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Non-burnt load-bearing bricks

The present invention relates to the manufacture of structural elements, in particular non-burnt load bearing bricks, and to such bricks having an advantageous configuration for construction purposes.

5 Conventionally, the process for the manufacture of bricks requires the step of firing as part of the manufacturing process before the bricks are ready for use. Conventional bricks normally require wetting before the said bricks may be laid or plastered. This is because conventional bricks have a high Initial Rate of Absorbtion (IRA) or suction rate,
10 which is the capacity of the brick to absorb water from the mortar or plaster due to the high porosity of the brick. Prior literature pertaining to the field of this invention have disclosed bricks in which the top surface has a V-shaped depression extending lengthwise along the brick and at least one of the two end surfaces is formed with an indented
15 region. Bricks conventionally used for construction purposes may have planar surfaces or may optionally have one or more one annular bores extending vertically from the top to the bottom surface of the brick.

20 An object of this invention is to provide a manufacturing process for the production of non-burnt load bearing bricks wherein the process does not require firing of the bricks, thereby the said process being cost effective in terms of usage of firing fuels such as timber and coal whilst reducing environmental pollution which may result from the conventional manufacturing process.

25 A further object of this invention is to provide bricks which are water and acid resistant, and comparatively more resistant to corrosion by exposure to elements with regard to conventional bricks.

30 The invention also provides bricks which are substantially higher in strength and durability, thereby enabling their use in the construction of load-bearing structural elements.

The non-burnt bricks as provided in this invention are of low porosity and thereby lower suction rate (IRA), thus saving time and the work load during any construction process which utilizes these bricks.

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Another object of the present invention is to provide a brick which has at least one indented region in the upper surface thereof, which provides improved bonding properties when a plurality of identical bricks having this configuration are bonded together by a bonding agent in the construction of walls and other structures.

A further object of this invention is to prevent slipping between vertically adjacent bricks when a plurality of identical bricks having the configuration of this invention are stacked and bonded together during construction, thereby resulting in a stronger structural element.

According to the present invention there is provided a method for the manufacture of non-burnt load bearing bricks, comprising:-

- (a) breaking up the earth to produce fine particles;
- (b) mixing 85 to 92% (by weight) earth, which consists of at least 60% sand, with 7 to 15% (by weight) ordinary silicate cement and 1 to 10% (by weight of ordinary silicate cement) cement strengthening admixture;
- (c) placing the resultant mixture into a mould and pressing the mixture into shape in the mould using a 60 to 120 tonne pressure brick press;
- (d) removing the shaped material from the mould and allowing the resultant non-burnt load bearing bricks to cure for not less than 15 days.

According to this present invention, there is further provided a brick wherein the upper surface thereof is formed with at least one indented region, which may be in the form of a shallow depression preferably located in the central region of the upper surface of the brick. The shallow depression in the brick as defined above provides a hollow which can hold a bonding agent when a plurality of identical bricks are required to be bonded together during the construction of walls and

other structures, while simultaneously maintaining the strength of the brick which could be considerably reduced if the depression provided is too deep or extends through the brick vertically from the upper to the lower surface thereof. The said shallow indented region also prevents slipping between vertically adjacent bricks, thereby resulting in the construction of stronger structural elements therefrom.

For a better understanding of the invention, reference will now be made by way of example to the accompanying drawings, in which:-

Figure 1 depicts a first embodiment of a brick according to the present invention, wherein 1(a) shows a top elevation, 1(b) shows a right elevation, 1(c) shows a front elevation, 1(d) shows a left elevation and 1(e) shows a bottom elevation thereof;

Figure 2 shows a view of section A1-A1 according to the embodiment shown in Figure 1(c);

Figure 3 shows a view of section B1-B1 according to the embodiment shown in Figure 1(d);

Figure 4 depicts a second embodiment of a brick according to the present invention, wherein 4(a) shows a top elevation, 4(b) shows a right elevation, 4(c) shows a front elevation, 4(d) shows a left elevation and 4(e) shows a bottom elevation thereof;

Figure 5 shows a view of section A4-A4 according to the embodiment shown in Figure 4(c);

Figure 6 shows a view of section B4-B4 according to the embodiment shown in Figure 4(d);

Figure 7 is a schematic view showing the apparatus used in the manufacturing process of the non-burnt load bearing bricks according to this invention.

