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(54) Title: REGENERATING AND PROTECTIVE SYSTEM FOR CONSTRUCTIONS IN CEMENT AND CEMENT

(57) Abstract

A mortar composition for application of a regenerating and protective coating on cementitious materials by means of an airless pump contains cement, aggregate and synthetic resin emulsion in fixed quantities. It is prepared by mixing the ingredients in a cement mixer until a homogeneous, free-running mortar is obtained followed by pouring it into an agitator with low rpm and agitating until complete utilisation.

REGENERATING AND PROTECTIVE SYSTEM FOR CONSTRUCTIONS IN CEMENT AND CEMENT

This invention covers a technical innovation in the composition, processing and application of a low thickness hydraulic mortar, with regenerating properties when used on cement, cement concrete and composite material structures.

The various properties of the subject mortar make it possible to utilise it in a wide range of circumstances and in many sectors of industry and building, and hydraulic works.

There are known to exist several types of coating and mortars in the prior art but inherent in them and in the processes for their production there are found to be several inconveniences and flaws.

In EP 0 455 940 there is disclosed a fine mixture particularly recommended for filling small cracks and crevices present in stone building materials, that comprises among its ingredients fine cement, quartz powder, water and polyethylene oxide, and a process for the production thereof. In the mixture quartz particles have an average size of less than 40 mm. The process is rather cumbersome as it involves letting the polymer be embued with water for 24 hours, and two mixing cycles, a high speed and a low speed one, thanks to which two mixtures are obtained and mixed together.

In EP 0 182 543 a very effective coating material for buildings is disclosed, though serious constraints are placed on it by the fact that it is mostly made up of a polymeric material to be obtained by polymerisation reactions which are inherently rather lengthy.

In JP 55 007 309 there is found to be disclosed a coating material with marked waterproofing properties. The application of said coating material is heavily penalised by the fact that it must involve two phases.

In JP 58 029 970 there is disclosed a cement mortar composition which comprises among its components a vinyl acetate resin. Although quick drying and mainly suitable for local applications, it must undergo polishing and cleaning treatments before utilisation, decreasing its suitability for coating pipes and drinking water tanks.

A major shortcoming of all the products and processes of the prior art is that the application is time consuming and expensive and the attainment of the materials is cumbersome and elaborated.

The foregoing discussion of prior art is not to be construed as an admission with regard to the common general knowledge in Australia.

Therefore an aim of the preferred embodiment of the present invention is to propose a coating material, more particularly a mortar, whose nature is similar to that of the cement and concrete used in buildings, which is easy to apply by means of an airless pump thus ensuring rapid and economical application with respect to traditional systems. The mortar, applied as described, makes it possible to obtain a coating of low thickness and which is compact and thus has excellent waterproofing, adhesive and physical and chemical resistance properties.

It is an object of the present invention to overcome or ameliorate at least one of the disadvantages of the prior art, or to provide a useful alternative.

According to one aspect of the invention there is provided a cementitious material for application onto at lest one member selected from the group consisting of pipes, cement, and concrete as a coating or a mortar with regenerating and protective

properties towards said at least one member, said cementitious material comprising a mixture of:

- a Component A consisting of respective volumetric amounts of cement and quartz sand each having a granulometry smaller than or equal to 200μm, where a ratio of said volumetric amounts of cement to quartz sand is 1:1.2-0.8, and

- a Component B consisting of a synthetic resin emulsion obtained by combining volumetric amounts of synthetic resin and water, wherein the ratio of said volumetric amounts of synthetic resin to water is 1:1.2-0.8,

wherein the volumetric ratio of Component A to Component B ranges between 100 part component A to 30 parts Component B and 100 parts Component A to 50 parts Component B.

According to another aspect of the invention there is provided a method of producing the cementitious material as described above, comprising the steps of:

- A. dry mixing together cement and quartz sand, of a granulometry which is smaller than or equal to 200μm, to obtain a Component A consisting of the cement and quartz sand;

- B admixing Component A with a Component B, the Component B consisting of a synthetic resin emulsion obtained previous to step B by admixture of respective volumetric amounts of the synthetic resin with water, wherein a ratio of the volumetric amounts of the synthetic resin and water is 1:0.3-0.5, until a homogeneous mixture is obtained;

