



(86) Date de dépôt PCT/PCT Filing Date: 2001/07/12
(87) Date publication PCT/PCT Publication Date: 2002/01/24
(45) Date de délivrance/Issue Date: 2011/06/07
(85) Entrée phase nationale/National Entry: 2003/01/17
(86) N° demande PCT/PCT Application No.: FR 2001/002269
(87) N° publication PCT/PCT Publication No.: 2002/006183
(30) Priorité/Priority: 2000/07/18 (FR00/09393)

(51) Cl.Int./Int.Cl. *C04B 26/02* (2006.01),
C04B 24/26 (2006.01), *C04B 24/42* (2006.01),
C04B 26/04 (2006.01), *E04F 13/04* (2006.01)
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(54) Titre : COMPOSE DE JOINTEMENT OU PLATRE POUR ELEMENTS DE CONSTRUCTION, SA METHODE DE PREPARATION ET METHODE DE REALISATION D'UNE TACHE
(54) Title: JOINTING COMPOUND OR PLASTER FOR CONSTRUCTION ELEMENTS, ITS METHOD OF PREPARATION AND METHOD OF PRODUCING A WORK

(57) **Abrégé/Abstract:**

The invention relates to a jointing compound or plaster for construction elements, particularly paper-faced plasterboards. This plaster comprises, in percentages by weight with respect to the total weight of plaster: - 50 to 85% of a mineral filler; - 1 to 20% of an organic binder dispersible in an aqueous phase; - 1 to 15% of a silicate-based agent other than the mineral filler; - 0.2 to 5% of a hydrophobic agent which is a silicone derivative; - 0.05 to 5% of polyvinyl alcohol; and - water to make up to 100%. The subject of the invention is also a method of producing a work such as a partition, a wall covering or a ceiling.



ABSTRACT

5 The invention relates to a jointing compound or
plaster for construction elements, particularly paper-
faced plasterboards.

10 This plaster comprises, in percentages by weight with
respect to the total weight of plaster:

- 50 to 85% of a mineral filler;
- 1 to 20% of an organic binder dispersible in an
aqueous phase;
- 1 to 15% of a silicate-based agent other than
15 the mineral filler;
- 0.2 to 5% of a hydrophobic agent which is a
silicone derivative;
- 0.05 to 5% of polyvinyl alcohol; and
- water to make up to 100%.

20

The subject of the invention is also a method of
producing a work such as a partition, a wall covering or
a ceiling.

**JOINTING COMPOUND OR PLASTER FOR CONSTRUCTION ELEMENTS,
ITS METHOD OF PREPARATION AND METHOD OF PRODUCING A WORK**

The present invention relates to a jointing compound
5 or plaster for construction elements, particularly
paper-faced plasterboards, and to a method of producing a
work such as a partition, a wall covering or a ceiling.

It is well known to use plasterboards for producing
10 partitions, coverings for vertical or inclined elements,
or for producing ceilings, whether suspended or not.

These boards generally consist of a core, essentially
made of plaster, covered on each of its sides with a
15 sheet, which serves both as reinforcement, and as facing
and which may consist of paperboard or of mineral fibres.

The subject matter of the international application
published under number WO-A-9702395 is a method of
20 constructing finishings, in which plasterboards are
joined together with a first plaster and the joints
between the boards are finished off with a complementary
plaster having the following composition:

- 50 to 85% of a mineral filler;
- 25 - 1 to 20% of an organic binder dispersible in an
aqueous phase;
- 0.2 to 5% of a hydrophobic agent;
- 1 to 15% of a workability agent (water-retaining
agent/thickener);
- 30 - 0.1 to 2% of a slip agent;
- 1 to 12% of a complementary slip agent;
- 0.1 to 5% of a dispersant;
- 0.001 to 0.015% of a pigment;
- 0.1 to 0.3% of a biocide;
- 35 - 0.1 to 0.3% of an antifoam agent; and
- water.

The colour of this plaster is matched as best as possible to that of the facing paper.

