

TITLE: MORTAR COMPOSITIONS, METHODS AND APPLICATIONS THEREFOR.

Field of the Invention

5 This invention relates to mortar compositions, methods and applications therefor. In particular, this invention relates to non-cementitious mortar and coating compositions, methods of producing non-cementitious mortar and coating compositions, and substrates which have been treated with said non-cementitious mortar compositions. This invention also relates to a method of coating a substrate and a method of producing a coated
10 substrate.

Background of the Invention

 Cement-based mortars are known to be applied to substrates including buildings and other structures to provide an even exterior surface. These known cement based
15 mortars are typically used on rough surfaces such as bricks, blocks or stones that are joined together by cement or concrete and provide an even exterior surface.

 However, a disadvantage of the known cement mortars is that they are unable to adhere strongly to a variety of surfaces such as metals, woods, plastics or other substrates as well as typical building structures which would allow for a greater number of
20 applications for the mortar and for substrates coated by the mortar. Further, the shelf life of cement based mortars is limited.

 Further, the known cement mortars are usually prepared on site. The powdered cement mortar is typically mixed with water in order to form a paste for application to a substrate. Typically, the cement mortar paste has a short shelf life which results in the
25 paste being prepared on site by the end users such as building labourers and being applied to the desired substrate within hours. This method of preparation of cement mortar leads to the on site requirement of a water source, mechanical mixers and labour. The cement mortar paste may also suffer from deficiencies in quality if the end users do not properly mix the constituents together.

30 Accordingly it is an object of the present invention to provide a mortar and coating composition which ameliorates these disadvantages of the prior art or provides a useful alternative to the prior art.

Summary of the Invention

Throughout this specification, unless the context clearly indicates otherwise, the word "comprise", "comprises", "comprising" or other variations thereof shall be understood as meaning that the stated integer is included and does not exclude other integers from being present even though those other integers are not explicitly stated.

According to a first embodiment of this invention, there is provided a non-cementitious mortar composition comprising:

- a) from 0 to about 80wt% of an inorganic filler;
- b) from about 25wt% to about 80wt% of a calcium carbonate containing substance;
- 10 c) from about 5wt% to about 80wt% of calcium hydroxide (putty lime);
- d) from about 0.01wt% to about 3wt% of a cellulose ether or cellulose polymer;
- e) from 0.001 to about 0.5wt% of one or more starch derivative; and
- f) from 0 to about 5wt% of additives.

According to a second embodiment of this invention, there is provided a premixed non-cementitious mortar composition comprising:

- a) from 0 to about 80wt% of an inorganic filler;
- b) from about 25wt% to about 80wt% of calcium carbonate containing substance;
- c) from about 5wt% to about 80wt% of calcium hydroxide (putty lime);
- d) from about 0.01wt% to about 3wt% of a cellulose ether or cellulose polymer;
- 20 and
- e) from about 0.001 to about 0.5wt% of one or more starch derivative;
- f) from 0 to about 5wt% of additives; and

water in a sufficient amount to form a paste capable of application to a substrate.

According to a third embodiment of this invention, there is provided a method of producing a non-cementitious mortar composition comprising the steps of:

- mixing from about 25wt% to about 80wt% of calcium carbonate containing substance with from about 5wt% to about 80wt% of calcium hydroxide (putty lime),
- adding from about 0.01wt% to about 3wt% of a cellulose ether or cellulose polymer; and
- 30 • adding from 0.001 to about 0.5wt% of one or more starch derivative(s).

According to a fourth embodiment of this invention, there is provided a method of producing a premixed non-cementitious mortar composition comprising the steps of:

- mixing from about 25wt% to about 80wt% of calcium carbonate containing substance with from about 5wt% to about 80wt% of calcium hydroxide (putty lime),
- adding from about 0.01wt% to about 3wt% of a cellulose ether or cellulose polymer;
- adding from 0.001 to about 0.5wt% of one or more starch derivative(s); and water.

According to a fifth embodiment of this invention, there is provided a premixed mortar composition produced by the method of the fourth embodiment.

According to a sixth embodiment of this invention, there is provided a method of coating a substrate comprising applying the non-cementitious mortar of the first or second embodiment of this invention to a substrate.

According to a seventh embodiment of this invention, there is provided a coated substrate produced by the method of the sixth embodiment.

