parts of white Portland cement;
- 1.12 parts of gypsum + starch (50/50); and
- 0.125 parts of hydrolytically degraded keratin.

United States Patent No. 5 653 797 discloses a composition for filling the joints formed by the adjacent edges of panels formed from plasterboards, this composition comprising:

(a) calcium sulphate hemihydrate;

(b) water in an amount sufficient to adjust the viscosity of the composition;

(c) a set retarder comprising a composition based on a polymer comprising acrylamide and acrylic acid monomers; and

(d) a set accelerator comprising a metal salt comprising acid cations.

That patent mentions the possible use of a binder such as a latex or polyvinyl alcohol.

Table II of column 8 of that patent indicates a composition comprising:

- 20 to 30% of calcium sulphate hemihydrate;
- 1 to 4% of a latex-type binder;
- 1 to 10% of perlite;
- 10 to 50% of limestone;
- 0.5 to 4% of clay;
- 0.1 to 1% of a thickener;
- 0.5 to 3% of talc;
- 1 to 4% of mica;
- 0.01 to 1% of the particular retarder described above;
- 0.01 to 2% of the particular accelerator described above;
- 0.01 to 1% of a preservative; and
- 20 to 30% of water.

However, when this composition hardens, it undergoes excessive shrinkage.

International Application published under the number WO 99/48833 discloses a composition that can be used for filling joints between adjacent plasterboards. This composition causes hydraulic setting when it is mixed with an effective amount of a set accelerator and it comprises a material such as plaster and a particular retarder based on a sulphonated polymer or copolymer.

Example 11 of that application discloses a composition for filling joints having the following formulation (in % by weight):

- 35.9% of calcium sulphate hemihydrate;
- 4.1% of a vinyl acetate/ethylene copolymer, in 50% water;
- 7.1% of perlite;
- 0.3% of cellulose ether;

- 8.1% of limestone;
- 2.6% of wollastonite;
- 2.6% of kaolin;
- 0.1% of lime;
- 1.0% of retarder; and
- 38.3% of water.

This composition also has the major drawback of resulting in excessive shrinkage.

The joint compounds or compositions that have been described have the drawback of being unsatisfactory because they do not have all the following qualities taken together:

- good workability;
- a colour compatible with that of the building elements for which they are intended; and
- the ability to obtain a joint having zero or almost zero shrinkage and good mechanical properties (hardness, tensile strength, compressive strength, impact strength, and slight deformability or elasticity in order to prevent cracking).

Furthermore, the compositions of the aforementioned documents US 5 653 797 and WO 99/48833 have the particular feature of containing a powerful retarder that blocks the hydration of the calcium sulphate hemihydrate. It is therefore the user who adds an accelerator in order for this hydration to start. This entails difficulties when the joint compound is being used on a work site, since there is a risk of the user not adding the correct dose of accelerator.

In addition, these compositions change over time. Depending on the time that has elapsed since the preparation of the composition, the same amount of accelerator added at the moment of application does not have the same effects. It follows that there is uncertainty as regards the hydraulic setting in the sense that it is not possible to know precisely when this setting will take place.

Moreover, other problems arise when the building element is a plasterboard covered with a paper facing:

- it is necessary, on the one hand, for the joint compound to have good adhesion to the paper facing and, on the other hand, for the adhesion of a wallpaper to the joint to be also good but not excessive, so as to make it possible to strip wallpaper one or more times without either tearing or degrading the joint compound; and

- the joint compound must have a water and/or paint absorption as close as possible to that of the facing paper, so as to avoid having to apply a coat of primer before wallpapering or painting.

The aim of the invention is therefore to provide a tapeless joint compound composition which, after mixing with water, gives a joint compound that has the abovementioned qualities and characteristics. It is based on the discovery that, in order for a joint compound to be satisfactory, it is necessary for it to contain calcium sulphate, a binder and a water repellent, and to do so in well-defined proportions.

Thus, the subject of the invention is a joint compound composition comprising:

a) 50 to 60% of calcium sulphate hemihydrate;

b) 5 to 15% of an organic binder in powder form; and

c) 0.05 to 0.2% of a water repellent.

Such a composition, after mixing with water, therefore gives a hydraulic setting joint compound that can be used by itself, that is to say it is both a filling joint compound and a finishing joint compound, and makes it possible to produce a joint without having to use a tape.

The subject of the invention is also a method of producing a structure, in which:

- building elements are juxtaposed;
- the joint compound composition according to the invention is mixed with water so as to obtain a joint compound;
- the space between the building elements is filled by means of the joint compound obtained above, without using a tape; and
- the joint compound is left to harden.