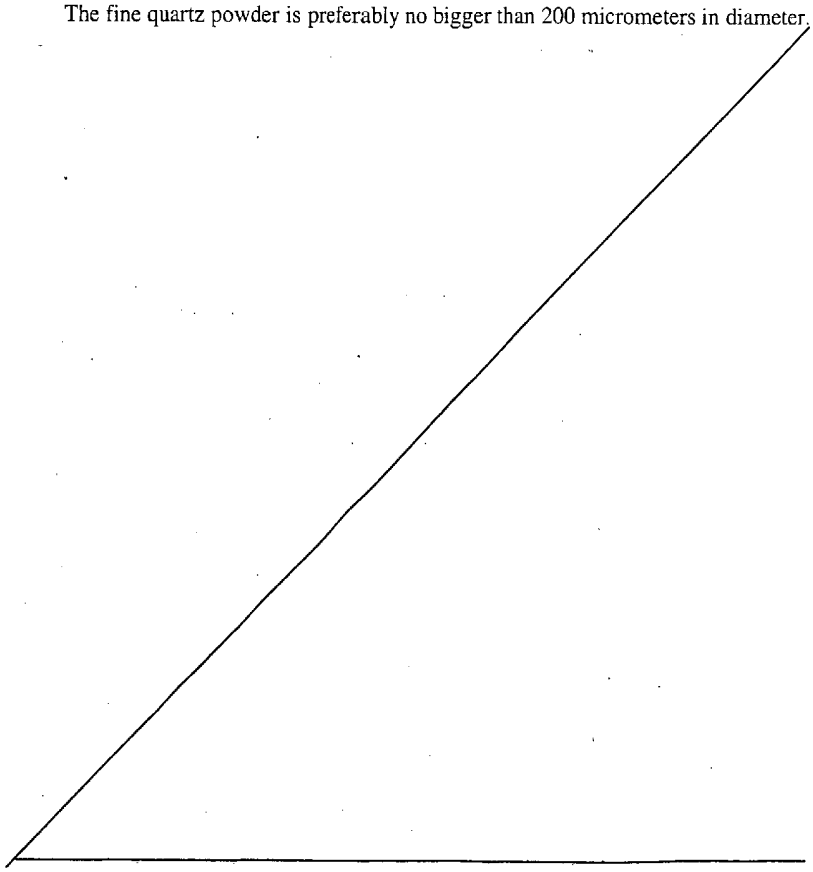
- C transferring the homogeneous mixture to an agitator from which the homogeneous mixture can be readily employed.

Unless the context clearly requires otherwise, throughout the description and the claims, the words 'comprise', 'comprising', and the like are to be construed in an inclusive sense as opposed to an exclusive or exhaustive sense; that is to say, in the sense of "including, but not limited to".

These and other features will be more readily apparent from the following description of a preferred not limiting embodiment of the invention.

Among its components, the coating, more specifically the mortar of the preferred embodiment of the present invention comprises fine quartz powder, a resin emulsion, emulsified additives and water.

The fine quartz powder is preferably no bigger than 200 micrometers in diameter.



Cement aggregate and emulsion are present in equal amounts plus or minus 20%, while cement aggregate and synthetic emulsion are present in a 1 to 0.3-0.5 volumetric proportion plus or minus 20%.

The mixture of the preferred embodiment of the present invention is obtained by a process which comprises a first phase wherein cement and quartz sand are dry mixed together; a second phase wherein the cement aggregate obtained is admixed with the resin emulsion previously obtained by admixture of a resin with water, and additives, until a homogeneous mixture is obtained; a third stage wherein the mixture is transferred to a low angular speed agitator from which it can be readily employed on a continuous basis, until it has been used up.

The coating, more particularly the mortar, is suitable to be applied with an airless pump, preferably of the diaphragm type with a 115 μm (45 micro inches) nozzle, equipped with an intake filter and modified valves if required.

A test aimed at better defining the physico-chemical properties of the mortar of the preferred embodiment of the present invention was carried out.

Analysis was carried out on four asbestos corrugate plate samples coated on both sides with a 1.5 mm thick hydraulic mortar. Endurance to Thermal Shock was evaluated qualitatively.

Analytical Results

Melting Point	1625 °C
Thermal Expansion Coefficient mm/°C	$8.8x110^{-6}$
Mohs Hardness	6.5
Thermal Shock Resistance	Very Good
Unsaturated vapour transpiration at 1.1 bars	75%

The present example highlights the fact that the mortar of the preferred embodiment of the present invention is a good absorbent, increases hardness of the material onto which it is applied, has a good chemical resistance and does not form any vapour barrier, allowing penetration of approximately 75% of it.

The typology of the system in question is determined by:

1) The choice of the particle size of the aggregate of less than 200 micron which, over and above the functional requirements set out must also permit the smooth passage of the mortar through the pump, pipes, valves and an exit nozzle of approximately 45 micro inches diameter, without causing excessive wear and tear.