Detailed Description of the Invention

The inorganic filler used in component a) of the composition of the first or second embodiment of this invention may be selected from the group consisting of crushed marble, crushed limestone, sand, lime and dolomite. The lime may be in particular selected from the group consisting of putty lime.

The calcium carbonate containing substance used in component b) of the composition of the first or second embodiment of this invention may be calcium carbonate or lime. The calcium carbonate may be powdered calcium carbonate. The powdered calcium carbonate may be formed from a sieve having from about 30 mesh to about 600 mesh, from about 40 to about 590 mesh, from about 50 to about 580 mesh, from about 60 to about 570 mesh, from about 70 to about 560 mesh, from about 80 to about 550 mesh, from about 90 to about 540 mesh, from about 100 to about 530 mesh, from about 110 to about 520 mesh, from about 120 to about 510 mesh, from about 130 to about 500 mesh, from about 140 to about 490 mesh, from about 150 to about 480 mesh, from about 160 to about 470 mesh, from about 170 to about 460 mesh, from about 180 to about 450 mesh, from about 190 to about 440 mesh, from about 200 to about 430 mesh, from about 210 to about 420 mesh, from about 220 to about 410 mesh, from about 230 to about 400 mesh, from about 240 to about 390 mesh, from about 250 to about 380 mesh, from about 260 to about 370 mesh, from about 270 to about 360 mesh, from about 280 to

about 350 mesh, from about 290 to about 340 mesh, from about 300 to about 330 mesh and from about 310 to about 320 mesh.

The calcium carbonate containing substance used in component b) of the composition of the first or second embodiment of this invention may be lime. In particular, the lime may be putty lime which has passed through a sieve from about 0.1 to about 2mm sieve, about 0.2 to about 2.0mm sieve, from about 0.3 to about 2.0mm sieve, from about 0.4 to about 2.0mm sieve, from about 0.5 to about 2.0mm sieve, from about 0.6 to about 2.0mm sieve, from 0.7 to about 2.0mm sieve, from about 0.8 to about 2.0mm sieve, from about 0.9 to about 2.0mm sieve, from about 1.0 to about 2.0mm sieve, from about 1.1 to about 2.0mm sieve, from about 1.2 to about 2.0mm sieve, from about 1.3 to about 2.0mm sieve, from about 1.4 to about 2.0mm sieve, from about 1.5 to about 2.0mm sieve, from about 1.6 to about 2.0mm sieve, from about 1.8 to about 2.0mm sieve.

The calcium hydroxide (putty lime) used in component c) of the composition of the first or second embodiment of this invention may be formed by having passed through a sieve from about 0.1 to about 2mm sieve, about 0.2 to about 2.0mm sieve, from about 0.3 to about 2.0mm sieve, from about 0.4 to about 2.0mm sieve, from about 0.5 to about 2.0mm sieve, from about 0.6 to about 2.0mm sieve, from 0.7 to about 2.0mm sieve, from about 0.8 to about 2.0mm sieve, from about 0.9 to about 2.0mm sieve, from about 1.0 to about 2.0mm sieve, from about 1.1 to about 2.0mm sieve, from about 1.2 to about 2.0mm sieve, from about 1.3 to about 2.0mm sieve, from about 1.4 to about 2.0mm sieve, from about 1.5 to about 2.0mm sieve, from about 1.6 to about 2.0mm sieve, from about 1.8 to about 2.0mm sieve.

The cellulose ether used in component d) of the composition of the first or second embodiment of this invention this invention may be an alkyl or cycloalkyl cellulose ether. The cellulose ether may be C₁ to C₁₈ alkyl cellulose ether. In particular, the cellulose ether may be a C₁, C₂, C₃, C₄, C₅, C₆, C₇, C₈, C₉, C₁₀, C₁₁, C₁₂, C₁₃, C₁₄, C₁₅, C₁₆, C₁₇, C₁₈ alkyl cellulose ether. In particular, the cellulose ether may be a methyl, ethyl or propyl cellulose ether.

The cellulose ether may be C₃ to C₁₈ cycloalkyl cellulose ether. In particular, the cellulose ether may be a C₃, C₄, C₅, C₆, C₇, C₈, C₉, C₁₀, C₁₁, C₁₂, C₁₃, C₁₄, C₁₅, C₁₆, C₁₇, C₁₈ cycloalkyl cellulose ether. In particular, the cellulose ether may be a cyclopropyl, cyclobutyl or cyclopentyl cellulose ether.