However, such a plaster is a finishing plaster, which
5 means that it cannot be used for filling the space
between two boards, especially because it does not allow
good bonding and adhesion of the jointing tape. It is
therefore necessary to have two plasters: a first
plaster, called filling plaster, used to fill the space
10 between two boards, and a second plaster, called
finishing plaster, which finishes off the junction
between the two boards.

Furthermore, such a plaster has too great a shrinkage
15 after hardening. The colour of the filling plaster is of
little matter as it will be covered with the finishing
plaster. On the other hand, it must, after drying, have a
negligible shrinkage as it is applied with a significant
thickness.

20

However, the colour of the finishing plaster is
important as it must be as close as possible to that of
the facing of the plasterboard. But it is not necessary
for the shrinkage of the finishing plaster after drying
25 to be very low, since this plaster is applied only with a
small thickness. The aforementioned application
WO-A-9702395 therefore does not address the problem of
shrinkage after drying, since this does not matter for
the application as a finishing plaster.

30

It would therefore be beneficial to have a plaster,
which could serve both as filling plaster and as
finishing plaster. Such a plaster would therefore have to
have one or more, preferably all, of the following
35 properties:

- good adhesion to the paper constituting the
facing of the plaster board;

- good bonding and good adhesion of the jointing tape;
- a colour identical to that of the facing paper;
- a negligible shrinkage after drying (for example, less than 20% as determined by the ring test);
- water absorption as close as possible to that of the facing paper, so as to avoid having to use a primer coat before wallpapering or painting;
- moderate adhesion of the paper constituting the wallpaper, so as to make it possible for it to be stripped off subsequently one or more times;
- easy paintability.

The Applicant has therefore carried out extensive research for the purpose of developing such a plaster.

It has now succeeded in doing so and consequently proposes a plaster having the following composition: in percentages by weight with respect to the total weight of plaster:

- 50 to 85% of a mineral filler;
- 1 to 20% of an organic binder dispersible in an aqueous phase;
- 1 to 15% of a silicate-based agent;
- 0.2 to 5% of a hydrophobic agent which is a silicone derivative;
- 0.05 to 5% of polyvinyl alcohol; and
- water to make up to 100%.

A second subject of the present invention is a method of preparing the plaster, in which the constituents of the plaster are mixed in any order.

A third subject of the present invention is a method of producing a work, comprising the juxtaposition of construction elements, the filling of the space between the construction elements by means of a filling plaster, the laying of a tape and the covering of the tape by

means of a finishing plaster and is characterized in that the same plaster is used as filling plaster and as finishing plaster.

5 Further characteristics and advantages of the invention will now be described in detail in the description, which follows.

Plaster according to the invention

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The plaster according to the invention therefore comprises, in percentages by weight with respect to the total weight of plaster:

- 50 to 85% of a mineral filler;
- 15 - 1 to 20% of an organic binder dispersible in an aqueous phase;
- 1 to 15% of a silicate-based agent;
- 0.2 to 5% of a hydrophobic agent which is a silicone derivative;
- 20 - 0.05 to 5% of polyvinyl alcohol; and
- water to make up to 100%.

As mineral filler, any mineral filler commonly employed for the manufacture of a jointing compound or
25 plaster may be used. In general, the mineral filler will be light in colour, preferably white, and the mean diameter d_{50} of which is in general between 5 and 35 microns, so that the plaster after drying gives a smooth finish corresponding to that of the facing of the
30 board.

As examples of mineral filler, mention may be made of calcium carbonate, anhydrous or dihydrated calcium sulphate, magnesium carbonate, dolomite, silicas,
35 silicates, aluminates and other such materials.

Preferably, calcium carbonate CaCO_3 is used.

The mineral filler preferably represents between 50 and 70% of the total weight of the plaster.

According to one embodiment, the binder/silicate-based agent weight ratio is between 0.5 and 2.

According to one embodiment, the binder/hydrophobic agent weight ratio is between 1.5 and 10.

According to an advantageous embodiment of the invention, the mineral filler furthermore includes perlite, preferably expanded and even more preferably hydrophobic perlite. The amount of perlite is then generally between 2 and 5%.

