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(54) Title: STABILIZED MUD PLASTER WITH LOW VAPOUR RESISTANCE

(57) Abstract: Stabilized mud plaster with low vapour resistance, particularly to be used as wall plaster. To the basic material, which is unburnt clay with over 250g/5cm² viscosity and drying shrinkage in length lower then 2%, where viscosity is tensile strength in wet condition, stabilizing hydrophobic dispersed powder in the amount of 0,25% to 3% of the total plaster weight is added. The total plaster weight is the weight of the material before water is added to achieve required consistence. The dispersion powder is selected either from the group of terpolymers on the basis of ethylene, vinyl laurate, vinyl chloride, vinyl acetate, vinyl ester, or a combination thereof, or from the group of copolymers on the basis of vinyl acetate, ethylene or a combination thereof, or it is a combination of a stabilizer selected from the group of copolymers on the basis of vinyl acetate, ethylene and a hydrophobic agent, which is zinc stearate.



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Stabilized Mud Plaster with Low Vapour Resistance

Field of the Invention

The invention relates to stabilised mud plaster with low vapour resistance, particularly intended for exterior use.

State of the Art

Mud or mud mixtures with other additives suitable for use in construction, containing clay or dust particles as a binding agent and sand or gravel particles with additives as filling agent, also called grog, mixed in an appropriate ratio, are in the area of construction called unburnt clay. Unburnt clay is used in making bricks, blocks, mortar and plaster, or it is poured or rammed in a formwork. Unburnt clay is characterised by low resistance to the effects of water. This low resistance is the result of clay heaving when in contact with water and its shrinkage when drying out. These effects may be prevented by compaction, choice of suitable clay, dispersed reinforcement, use of additives, also called binders, stabilizers, stabilizing binders or a combination thereof. Lime or cement, or a combination thereof, is mostly used as a binder and stabilizer, usually amounting to 3% - 6% of unburnt clay mass. However, these binders considerably increase vapour resistance, make the product less air-permeable and less vapour-permeable and change the product colour. Despite the fact, they are used when making bricks, blocks and ramming clay into formwork. Increased vapour resistance is undesirable when unburnt clay is used for exterior plastering on straw insulation, where it could cause vapour condensation on straw/exterior plaster contact area.

Nowadays, the problem is solved in several ways. Air-permeable siding is used instead of plaster, e.g. larch wood, or a lime plaster is applied, which, however, is not very convenient due to its higher vapour resistance and longer

seasoning, or unburnt clay mortar without stabilizers is used, which is protected against the effects of rain by a suitable architectural design.

Bitumen is also used as a stabilizing binder amounting to 3% - 6% of unburnt clay mass. However, these reduce strength, increase vapour resistance and change the product colour.

Similar problem is also solved in the Japanese patent JP 6122545, which does not relate to plaster but to firebricks. Stabilizing polymer binding agents are used there, but their selection and ratios for stabilized unburnt clay plaster are not specified.

Other disadvantages are lower tensile strength and lower pressure strength compared to other materials.

Nature of the Invention

The aim of the invention was to develop such a composition of unburnt clay, and/or the ratio of its additives, that would eliminate the disadvantages of the current solutions mentioned above completely, or at least to a certain extent.

This is achieved by stabilized clay plaster with low vapour resistance, particularly used as wall plaster, a nature of which, according to the invention, is based on the fact that stabilizing hydrophobic dispersed powder in the amount of 0,25% to 3% of the total plaster weight is added to the basic material, which is unburnt clay with over 250g/cm² viscosity and drying shrinkage in length lower than 2%, where viscosity is tensile strength in wet condition. The total plaster weight is the weight of the material before water is added to achieve required consistence. The dispersion powder is chosen either from the group of terpolymers on the basis of ethylene, vinyl laurate, vinyl chloride, vinyl acetate, vinyl ester, or a combination thereof, or from the group of copolymers on the basis of vinyl acetate, ethylene or a combination thereof, or it is a combination of

a stabilizer chosen from the group of copolymers on the basis of vinyl acetate, ethylene and a hydrophobic agent, which is zinc stearate.

In a preferred embodiment, the invention is characterised in that the stabilized mud plaster, before water is added, contains 98 percent by weight of unburnt clay and 2 percent by weight of stabilizing hydrophobic dispersion powder selected from the group of terpolymers on the basis of ethylene, vinyl laurate, vinyl chloride.

An alternative preferred embodiment is characterised in that the stabilized mud plaster, before water is added, contains 99 percent by weight of unburnt clay and 1 percent by weight of stabilizing hydrophobic dispersion powder selected from the group of terpolymers on the basis of vinyl acetate, vinyl ester, ethylene.

Another preferred embodiment is characterised in that the stabilized mud plaster, before water is added, contains 97 percent by weight of unburnt clay and 1.5 percent by weight of stabilizing dispersion powder selected from the group of copolymers on the basis of vinyl acetate, ethylene and 1.5 percent by weight of a hydrophobic agent, which is zinc stearate.