Finally, the invention relates to a joint as obtained by implementing this method.

Other features and advantages of the invention will become apparent on reading the following description.

DETAILED DESCRIPTION OF THE INVENTION

Composition according to the invention

The general composition of the invention was given above.

According to a preferred embodiment of the invention, the composition furthermore includes:

d) from 1 to 10% of a lightening agent (light weight agent)

According to one particularly advantageous embodiment of the invention, the composition comprises:

a) 50 to 60% of calcium sulphate hemihydrate;

b) 5 to 10% of an organic binder;

c) 0.07 to 0.15% of a water repellent; and

d) 3 to 7% of a lightening agent.

Of course, the balance to 100% consists of one or more fillers and optionally one or more additives chosen from water retainers, thickeners, workability agents, dyes or pigments, set retarders and set accelerators.

Preferably, a calcium sulphate hemihydrate of the alpha type is used since this allows the necessary amount of water for mixing the composition to be reduced.

The organic binder has the function of softening the calcium sulphate in the joint and of obtaining good mechanical properties. As binder, it is possible to use copolymers of vinyl esters and of ethylene monomers, such as ethylene/vinyl acetate (EVA) copolymers, whether plasticized or unplasticized, ethylene/vinyl versatate copolymers and vinyl acetate/vinyl versatate copolymers, polyacrylics, vinyl acetate/acrylic copolymers, styrene/acrylic and styrene/butadiene copolymers, vinyl acetate/vinyl versatate/acrylic and vinyl acetate/vinyl versatate/vinyl maleate terpolymers, acrylic terpolymers and blends thereof.

The vinyl copolymers may be stabilized with polyvinyl alcohol.

The organic binder is also preferably used in the form of a redispersible powder.

As water repellent that can be used in the joint compound composition according to the invention, it is possible to choose, in particular, a fatty acid, a fatty acid salt, a wax or a silicone derivative.

Preferably, oleic acid or stearic acid are used as fatty acid.

As fatty acid salt, alkali metal or alkaline-earth metal salts are preferred, particularly sodium, potassium, magnesium or calcium salts.

As silicone derivative, mention may be made of siliconates, silanes, hydrogenated silicone oils, silicone emulsions, amino silicone emulsions, alkylsiloxane resins, such as hydrogenomethylpolysiloxane and polydimethylaminosiloxane, and blends thereof.

The water repellent most particularly preferred is chosen from oleic acid, stearic acid, sodium oleate and sodium stearate.

As lightening agent suitable for the invention, mention may be made of perlite, glass microbeads and polymer microspheres.

Preferably, the lightening agent is non-water-repellent expanded perlite.

It is also possible to use at least one filler such as, for example, limestone, magnesium carbonate, calcium magnesium carbonate (dolomite), magnesium hydroxide, silica, natural or synthetic gypsum, or else ground natural or synthetic anhydrite. Preferably, limestone is used.

The joint compound composition according to the invention may also include one or more water retainers that may be chosen from cellulose ethers, particularly methyl cellulose (MC), carboxymethyl cellulose (CMC), hydroxyethyl cellulose (HEC), ethylhydroxyethyl cellulose (EHEC), methylhydroxypropyl cellulose (MHPC) and methylhydroxyethyl cellulose (MHEC).

These water retainers may also have a viscosity-modifying action and therefore have a positive influence on the quality of the paste.

Optionally, the cellulose ethers may be partly substituted with or else accompanied by naturally occurring polycarbohydrate derivatives that participate in the rheology of the paste, such as galactomanans, polysaccharides, xanthan, guar derivatives, etc. The commercially available "modified" cellulose ethers are often the aforementioned molecules with other wetting agents or thickeners: they may be highly suitable for the invention. However, it is possible to use other water-retaining or viscosity-modifying agents, such as starch ethers or agents which, in addition to their main function, exhibit a sufficient water-retaining action, such as polyvinyl alcohol.

The joint compound composition according to the invention may furthermore include one or more thickeners, which may be polyacrylamides, CMC, starch derivatives, or clays such as attapulgite, sepiolite, montmorillonite and bentonite.

Preferably, the thickener is a polyacrylamide.

The composition according to the invention may also include one or more workability agents. This workability agent may be a plasticizer, a wetting agent or a slip agent.

As plasticizer suitable for the invention, mention may be made of sulphonated polymers, preferably agents based on sulphonated melamine-formaldehyde.