As organic binder dispersible in an aqueous phase, mention may be made of polyvinyl acetate homopolymers (plasticized or unplasticized), ethylene/vinyl acetate copolymers (plasticized or unplasticized EVAs), ethylene/vinyl versatate copolymers, vinyl acetate/vinyl versatate copolymers, polyacrylics, vinyl acetate/acrylic copolymers, styrene/acrylic copolymers, styrene/butadiene copolymers, vinyl acetate/vinyl versatate/vinyl maleate terpolymers, vinyl acetate/vinyl versatate/acrylic terpolymers, acrylic terpolymers and blends thereof.

The proportion of organic binder is preferably between 2 and 12% of the total weight of the plaster.

The silicate-based agent (different from the mineral filler) preferably comprises talc and/or mica and/or a clay. Preferably, a mixture of talc and mica is used.

The proportion of silicate-based agent is preferably between 3 and 10% of the total weight of the plaster.

The hydrophobic agent is a silicone derivative. As silicon derivatives, mention may be made of siliconates,

silanes, hydrogenated silicone oils, silicone emulsions, aminosilicone emulsions, alkylsiloxane resins, such as hydrogenomethyl-polysiloxane and aminated polydimethylsiloxane, and mixtures thereof.

5

Preferably, a resin of the aminated polydimethylsiloxane type is used as silicone derivative.

The proportion of silicone derivative is preferably
10 between 0.5 and 3% of the total weight of the plaster.

Advantageously, the proportion of silicone derivative is chosen so as to allow a joint to be produced which has the same surface properties as those of the facing paper.
15 These surface properties are decolouration or colouration owing to the effect of the natural colour, reflectance and surface water absorption. These properties are described in detail in application WO-A-9702395,
to which
20 reference may be made for further details. It is understood that the technical characteristics described in that application apply *mutadis mutandis* to the present application.

25 The proportion of polyvinyl alcohol is preferably between 0.05 and 1% of the total weight of the plaster.

According to an advantageous embodiment, the plaster furthermore includes starch and/or a starch derivative.
30

The proportion of starch and/or starch derivative is in general between 0.05 and 5%, preferably between 0.1 and 1%, of the total weight of the plaster.

35 The plaster according to the invention may be prepared by mixing its constituents in any order.

Of course, provided that the proportions assigned to each of the essential constituents are respected, it is possible to introduce into the plaster according to the invention, as secondary ingredients, additives normally
5 used to facilitate the processing of the other constituents or for conferring additional particular properties on the plaster. By way of examples of such additives, mention may be made of water-retaining agents or thickeners, slip agents, dispersants, antigels,
10 pigments, biocides and antifoams. These additives are described, for example, in the application WO-A-9702395, to which reference may be made for further details.

15 The plaster according to the invention can be used for producing, by means of plasterboards, many types of work, such as partitions, wall coverings or ceilings, whether suspended or not.

20 The plaster according to the invention is particularly suitable for producing a work by means of paper-faced plasterboards.

Of course, the plaster according to the invention may
25 be used merely as a finishing plaster, a conventional plaster providing the function of a filling plaster.

Method according to the invention

30 The production of a work by means of plasterboards generally comprises the juxtaposition of plasterboards, the filling of the space between the boards by means of a filling plaster, the laying of a tape, the covering of the tape by means of the filling plaster and the covering
35 of the filling plaster with a finishing plaster.

Surprisingly, the Applicant has succeeded in producing a work using, as filling plaster and as

finishing plaster, one and the same plaster. This is achieved by:

- (1) the plaster that has been developed and has been described hereinabove; and/or
- 5 (2) by matching the content of hydrophobic agent (silicone) of the finished or completed joint (namely filled and finished) with the content of hydrophobic agent (silicone) of the facing of the board; and/or
- 10 (3) by increasing the binder content of the plasters of the type of those described in the application WO-A-9702395 and, optionally, the content of silicate-based agents (other than the mineral filler).

15

With regard to point (1), the plaster has been described in detail above.