Further, the cellulose ether may be a C₁ to C₁₈ alkyl hydroxyethyl cellulose ether such as C₁, C₂, C₃, C₄, C₅, C₆, C₇, C₈, C₉, C₁₀, C₁₁, C₁₂, C₁₃, C₁₄, C₁₅, C₁₆, C₁₇, C₁₈ alkyl

hydroxyethyl cellulose ether. In particular, the cellulose ether may be a methyl hydroxyethyl ether, ethyl hydroxyethyl ether or propyl hydroxyethyl ether.

An example of the cellulose ether used in component d) of the composition of the first or second embodiment is methylcellulose or modified methylcellulose. It is understood in the art that methyl ether cellulose or cellulose methyl ether are synonyms for methyl cellulose.

The cellulose ether used in component d) of the composition of the first or second embodiment of this invention may have a molecular weight in the range of about 50,000 to about 500,000 kg/kmol, about 60,000 to about 490,000 kg/kmol, about 70,000 to about 480,000 kg/kmol, about 80,000 to about 470,000 kg/kmol, about 90,000 to about 460,000 kg/kmol, about 100,000 to about 450,000 kg/kmol, about 100,000 to about 440,000 kg/kmol, about 100,000 to about 430,000 kg/kmol, about 100,000 to about 420,000 kg/kmol, about 100,000 to about 410,000 kg/kmol, about 100,000 to about 400,000 kg/kmol, about 100,000 to about 390,000 kg/kmol, about 100,000 to about 380,000 kg/kmol, about 100,000 to about 370,000 kg/kmol, about 100,000 to about 360,000 kg/kmol, about 100,000 to about 350,000 kg/kmol, about 100,000 to about 340,000 kg/kmol, about 100,000 to about 330,000 kg/kmol, about 100,000 to about 320,000 kg/kmol, about 100,000 to about 310,000 kg/kmol, about 100,000 kg/kmol to about 300,000 kg/kmol, about 110,000 kg/kmol to about 300,000 kg/kmol, about 120,000 kg/kmol to about 290,000 kg/kmol, about 130,000 kg/kmol to about 280,000 kg/kmol, about 140,000 kg/kmol to about 270,000 kg/kmol, about 150,000 kg/kmol to about 260,000 kg/kmol, about 150,000 kg/kmol to about 250,000 kg/kmol, about 160,000 kg/kmol to about 250,000 kg/kmol, about 160,000 kg/kmol to about 240,000 kg/kmol, about 170,000 kg/kmol to about 230,000 kg/kmol, about 180,000 kg/kmol to about 220,000 kg/kmol, about 180,000 kg/kmol to about 210,000 kg/kmol, about 180,000 kg/kmol to about 200,000 kg/kmol, and about 190,000 kg/kmol to about 200,000 kg/kmol.

Cellulose ethers which are known in the art may also be used in the present invention especially for their properties which include their properties and uses as thickening agents, bonding agents, adhesives, printing pastes, suspension stabilizing agents, thermoplastic materials, protective colloids, emulsion stabilizers, finishing compositions, coating compositions, plastic sheets, and film-forming agents. Reference is made herein to textbooks such as, for example, Cellular Materials to Composites, Volume 3, Chapter "Cellulose Ethers", pages 226-269, Encyclopedia of Polymer Science and Engineering, 2nd Ed., 1985, John Wiley & Sons, New York.

The cellulose ethers used in this invention may have a solution viscosity of about 20,000 to about 70,000 cps, or about 25,000 to about 70,000 cps, or about 35,000 to about 65,000 cps, or
5 about 40,000 to about 60,000 cps, or about 45,000 to about 60,000 cps, or about 50,000 to about 60,000 cps, or about 55,000 to about 60,000 cps.

10 The viscosity of cellulose ethers may be increased by increasing the degree of polymerization (DP) or viscosity of the cellulose pulp used to make the cellulose ethers, or by protecting against DP or viscosity degradation during pulp grinding and other processes performed during cellulose ether manufacturing. For example, if a specific solution viscosity is desired for the cellulose ethers, the appropriate cellulose pulp viscosity is determined and a cellulose pulp having this viscosity is selected.