As wetting agent suitable for the invention, mention may be made of alkyl sulphates, such as sodium lauryl sulphate, alkylaryl sulphonates or phosphate derivatives.

As slip agent suitable for the invention, mention may be made of talc or mica. Because of their lamellar morphologies, these agents promote slip of the spreader when jointing and help to reduce shrinkage.

The composition according to the invention may also contain one or more colorants that may be chosen, for example, from titanium dioxide and optical brighteners.

The composition according to the invention may also contain additives for adjusting the setting time, these being set retarders or set accelerators.

In general, a pair of agents, one of which is an accelerator and the other a retarder, is added.

Among set accelerators that may be suitable for the invention, mention may be made of sulphates. Preferably, gypsum is used in the form of a powdered mixture of gypsum and starch, the gypsum always retaining the same ability to accelerate the setting of the plaster thanks to the starch, which preserves it from ageing. Thus, the setting of the joint compound is made insensitive to external gypsum contaminations, especially those that may be present in the form of setting nuclei in the plasterer's trough or applicator.

Among set retarders, mention may be made of agents based on hydrolytically degraded keratin, hydroxycarboxylic acids, such as tartaric acid and citric acid, salts of these acids, and calcium monophosphate. These agents may be employed in proportions that vary according to the proportions of hemihydrate plaster and of accelerator.

Advantageously, the proportions of accelerator and of retarder are adjusted in such a way that the hardening time is short enough to allow the jointing to be completed during the day.

Various other additives may optionally be added to the composition according to the invention. Thus, it is possible to add to the composition an agent capable of bringing the pH of the joint compound to a basic pH. The basic agent makes it easier for the water-retaining agent, mainly when it is cellulose ether, to dissolve and consequently favours build-up of viscosity. As basic agent, an inorganic agent may be used, preferably "white" Portland cement, that is to say Portland cement devoid of iron oxide, or lime.

Also preferably, the amount of basic agent needed to achieve a pH of greater than or equal to 8 is introduced into the joint compound.

Preparation of the composition according to the invention

The joint compound composition according to the invention is prepared by blending its constituents in any order, preferably until a homogeneous powder is obtained.

Although the constituents of the composition according to the invention are not necessarily all in powder form, once they have been blended the composition according to the invention is generally and overall in the form of a powder.

In general, the particles making up the powder have a diameter of at most 200 microns.

Method of producing a structure according to the invention

According to the invention, to produce a structure, panels or building elements are juxtaposed, the joint compound composition according to the invention is mixed with water, so as to obtain a joint compound, and then the space between the building

elements is filled by means of the joint compound obtained, without using a tape, and the joint compound is left to harden.

The mixing is generally carried out with a mass ratio of water to joint compound composition ranging from 40 to 50%.

The method according to the invention applies in particular to the production of a structure by means of plasterboards coated with a paper facing.

These plasterboards may have edges of various geometries, and in particular feathered, rounded or both rounded and feathered edges.

Joint according to the invention

By implementing the method according to the invention, it is therefore possible to obtain a satisfactory joint.

Such a joint also has the advantage of allowing the application of paint, by all suitable painting techniques used by those skilled in the art, particularly by applying the paint with a roller, a brush or by airless spraying.

EXAMPLES

The following examples illustrate the present invention without, however, limiting the scope thereof.

Example 1

A joint compound composition E according to the invention was prepared, together with three joint compound compositions in powder form, A, B and C, outside the scope of the invention, by way of comparison.

The corresponding formulations are given in the following table, in which the values indicated correspond to parts by weight:

Composition		JOINT COMPOUND			
		E (inv.)	A (comp.)	B (comp.)	C (comp.)
Plaster	alpha hemihydrate	500.0	500.0	500.0	500.0
Organic binder	Vinyl acetate/ethylene copolymer (1)	-	40.0	40.0	40.0
	Vinyl acetate/vinyl versatate copolymer (2)	60.0	-	-	-
Water repellent	Silicone powder	-	-	2.0	-
	Sodium stearate	1.0	-	-	1.0
	White cement(3)	-	100.0	-	-
Lightening agent	Perlite(4)	40.0	40.0	40.0	40.0
Water retainer	MHPC	3.0	3.0	3.0	3.0
Filler	Limestone	370.9	291.9	389.9	390.9
Workability agent	Talc	20.0	20.0	20.0	20.0
Additives	Thickener, retarder, accelerator, colorant	qsp 1000	qsp 1000	qsp 1000	qsp 1000

(1) stabilized with polyvinyl alcohol;

(2) stabilized with polyvinyl alcohol;

(3) White Portland cement;

(4) Non-water-repellent expanded.