With regard to point (2), the matching of the
20 silicone contents of the facing and of the plaster was not clearly demonstrated in the application WO-A-9702395. The invention therefore proposes to optimize the plaster content/facing content weight ratio, of between 3 and 10, with preferred content values for the facing and the
25 board.

With regard to point (3), the adhesion to tape was not discussed and not demonstrated in the application WO-A-9702395, since the adhesion to tape is not a
30 criterion for finishing plasters. The invention therefore proposes to increase the binder content and/or to add polyvinyl alcohol to plasters of the type described in that application WO-A-9702395 in order to optimize the adhesion to tape (without the other properties being
35 affected).

According to an additional and advantageous characteristic of the invention, plasterboards which have

a paper facing, the silicone content of the coating of which is between 0.1 and 1%, are joined together. According to another characteristic, the content of the hydrophobic or silicone agent of the plaster is between
5 0.5 and 3%. The plaster content/facing content weight ratio is between 3 and 10 for the optimization described above.

This therefore constitutes an excellent compromise
10 between easy painting, effective retention of the wallpaper, strippability of the wallpaper and good adhesion of the plaster to the facing of the plasterboard, as will become apparent on reading the examples which follow.

15

European Patent Application No. EP 521 804 in the name of the Applicant describes a paper for covering plasterboards, and the plasterboards covered with this paper. These boards are very suitable for use with the
20 plaster according to the invention.

Examples

The following examples are given purely by way of
25 illustration and imply no limiting character.

Example 1

A control plaster, the composition of which is in
30 accordance with the aforementioned international application WO-A-9702395, and plasters A to F according to the invention were prepared.

The various plasters were composed, apart from the
35 essential constituents, of additives normally used in the manufacture of plasters and well known to those skilled in the art.

The composition of the various plasters is given in the following table:

Constituents		Plasters							
Function	Nature	Control	A	B	C	D	E	F	
Mineral filler	CaCO ₃	55.722	56.522	56.322	55.622	56.022	55.122	56.522	
Mineral filler	Perlite ⁽¹⁾	3.535	3.535	3.535	3.535	3.535	3.535	3.535	
Binder	EVA resin	3.6	3.6	3.6	4.5	3.6	4.5	3.6	
Hydrophobic agent	Siloxane ⁽²⁾	2.0	2.0	2.0	2.0	2.0	2.0	1.0	
Workability agent	Talc	1.35	1.35	1.35	1.35	1.35	1.35	1.35	
Water-retaining agent/thickener	Ether ⁽³⁾	0.45	0.45	0.45	0.45	0.45	0.45	0.45	
Slip agent	Mica	3.6	3.6	3.6	3.6	3.6	3.6	3.6	
Dispersant/Antigel	Ethylene glycol	0.577	0.577	0.577	0.577	0.577	0.577	0.577	
Pigment	Iron oxide	0.01	0.01	0.01	0.01	0.01	0.01	0.01	
Biocide	Mixture ⁽⁴⁾	0.084	0.084	0.084	0.084	0.084	0.084	0.084	
Antifoam agent	Nonionic surfactant	0.072	0.072	0.072	0.072	0.072	0.072	0.072	
Cohesion resin	EVOH	0	0.2	0.4	0.2	0.2	0.2	0.2	
Adhesion promoter	Starch derivative	0	0	0	0	0.5	0.5	0	
Balance to 100	Water	29	28	28	28	28	28	29	
TOTAL		100	100	100	100	100	100	100	

- (1): hydrophobic expanded perlite;
- (2): resin of the aminated polydimethylsiloxane type;
- (3): modified cellulose ether;
- 5 (4): synergistic mixture of aromatic (non-metallic, non-phenolic) compounds.

Example 2

10 Tests were carried out on the adhesion of the PREGYLISSTM 35 setting plaster from the Lafarge Plâtres range to boards as described in the aforementioned application EP-A-521 804, having:

- a) a coating containing 0% silicone;
- 15 b) a coating containing 0.2% silicone;
- c) a coating containing 0.4% silicone.