15 The inorganic filler used in component a) of the composition of the first or second embodiment of this invention may be in the range of:

about 0.1 to about 80 wt%,
about 0.5 to about 80 wt%,
about 1.0 to about 80 wt%,
20 about 1.5 to about 80 wt%,
about 2.0 to about 80 wt%,
about 2.5 to about 80 wt%,
about 5 to about 80 wt%,
about 10 to about 80 wt%,
25 about 15 to about 80 wt%,
about 20 to about 80 wt%,
about 25 to about 80 wt%,
about 30 to about 80 wt%,
about 35 to about 80 wt%,
30 about 40 to about 80 wt%,
about 45 to about 80 wt%,
about 50 to about 80 wt%,
about 55 to about 80 wt%,
about 60 to about 80 wt%,
35 about 65 to about 75 wt%, and

about 70 to about 75 wt%.

The calcium carbonate containing substance used in component b) of the first or second embodiment of the present invention may be in the range of:

about 25wt% to about 80wt%,

5 about 30wt% to about 80wt%,

about 30wt% to about 75wt%,

about 35wt% to about 70wt%,

about 40wt% to about 65wt%,

about 45wt% to about 60wt%, and

10 about 50wt% to about 60wt%.

In a preferred embodiment of this invention, the calcium carbonate containing substance used in component b) of this invention is putty lime which may be present in the following ranges:

about 25wt% to about 80wt%,

15 about 25wt% to about 75wt%,

about 25wt% to about 70wt%,

about 25wt% to about 65wt%,

about 25wt% to about 60wt%,

about 25wt% to about 55wt%,

20 about 25wt% to about 50wt%,

about 25wt% to about 45wt%,

about 25wt% to about 40wt%,

about 30wt% to about 40wt%, and

about 30wt% to about 35wt%.

25 The calcium hydroxide (putty lime) used in component c) of the first or second embodiment of the present invention may be in the range of:

about 5wt% to about 80wt%

about 5wt% to about 75wt%,

about 10wt% to about 70wt%,

30 about 15wt% to about 65wt%,

about 20wt% to about 60wt%,

about 25wt% to about 55wt%,

about 30wt% to about 50wt%,

about 35wt% to about 45wt%, and

35 about 40wt% to about 45wt%.

The cellulose ether or cellulose polymer used in component d) of the first or second embodiment of this invention may be in the following ranges:

- about 0.01 to about 3.0 wt%,
- about 0.05 to about 3.0wt%,
- 5 about 0.10 to about 3.0wt%,
- about 0.15 to about 3.0wt%,
- about 0.20 to about 3.0wt%,
- about 0.25 to about 3.0wt%,
- about 0.30 to about 3.0wt%,
- 10 about 0.35 to about 3.0wt%,
- about 0.40 to about 3.0wt%,
- about 0.45 to about 3.0wt%,
- about 0.50 to about 3.0wt%,
- about 0.55 to about 3.0wt%,
- 15 about 0.60 to about 3.0wt%,
- about 0.65 to about 3.0wt%,
- about 0.70 to about 2.5 wt%,
- about 0.75 to about 2.0wt%,
- about 0.80 to about 2.0wt%,
- 20 about 0.85 to about 2.0wt%,
- about 0.90 to about 2.0wt%,
- about 0.95 to about 2.0wt%, and
- about 1.0 to about 2.0wt%.

The cellulose ether or cellulose polymer used in component d) may be methylcellulose and may be in the following ranges:

- 25 about 0.01 to about 3.0 wt%,
- about 0.05 to about 3.0wt%,
- about 0.10 to about 3.0wt%,
- about 0.15 to about 3.0wt%,
- 30 about 0.20 to about 3.0wt%,
- about 0.25 to about 3.0wt%,
- about 0.30 to about 3.0wt%,
- about 0.35 to about 3.0wt%,
- about 0.40 to about 3.0wt%,
- 35 about 0.45 to about 3.0wt%,

- about 0.50 to about 3.0wt%,
- about 0.55 to about 3.0wt%,
- about 0.60 to about 3.0wt%,
- about 0.65 to about 3.0wt%,
- 5 about 0.70 to about 2.5 wt%,
- about 0.75 to about 2.0wt%,
- about 0.80 to about 2.0wt%,
- about 0.85 to about 2.0wt%,
- about 0.90 to about 2.0wt%,
- 10 about 0.95 to about 2.0wt%, and
- about 1.0 to about 2.0wt%.