Example 2

Joint compounds were prepared by adding water, in an amount of 42 g of water per 100 g of composition, to compositions E, A, B and C of Example 1. The joint compounds thus obtained were then tested in order to produce a joint between two paper-faced plasterboards.

Composition A did not give satisfactory results, especially because the use of cement gives the paste a high pH, thereby causing hydrolysis of the starch-based wallpaper adhesive and, consequently, the wallpaper does not adhere.

Composition B allowed good application of paint to the joint and good adhesion of the wallpaper. However, it was very difficult to mix the composition, probably because the silicone is very poorly wetted. Such mixing therefore cannot be carried out on a work site.

Composition C allowed good mixing. However, when applying paint, the joint absorbed the paint too quickly and the adhesion of the wallpaper to this joint compound was insufficient because of the excessively large porosity of the joint, which absorbed an excessive amount of adhesive.

Composition E, which met all the formulation criteria of the invention, mixed normally and gave good bonding, and the binder created a sufficiently thick film for application of the paint or for bonding of the wallpaper. The alpha-type plaster used made it possible to reduce the water required and, consequently, the shrinkage on drying. The perlite made the joint compound easy to rub down and also reduced the shrinkage. This joint compound was therefore satisfactory from all standpoints.

CLAIMS

1. Joint compound composition comprising:

a) 50 to 60% of calcium sulphate hemihydrate;

b) 5 to 15% of an organic binder in powder form; and

c) 0.05 to 0.2% of a water repellent.

2. Joint compound composition according to Claim 1, characterized in that it furthermore includes:

d) 1 to 10% of a lightening agent.

3. Joint compound composition according to Claim 1, characterized in that it comprises:

a) 50 to 60% of calcium sulphate hemihydrate;

b) 5 to 10% of an organic binder;

c) 0.07 to 0.15% of a water repellent; and

d) 3 to 7% of a lightening agent.

4. Joint compound composition according to one of Claims 1 to 3, characterized in that the calcium sulphate hemihydrate is of the alpha type.

5. Joint compound composition according to one of Claims 1 to 4, characterized in that the organic binder is chosen from the group formed by copolymers of vinyl esters and of ethylene monomers, polyacrylics, vinyl acetate/acrylic copolymers, styrene/acrylic and styrene/butadiene copolymers, vinyl acetate/vinyl versatate/acrylic and vinyl acetate/vinyl versatate/vinyl maleate terpolymers, acrylic terpolymers and blends thereof.

6. Joint compound composition according to one of Claims 1 to 5, characterized in that the water repellent is chosen from the group formed by fatty acids, fatty acid salts, waxes and silicone derivatives.

7. Joint compound composition according to one of Claims 1 to 5, characterized in that the water repellent is chosen from oleic acid, stearic acid and their alkali metal or alkaline-earth metal salts.

8. Joint compound composition according to one of Claims 2 to 7, characterized in that the lightening agent is perlite, in particular non-water-repellent expanded perlite.

9. Joint compound composition according to one of Claims 1 to 8, characterized in that it is in the form of a powder.

10. Joint compound composition according to Claim 9, characterized in that the powder is composed of particles having a diameter of at most 200 microns.

11. Method of producing a structure, in which:

- building elements are juxtaposed;
- the joint compound composition according to one of Claims 1 to 10 is mixed with water so as to obtain a joint compound;
- the space between the building elements is filled by means of the joint compound obtained above, without using a tape; and
- the joint compound is left to harden.

12. Method according to Claim 11, characterized in that the building elements are plasterboards coated with a paper facing.

13. Joint between two building elements, obtained by implementing the method according to Claim 11 or Claim 12.

ABSTRACT

JOINT COMPOUND COMPOSITION FOR BUILDING ELEMENTS AND METHOD OF PRODUCING A STRUCTURE

The present invention relates to a joint compound composition for building elements, particularly paper-faced plasterboards.

This composition comprises:

a) 50 to 60% of calcium sulphate hemihydrate;

b) 5 to 15% of an organic binder in powder form; and

c) 0.05 to 0.2% of a water repellent.

The invention also relates to a method producing a structure, such as a partition, a wall trim or a ceiling.

According to this method:

- building elements are juxtaposed;

- the joint compound composition according to the invention is mixed with water so as to obtain a joint compound;

- the space between the building elements is filled by means of the joint compound obtained above, without using a tape; and

- the joint compound is left to harden.