It was found that too high a silicone content in the coating was unfavourable to good bonding of the
20 conventional setting plaster (adhesion value at best 0.25 MPa).

Example 3

25 Adhesion tests were carried out under the conditions described in paragraph 6.5 of the draft European Standard CEN241N175 of January 1998, which covers the characteristics of coatings on specimens of the control plaster and plasters A to F of Example 1, with boards
30 having a silicone content in the coating of 0.4%.

The tape adhesion was determined under the conditions described in "Guide Technique - Enduits de traitement des joints entre plaques de plâtre - Modalités d'essais"
35 [Technical Guide - Plasters for treating joints between plasterboards - Test methods] of Specialist Group No. 9 of the Commission of the CSTB responsible for drawing up technical literature (January 1999).

The results are given in the table below.

		Plasters						
Type of test		Control	A	B	C	D	E	F
Adhesion	Values (MPa)	0.249	0.362	0.418	0.433	0.336	0.397	0.418
	Shore C hardness	60	67	71	71	66	73	70
A2P® tape bonding	Mass (g)	376	1052	1357	1331	1148	1763	1326
	Delamination (%)	0	0	45	10	5	65	15
SOROPA® tape bonding	Mass (g)	522	1160	1425	1366	1278	1585	1360
	Delamination (%)	0	20	75	50	35	100	85

- 5 It is clearly apparent that all the plasters according to the invention have a higher performance than the control plaster.

Example 4

10

Joints as indicated in Example 3 were produced. A wallpaper was then pasted onto them in the conventional way.

- 15 Next, for the purpose of determining the impact of the silicone content of the coating of the facing paper of the boards on the stripping behaviour, a steam-stripping test was carried out.

- 20 It was found that stripping was more difficult when the boards have a coating containing no silicone.

- Thus, wallpaper was applied and then removed several times. The results are the same as for the first
25 stripping. However, it was noted that, on boards with a silicone coating, at each stripping operation markedly

more adhesive was removed than on boards with a non-silicone coating.

Example 5

5

A test was carried out to determine the shrinkage after drying. The following results were obtained:

Plaster	Control	A	B
Shrinkage (%)	21	17	17

10 The shrinkage of the plaster according to the invention is less than that of the control.

Example 6

15 A test was carried out under the conditions described in the application WO-A-9702395 in order to determine the L*, a* and b* values (CIE 1976 standard, Minolta CR310 apparatus). The following values were obtained, the middle column giving the average value for the plasters
20 according to the invention and the right-hand column for the board according to application EP-A-521 804 used in Example 3.

	Plaster	Board
L*	86 to 88.2	86.5 to 88.7
a*	-0.5 to -0.7	-0.3 to -0.6
b*	3.7 to 4.1	2.8 to 3.8

25 The differences between the plaster and the board are imperceptible to the eye. The surface characteristics, as expressed according to the aforementioned application WO-A-9702395, are therefore very good.

30 The plaster according to the invention may be a setting plaster or a drying plaster; preferably it is a

drying plaster. In the latter case, the drying plaster is advantageously a plaster called ready-mix plaster, that is to say one into which water has already been incorporated.

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CLAIMS:

1. Jointing compound or plaster for construction elements comprising, in percentages by weight with respect to the total weight of plaster:

- 50 to 85% of a mineral filler;
- 1 to 20% of an organic binder dispersible in an aqueous phase;
- 1 to 15% of a silicate-based agent other than the mineral filler;
- 0.2 to 5% of a hydrophobic agent which is a silicone derivative;
- 0.05 to 5% of polyvinyl alcohol; and
- water to make up to 100%.

2. Plaster according to claim 1, which furthermore includes starch and/or a starch derivative.

3. Plaster according to claim 2, in which the proportion of starch and/or starch derivative is between 0.05 and 5%.

4. Plaster according to any one of claims 1 to 3, in which the silicate-based agent comprises talc and/or mica and/or a clay.

5. Plaster according to claim 4, in which the silicate-based agent is a talc/mica mixture.

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6. Plaster according to any one of claims 1 to 5, in which the binder/silicate-based agent weight ratio is between 0.5 and 2.