The one or more starch derivative(s) used in component f) of the first or second embodiment of this invention may be in the following ranges:

- about 0.001 to about 0.5 wt%,
- 15 about 0.001 to about 0.45wt%,
- about 0.001 to about 0.40wt%,
- about 0.001 to about 0.30wt%,
- about 0.001 to about 0.30wt%,
- about 0.005 to about 0.30wt%,
- 20 about 0.010 to about 0.30wt%, and
- about 0.015 to about 0.30wt%.

An example of the starch derivative is, but should not be limited to, substituted or unsubstituted starch.

- Typically, the composition of the first and second embodiment of this invention is in a paste form. Still typically, the non-cementitious composition used in the first or second embodiment of this invention is in a pre-mixed paste form.

- Typical substrates which are utilised in the method of the fifth and sixth embodiments of this invention include brick, engineering substrates, iron, steel, steel alloys, magnesium, magnesium alloys, copper, copper alloys, aluminium, aluminium alloys, tin plate, zinc-alum (ZA), galvanised steel, Colorbond™, stainless steels, Blueboard™, fibro, concrete, glazed tiles, glazed pottery (oil and water based), painted surfaces, plastics, render, stone, gypsum, Gyprock™, brick, plywood, masonite™ and wood.

However, it should be appreciated that other substrates not specified above but which would be capable of adhering to the non-cementitious mortar of this invention are included within the scope of this invention.

5 The non-cementitious mortar composition may also include suitable optional additives and/or fillers. The optional additives and/or filler which are used in the composition and methods of this invention include colour pigments, aggregates, thickeners, microfillers and fillers, air entraining agents, extenders, strength enhancers, plasticisers, surfactants, dispersion agents, anti-slip agents, corrosion inhibitors, ultraviolet (UV) light absorbing agents and fire retardants.

10 The typical percentage range of component g) additives, when present, in respect of the total compositions may be
0 to about 5 percent by weight,
about 0.1 to about 5 percent by weight,
about 0.5 to about 5.0 percent by weight,
15 about 1.0 to about 5.0 percent by weight,
about 1.5 to about 5.0 percent by weight,
about 2.0 to about 5.0 percent by weight,
about 2.5 to about 5.0 percent by weight,
about 3.0 to about 5.0 percent by weight, and
20 about 3.0 to about 4.5 percent by weight.

The method of producing a premixed non-cementitious mortar composition may comprise the steps of slaking quicklime of a high calcium content into a putty lime to ensure the plasticity and workability thereof.

The quicklime used in this invention may be as follows:

- 25
- Calcium oxide content > about 95wt%
 - Magnesium oxide content < about 5wt%

Slaking of putty lime

30 An example of the steps of forming the putty lime which is used in this invention is as follows:

- (1) Quicklime is fed through a conveyor to a suitable slaking drum at a rate of about 2,000kg/hr;

(2) Water is added simultaneously to the quicklime at a rate of about 5,500 to about 6,500 litre/hr;

(3) The slaking temperature is maintained between a narrow range of about 90°C to about 100°C, the slaking temperature being maintained through further addition or
5 reduction of water flow rate;

(4) The resulting milk of lime is passed through an approximately 2mm sieve and is pumped to a maturing tank for maturation process of at least 7 days;

After the maturation process, quality control (QC) moisture analysis test checks were
10 conducted to ensure the final moisture content of putty lime to be in the range of about 55% to about 62%. The well matured putty lime may then be sieved through an approximately 1mm sieve again and is ready for use in the final composition of the invention.

The resulting putty lime conforms to quality standard MS1569:2003 set by SIRIM QAS
15 International Sdn Bhd (official quality assurance body of Malaysia)

The additives i) may then be prepared in a mixer/homogeniser in a predetermined concentration as specified above.

20 The main process may then be prepared in batch in the main mixer, by way of adding in the additives i) together with a suitable amount of water.

A specified weight of putty lime which conforms to quality standard MS1569:2003 set by SIRIM QAS International Sdn Bhd is added to the main mixer whilst ensuring that the mix is homogenized for a fixed period of time.

25 A specified weight of fillers (calcium carbonate powder in 30-600 mesh) is also added to the main mixer whilst ensuring that the mix is homogenized for a fixed period of time.