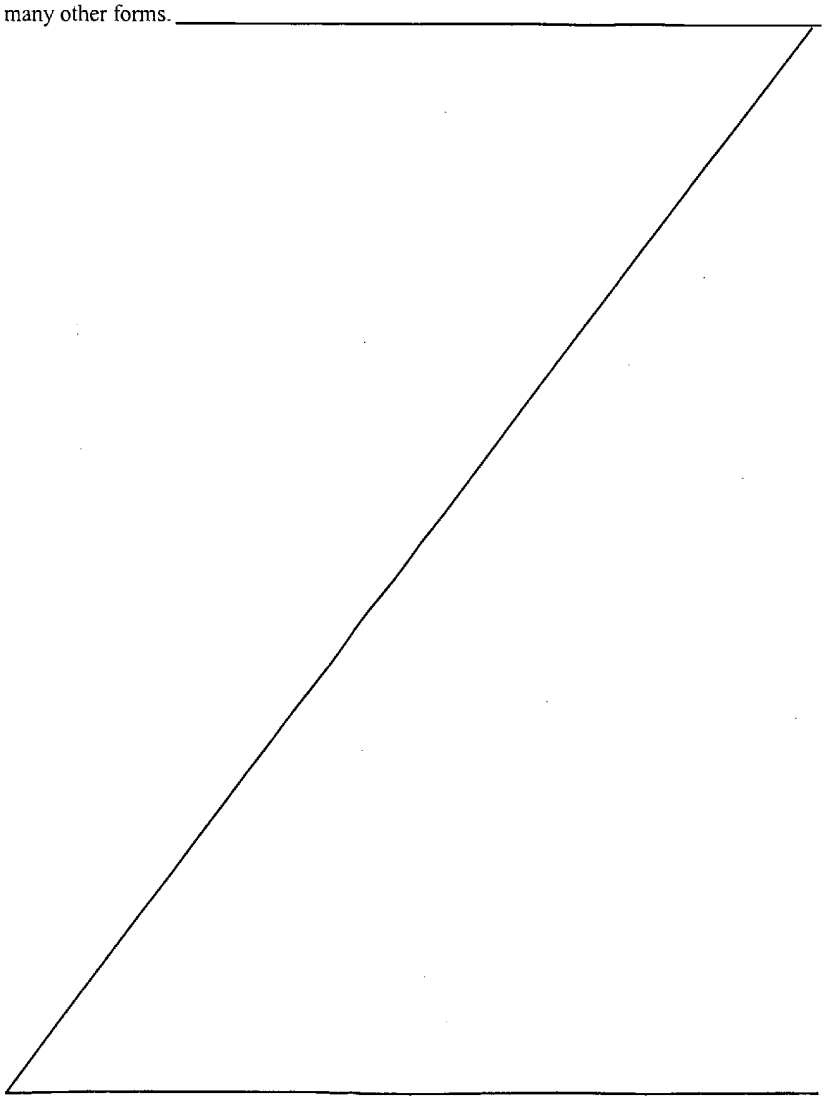
2) Relatively equal quantities in volume or weight of cements, aggregates, additives and resins emulsified in water.

3) Processing achieved by:

- mixing in a cement mixer in order to obtain a homogenous, free-running mortar;
- transfer to and continued processing in an agitator with low rpm until complete utilisation of the batch.

4) Application by means of an airless pump, preferably of the diaphragm type, with a special intake filter and modification of the valves as required, with a nozzle of approximately 45 micro inches (115 μm).

Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.



THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A cementitious material for application onto at lest one member selected from the group consisting of pipes, cement, and concrete as a coating or a mortar with regenerating and protective properties towards said at least one member, said cementitious material comprising a mixture of:

- a Component A consisting of respective volumetric amounts of cement and quartz sand each having a granulometry smaller than or equal to 200μm, where a ratio of said volumetric amounts of cement to quartz sand is 1:1.2-0.8, and

- a Component B consisting of a synthetic resin emulsion obtained by combining volumetric amounts of synthetic resin and water, wherein the ratio of said volumetric amounts of synthetic resin to water is 1:1.2-0.8,

wherein the volumetric ratio of Component A to Component B ranges between 100 part component A to 30 parts Component B and 100 parts Component A to 50 parts Component B.

2. A cementitious material according to claim 1, wherein said cementitious material has cement and quartz sand particles each sized for obtaining layers of said cementitous material by applying said cementitous material with an airless diaphragm pump.

3. A method of producing the cementitious material of claim 1, comprising the steps of:

- A. dry mixing together cement and quartz sand, of a granulometry which is smaller than or equal to 200μm, to obtain a Component A consisting of the cement and quartz sand;

- B admixing Component A with a Component B, the Component B consisting of a synthetic resin emulsion obtained previous to step B by admixture of respective volumetric amounts of the synthetic resin with water, wherein a ratio of the volumetric amounts of the synthetic resin and water is 1:0.3-0.5, until a homogeneous mixture is obtained;

- C transferring the homogeneous mixture to an agitator from which the homogeneous mixture can be readily employed.

4. A method according to Claim 3, wherein said cementitious material has cement and quartz sand particles each sized for obtaining layers of the cementitious material by applying said cementitious material with an airless diaphragm pump.

5. A cementitious material according to Claim 1, wherein the cement and quartz sand each have a granulometry smaller than 200μm.

6. A cementitious material according to Claim 1, wherein the cementitious material has cement and quartz sand particles each sized for obtaining layers of the cementitious material by applying the cementitious material with an airless diaphragm pump with a 115μm nozzle.

7. A cementitious material according to Claim 1, wherein the cementitious material has cement and quartz sand particles each sized for obtaining layers of the cementitious material by applying the cementitious material with an airless diaphragm pump with a 115μm nozzle, equipped with an intake filter.

DATED this 26th Day of February 2001
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