7. Plaster according to any one of claims 1 to 6, in which the binder/hydrophobic agent weight ratio is between 1.5 and 10.

8. Plaster according to any one of claims 1 to 7, in which the mineral filler furthermore includes perlite.

9. Plaster according to claim 8, in which the perlite is expanded perlite.

10. Plaster according to claim 8 or 9, in which the mineral filler comprises between 2 and 5% perlite with respect to the total weight of the plaster.

11. Plaster according to any one of claims 1 to 10, in which the organic binder dispersible in an aqueous phase is chosen from the group consisting of polyvinyl acetate homopolymers, ethylene/vinyl acetate copolymers, ethylene/vinyl versatate copolymers, vinyl acetate/vinyl versatate copolymers, polyacrylics, vinyl acetate/acrylic copolymers, styrene/acrylic copolymers, styrene/butadiene copolymers, vinyl acetate/vinyl versatate/acrylic terpolymers, vinyl acetate/vinyl versatate/vinyl maleate terpolymers, acrylic terpolymers and blends thereof.

12. Plaster according to claim 11, in which the polyvinyl acetate homopolymers are plasticized or unplasticized.

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13. Plaster according to claim 11 or 12, in which the ethylene acetate copolymers are plasticized or unplasticized EVAs.

14. Plaster according to any one of claims 1 to 13, in which the silicone derivative is chosen from the group consisting of siliconates, silanes, hydrogenated silicone oils, silicone emulsions, aminosilicone emulsions, alkylsiloxane resins, and mixtures thereof.

15. Plaster according to claim 14, in which the alkylsiloxane resins are hydrogenomethylpolysiloxane and aminated polydimethylsiloxane.

16. Plaster according to any one of claims 1 to 15, in which the mineral filler comprises calcium carbonate CaCO_3 .

17. Plaster according to any one of claims 1 to 16, comprising, in percentages by weight with respect to the total weight of plaster:

- 50 to 70% of a mineral filler;
 - 2 to 12% of an organic binder dispersible in an aqueous phase;
 - 3 to 10% of a silicate-based agent;
 - 0.5 to 3% of a hydrophobic agent which is a silicone derivative;
 - 0.05 to 1% of polyvinyl alcohol;
 - 0.1 to 1% of starch and/or a starch derivative;
- and

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- water to make up to 100%.

18. Method of preparing a plaster according to any one of claims 1 to 17, in which the constituents of the plaster are mixed in any order.

19. Method of producing a work, using a jointing compound or plaster according to any one of claims 1 to 17, comprising the juxtaposition of plasterboards having a paper facing, the filling of the space between the boards by means of a filling plaster, the laying of a tape, the covering of the tape by means of the filling plaster and the covering of the filling plaster with a finishing plaster, characterized in that a weight ratio of the finishing plaster/silicone content of the paper facing is between 3 and 10, and in that the filling plaster and/or the finishing plaster are/is the jointing compound or plaster according to any one of claims 1 to 17.

20. Method according to claim 19, in which the silicone content of the coating of the facing paper is between 0.1 and 1%.

21. Method according to claim 19 or 20, in which the same plaster is used as filling and finishing plaster.

22. Method according to claim 21, in which the plaster has a binding agent content such that the binder/silicate-based agent weight ratio is between 0.5 and 2.

23. Method according to claim 22, in which the plaster has a binding agent content such that the binder/hydrophobic agent weight ratio is between 1.5 and 10.

- 20 -

24. Method according to claim 21, in which the plaster used is the plaster according to any one of claims 1 to 17.

25. Method of producing a work, using a jointing compound or plaster according to any one of claims 1 to 17, comprising the juxtaposition of plasterboards having a paper facing, the filling of the space between the boards by means of a filling plaster, the laying of a tape, the covering of the tape by means of the filling plaster and the covering of the filling plaster with a finishing plaster, characterized in that the filling and finishing plaster is a plaster according to any one of claims 1 to 17.