Thereafter, the resultant non-cementitious mortar composition is ready for packing. Whilst a particular method of preparation has been described above to illustrate
30 the method of this invention, it should be understood that the preparation of the compositions and mortars of this invention should not be restricted to the specific method described above.

The compositions and methods of the present invention may also include other suitable additives which include glycol which may also be added together with a
35 detergent so as to act as an air entraining agent. Further, silica may be added in various

forms including the addition of silica fume. Other suitable additives include lime, especially calcium carbonate and other fillers and additives which may be required for application of the composition to different substrates such as the corrosion inhibitors for metal substrates.

5 The compositions and methods of the present invention may also include further compatible polymers, resins and additives which may be added to achieve desired properties as may be envisaged for various types of applications.

Typically, the method of coating a substrate according to the fourth embodiment of this invention comprises applying the non-cementitious mortar to a substrate.
10 Typically, the step of applying the non-cementitious mortar to a substrate may comprise a step of forming a base coat on the substrate and allowing the base coat to dry. Typically, the non-cementitious mortar is applied to a suitable thickness to form a base coat for the particular application. Preferably, the thickness is in the range of 0.5 to 3 mm, still preferably 1 to 3mm, still preferably 1.5 to 3mm and yet still preferably 2.0 to 3mm.

15 Still preferably, after the base coat of the non-cementitious mortar has dried on the substrate, a top coat may be applied on to the dried base coat. Typically, the top coat may be paint, render or other desired finish. Typically, the desired finish is usually one known in the building or construction industry or a decorative finish. Also, the top coat may be a further non-cementitious or cement comprising mortar mixed with other
20 additives such as heat reflective agents, anti-slip agents, ultra-violet light (UV) absorption agents, anti-static agents, corrosion inhibitors, etc.

The coated substrates produced according to this invention may be used in many wide ranging applications including building panels and structures. Typically, such building panels and structures may include external walls for buildings including houses,
25 units and other building structures including warehouses and other storage structures. The coating composition for the building panels and structures can be varied to add suitable additives to provide desired properties of weather resistance strength, colour, strength, etc. Further, such building panels may be pre-fabricated for ease of use.

In an embodiment of this invention, the non-cementitious mortar is coated on a
30 substrates such as bricks, stone or plasterboard.

The coated substrates produced according to this invention may also be used in producing shaped objects which may be used for decorative or industrial uses.

Examples

This invention will now be described, by way of illustration only, with reference to the following examples. The examples serve only to illustrate this invention and should not be construed as limiting the generality of the disclosure of the above description and also the scope of the claims.

5

Example 1

	a)	Putty lime	33.00wt%
	b)	Calcium Carbonate powder	49.00wt%
10	c)	Methylcellulose	0.26wt%
	d)	Starch	0.03wt%
	e)	Water	17.71wt%

Example 2

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	a)	Putty lime	35.00 wt%
	b)	Calcium Carbonate powder	47.00 wt%
	c)	Methylcellulose	0.32wt%
	d)	Starch	0.03wt %
20	e)	Water	17.65wt%

The properties of the two compositions in Examples 1 and 2 above are then subjected to the following tests.

- 25 1. 500g of each sample prepared in accordance with the mix as specified by the manufacturer is taken and placed in a 1,000 ml beaker
2. Condition of test
- a. Outdoor temperature 23°C – 36°C
- b. Outdoor humidity 45% to 55%
- 30 c. Indoor temperature 22°C – 30°C
- d. Indoor humidity 55% to 65%
3. The sample was tested under the following circumstances :-
- a. Outdoor lid uncovered

Most site workers do not leave prepared and unused materials under the sun for long. This test is therefore done to show how long it takes to set under the sun for comparison purposes

b. Outdoor lid covered

- 5 It is recommended that any material that is prepared and unused to be covered with its original lid or at least be loosely covered with a flat board eg a plank or plastic cover

Here, the experiment is carried out by covering the top of the beaker with a piece of hard plastic and then placing the beaker under the sun. The shelf life of the composition is
10 then timed.

c. Indoor lid uncovered

Since most applications are conducted indoors, any material not used is typically left open (although it comes with the original lid). In cases where the product is packaged in plastic
15 (LDPE) bags, usually a plasterer will place the composition material in an open drum/pail for easy storage and application. Any unused composition material is usually left uncovered.