The advantage and increased efficiency of the present invention is high clay stabilization without increasing vapour resistance. The principle of stabilization is based on double protection here. On one hand, it is higher tensile strength, because the forces generated by clay heaving particularly in the surface layer are absorbed, on the other hand, it is hydrophobization preventing water penetration into deeper layers. The stabilizing hydrophobic dispersion powder, as described in this invention, unlike cement and lime, increases tensile strength considerably without significant increase in the vapour resistance of the mud plaster. The agent of hydrophobic effects is either the stabilizing hydrophobic dispersion powder or stabilizing dispersion powder with a hydrophobic agent. According to this invention, the stabilizing hydrophobic dispersion powder or stabilizing dispersion powder with a hydrophobic agent is gauged to prevent penetration of water in liquid phase and enable passage of water vapour. This kind of stabilization preserves the required properties, i.e. does not increase

vapour resistance, prevents water penetration, does not change the product colour, does not generate dangerous properties and enables recycling.

The stabilizing hydrophobic dispersion powder in the mud plaster is also efficient in a small quantity, let us say from 0.25 percent by weight of clay, when moderate stabilization against the effects of water is achieved. On the other hand, with the dosage exceeding 3 percent by weight of clay, the tensile strength and the pressure strength is improved considerably. Neither of these extreme examples will be used in a large scale.

Examples of the Invention

Example 1

Unburnt clay with the viscosity, i.e. tensile strength in wet condition, exceeding $250\text{g}/5\text{cm}^2$ and the drying shrinkage in length below 2% is mixed with the stabilizing hydrophobic dispersion powder in the ratio of 98 percent by weight of clay to 2 percent by weight of stabilizing hydrophobic dispersion powder. The dispersion powder is selected from the group of terpolymers on the basis of ethylene, vinyl laurate, vinyl chloride, or a combination thereof. Water is added to achieve the required consistence.

Example 2

Unburnt clay with the viscosity, i.e. tensile strength in wet condition, exceeding $250\text{g}/5\text{cm}^2$ and the drying shrinkage in length below 2% is mixed with the stabilizing hydrophobic dispersion powder in the ratio of 99 percent by weight of clay to 1 percent by weight of stabilizing hydrophobic dispersion powder selected from the group of terpolymers on the basis of vinyl acetate, vinyl ester, ethylene or a combination thereof.. Water is added to achieve the required consistence.

Example 3

Unburnt clay with the viscosity, i.e. tensile strength in wet condition, exceeding 250g/5cm² and the drying shrinkage in length below 2% is mixed with the stabilizing hydrophobic dispersion powder in the ratio of 97 percent by weight of clay to 1.5 percent by weight of stabilizing dispersion powder selected from the group of copolymers on the basis of vinyl acetate, ethylene or a combination thereof and 1.5 percent by weight of a hydrophobic agent, which is zinc stearate. Water is added to achieve the required consistence.

The practical application is varied.

Firstly, it is the exterior mud plaster in the form of dry mix. Minimum application thickness is 5 mm. It can be applied on straw insulation, mud wall (incl. reconstruction), smooth background with bonding agent. Plaster is applied on background levelled by unburnt clay without stabilisation, or directly.

Another possible application is exterior plaster made in-situ. Minimum application thickness is 5 mm. It can be applied on straw insulation, mud wall (incl. reconstruction), smooth background with bonding agent. Plaster is applied on background levelled by unburnt clay without stabilisation, or directly.

It can also be used for machine-made pressed mud bricks or stabilized blocks. Bricklaying is carried out on mortar of the same composition supplied as dry mix. Finally, it can be used for mud bricks or stabilised blocks hand made in-situ. Bricklaying is carried out on mortar of the same composition.

Industrial application

The stabilized mud plaster according to this invention can be industrially-produced as dry mix or made in-situ following the manual.

Patent Claims

1. Stabilized mud plaster with low vapour resistance, particularly with over 250g/5cm² viscosity where viscosity is tensile strength in wet condition, particularly intended to be used as wall plaster, *characterised in that* to the basic material, which is unburnt clay, is stabilizing hydrophobic dispersed powder in the amount of 0,25% to 3% of the total plaster weight is added, where the total plaster weight is the weight of the material before water is added to achieve required consistence, and where the dispersion powder is either selected from the group of terpolymers on the basis of ethylene, vinyl laurate, vinyl chloride, vinyl acetate, vinyl ester, or a combination thereof, or from the group of copolymers on the basis of vinyl acetate, ethylene or a combination thereof, or it is a combination of a stabilizer chosen from the group of copolymers on the basis of vinyl acetate, ethylene and a hydrophobic agent, which is zinc stearate.
2. Stabilized mud plaster according to claim 1, *characterised in that*, before water is added, it contains 98 percent by weight of unburnt clay and 2 percent by weight of stabilizing hydrophobic dispersion powder selected from the group of terpolymers on the basis of ethylene, vinyl laurate, vinyl chloride.
3. Stabilized mud plaster according to claim 1, *characterised in that*, before water is added, it contains 99 percent by weight of unburnt clay and 1 percent by weight of stabilizing hydrophobic dispersion powder selected from the group of terpolymers on the basis of vinyl acetate, vinyl ester, ethylene.
4. Stabilized mud plaster according to claim 1, *characterised in that*, before water is added, it contains 97 percent by weight of unburnt clay and 1.5 percent by weight of stabilizing dispersion powder selected from the group of copolymers on the basis of vinyl acetate, ethylene and 1.5 percent by weight of a hydrophobic agent, which is zinc stearate.