This test is to determine the time taken before it is set under the above conditions.
20

d. Indoor lid covered

The procedure for this test is similar to the procedure for test (c) mentioned above except that the drum/pail is covered loosely with a lid or any flat surfaced material (eg a wooden plank/flat plastic) over the top of the drum/pail.
25

This test is to determine the time taken before it is set under the above conditions.

e. Shelf life

This test is conducted to determine the time taken before the material is not useable,
30 under its original packaging and specified condition, ie inside storage warehouse

Example	Condition	Composition of this invention	Known Cementitious mortar
1	Outdoor lid uncovered	8 hours	2 hours
2	Outdoor lid loosely covered	2 days	4 hours
3	Indoor lid uncovered	Exceeded 5 days*	4 hours
4	Indoor lid loosely covered	Exceeded 5 days*	16 hours
5	Shelf-life	2 years	6-12 month **

* Experiment did not extend beyond 5 days

** as claimed by skim coat manufacturers available in Malaysian market

The above results demonstrated the longer shelf life of the composition as set out in the
5 Examples of the present invention.

The above parameters provide the benefit of the following effect on the composition of the present invention:

- (a) Enhanced plasticity giving a "smoother" / easier workability
- 10 (b) Improved water retention capability for a more even setting
- (c) Improved rheology

Appearance and application of the composition of the invention

1. In smooth and fine paste form. No residue of more than 1mm
- 15 2. In shades of white colour (natural) or any other added colours
3. For fine coating of concrete/precast concrete/plastered brick walls and ceiling
4. Fine coating thickness of not more than 2 mm per layer
5. Bond strength of more than 0.5N/mm^2
6. Non-cementitious, asbestos free and gypsum free

20

The following sets out a preferred method of production of the composition of the examples.

Batch Production Of Non-Cementitious mix of 1,000 kg product

1. Tank Separation
- 5 a. Tank A – putty lime (3000 litre capacity)
- b. Tank B – additive mixture (3000 litre capacity)
- c. Tank C – final mix (5000 litre capacity)
2. Preparation of Tank A – putty lime, please refer to detailed preparation process above
- 10 3. Preparation of Tank B
- a. 980 litre of water
- b. Add in 14.5kg of Methylcellulose having viscosity of 60,000 mPa.s
- c. Add in 1.67kg of Starch Ethers
- d. Go through thorough homogenising process
- 15 4. Final mix
- a. Load cell at Tank C provides accurate measurement down to 1kg variance
- b. Homogeniser starts and continues to run until the final product is obtained
- c. Pump from Tank B to Tank C 360kg of mixture
- d. Start homogenizing process for 5 minutes
- 20 e. Pump from Tank A to Tank C 660kg of putty lime
- f. Homogenizing process continues for 15 minutes
- g. Through conveyor, add in 980 kg of calcium carbonate powder
- h. Homogenizing process continues for 20 minutes
- i. Pump final mixture to holding tank ready for packaging

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Application of non-cementitious composition onto substrates

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In a preferred embodiment of the present invention, the non-cementitious composition as described in the specification and examples is in the form of a pre-mix mortar paste with the water having been already added to the non-cementitious composition. The pre-mix mortar paste is formed in a manner which allows easy application of the pre-mixed mortar

35 paste to substrates such as walls, etc.

This leads to the following advantages:

- No requirement for water source at site of application
- 5 • No requirement for mechanical stirrers or concrete mixers at site
- Higher quality control of non-cementitious composition
- Cost effective compared to other known cementitious applications

10 The applications of the coated substrates and compositions and methods of this invention include:

- building products such as external walls for buildings including houses, units and other building structures including warehouses and other structures;
- internal walls for homes, portable homes, boats, ships and caravans
- masonry based shaped objects
- 15 • coatings for substrates
- fine coating on concrete substrates such as concrete pillars, precast concrete slabs

20 Modifications and variations such as would be apparent to a skilled addressee are deemed to be within the scope of this invention. It is also understood that the scope of this invention should not be limited to the examples illustrated above.

Claims

What is claimed is:

1. A non-cementitious mortar composition comprising:
 - a) from 0 to about 80wt% of an inorganic filler;
 - 5 b) from about 25wt% to about 80wt% of calcium carbonate;
 - c) from about 5wt% to about 80wt% of calcium hydroxide (putty lime);
 - d) from about 0.01wt% to about 3wt% of a cellulose ether or cellulose polymer;
 - e) from 0.001 to about 0.5wt% of one or more starch derivative; and
 - f) from 0 to about 5wt% of additives.
- 10 2. A non-cementitious mortar composition according to claim 1, wherein the inorganic filler a) is selected from the group consisting of lime, crushed marble, crushed limestone, and dolomite.
- 15 3. A non-cementitious mortar composition according to claim 1 or 2, wherein the inorganic filler a) is selected from putty lime.
4. A non-cementitious mortar composition according to claim 3, wherein the putty lime has passed through an approximately 2mm sieve.
- 20 5. A non-cementitious mortar composition according to any one of the preceding claims, wherein the component b) is powdered calcium carbonate.
6. A non-cementitious mortar composition according to any one of the preceding claims, wherein the component b) is powdered calcium carbonate formed from a sieve having from about 30 to about 600 mesh.
- 25 7. A non-cementitious mortar composition according to any one of the preceding claims, wherein component d) the cellulose ether or cellulose polymer is a non-ionic cellulose ether.
- 30 8. A non-cementitious mortar composition according to claim 7, wherein the non-ionic cellulose ether is selected from the group consisting of methylcellulose, methylhydroxy cellulose and methyl hydroxy propyl cellulose.

9. A non-cementitious mortar composition according to any one of claims 1 to 8, wherein the cellulose ether or cellulose polymer is methylcellulose.

10. A non-cementitious mortar composition according to any one of the preceding claims, wherein the additive is present in the composition as a colour pigment.

11. A non-cementitious mortar composition according to any one of the preceding claims, wherein the inorganic filler a) is present in an amount of about 20 to about 80wt%.

12. A non-cementitious composition according to any one of the preceding claims, wherein the calcium carbonate b) is present in an amount of about 40 to about 65wt%.

13. A non-cementitious composition according to any one of the preceding claims, wherein the calcium hydroxide (putty lime) c) is present in an amount of about 25 to about 55wt%.

14. A non-cementitious composition according to any one of the preceding claims, wherein the starch derivative e) is present in an amount of about 0.01 to about 0.3wt%.

15. A non-cementitious composition according to any one of the preceding claims, wherein the composition is in the form of a paste.

16. A method of producing a non-cementitious mortar composition comprising the steps of:

- mixing from about 25wt% to about 80wt% of calcium carbonate containing substance with from about 5wt% to about 80wt% of calcium hydroxide (putty lime),
- adding from about 0.01wt% to about 3wt% of a cellulose ether or cellulose polymer; and
- adding from 0.001 to about 0.5wt% of one or more starch derivative(s).

17. A method according to claim 16, wherein the non-cementitious mortar composition is a premixed non-cementitious mortar composition.

18. A method according to claim 16 or 17, wherein the calcium carbonate is putty lime.
- 5 19. A method according to claim 18, wherein the putty lime is produced by slaking quicklime.
20. A method according to claim 19, wherein the quicklime has a substantially high calcium content.
- 10 21. A method according to claim 20, wherein the quicklime comprises a calcium oxide content of more than about 95wt%.
22. A method according to any one of claims 19 to 21, wherein the quicklime further comprises magnesium.
- 15 23. A method according to claim 22, wherein the quicklime comprises a magnesium oxide content of less than about 5wt%.
24. A method according to any one of claims 19 to 23, wherein the quicklime is fed through a conveyor to a slaking drum at a rate of about 2000kg/hour.
- 20 25. A method according to claim 24, wherein water is added simultaneously to the quicklime at a rate of about 5,500 to about 6,500 litre/hour.
- 25 26. A method according to claim 24 or 25, wherein the temperature of the slaking drum is maintained between a range of about 90°C to about 100°C.
27. A method according to claim 26, wherein the temperature of the slaking drum is maintained between a range of about 95°C to about 100°C.
- 30 28. A non-cementitious mortar composition produced by the method of any one of claims 16 to 27.
29. A method of coating a substrate comprising applying a non-cementitious mortar composition of any one of claims 1 to 15 to a substrate.
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30. A method according to claim 29, wherein the substrate is selected from the group consisting of concrete, precast concrete, plastered brick walls and ceilings.
- 5 31. A coated substrate produced by the method of claims 29 or 30.