The present invention provides a method for the manufacture of non-burnt load-bearing bricks. The process makes use of Malaysian local earth, which comprises over 60% sand. The main raw materials used in this process are clay and sand, which are broken up to produce fine particles and screened to remove roots, wood and other foreign substances. Ordinary silicate cement which contains a small amount of cement strengthening admixture is thereafter mixed with the aforesaid raw materials. The resultant mixture is then placed into a mould and pressed into shape using a 60 to 120 tonne pressure brick press. The shaped materials are then removed from the mould and the resulting load-bearing bricks are allowed to be cured. The semi-finished product requires to be sprinkled with water during the early stages of the curing process. No further wetting of the bricks is required during the later stages of curing. Curing proceeds until the bricks achieve the required strength for construction purposes.

The example below illustrates the process of the manufacture of the non-burnt load-bearing bricks according to this invention:-

Example

The main component of the bricks manufactured according to this invention is earth, i.e. in the range of 85 - 92% by weight thereof. The earth used for this purpose preferably comprises at least 60% sand; if the sand component in the local earth used in this process is lower than 60%, addition of sand is required to achieve the desired percentage. Preferably the sand used in this process should comprise at least 50% coarse particles, i.e. particles which have a diameter of between 2 - 5mm. The earth must be separated from roots, wood and other foreign substances.

The earth is mixed with 7 - 15% (by weight) ordinary silicate cement and 1 - 10% (by weight of ordinary silicate cement) cement strengthening admixture. The purpose of the admixture is to hasten the hardening process and to enable achieve the required strength in a shorter period of time. The admixture used may be selected from any of the following compounds:-

- (a) sulphate compound;
- (b) sulphate-calcium chloride compound;
- (c) sulphate-triethanolamine compound;
- (d) naphthyl compound;

5 or a combination of any of the aforesaid compounds.

The semi-finished product is protected with a plastic sheet, preferably of black colour, for the first 3 days. It is then sprinkled with water, preferably twice daily, for a period of 10 days in order to cure the product and hasten the chemical reaction. The product is then cured for
10 a further period of about 2 weeks, after which the resultant non-burnt load-bearing brick may be used for construction purposes.

The manufacture of non-burnt load bearing bricks according to this invention may be carried out by means of the combination of apparatus as set out schematically in Figure 7. Referring to Figure 7, the raw
15 material (1), which consists of earth, is placed in the charging hopper (2) and transported on the conveyor belt (3) to the earth cracker (4). The raw material is broken up in the earth cracker (4) and sieved through a screening machine. The broken earth is then dropped onto a further conveyor belt which transports the earth to a hopper.
20 Gelatinizing Gelling Agent A (6) and Gelatinizing Gelling Agent B (7), which are contained in an ingredient device (5), are added to the earth on the conveyor belt while the earth is being transported to the hopper. Upon reaching the hopper, the earth is transferred to a mixer (8) where a quick-hardening admixture (9) is thoroughly mixed into the earth.
25 The resultant mixture is then conveyed to a brick press (10) where the mixture will be pressed into shape in the mould to form the bricks. The resulting bricks are thereafter allowed to be cured (11).

The invention further provides bricks having an advantageous and aesthetically pleasing configuration for construction purposes. Referring
30 to Figures 1 to 3, a first embodiment of the brick according to this invention has a upper surface which has a shallow depression located in the central region of the upper surface of the brick and extending length-wise along the surface thereof. Figure 2, which shows the view of the cross-section A1-A1 made through the centre of the brick as

illustrated in Figure 1(c), depicts this section of the shallow depression to be substantially 'C'-shaped. Figure 3, which shows a view of longitudinal section B1-B1 made through the centre of the brick as illustrated in Figure 1(d), depicts this section of the said shallow depression to be in the shape of a shallow, wide 'U' extending length-wise along the brick but not extending up till the sides thereof. As shown in Figure 1(b) to (e), the lower surface of the brick and the side surfaces thereof are substantially planar.

Referring to Figures 4 to 6, a second embodiment of the brick according to this invention has an upper surface (Figure 4a) which has two shallow depressions located respectively to the left and to the right of the central axis of the upper surface of the said brick. Figure 5, which shows a view of cross-section A4-A4 made through the centre of one of the aforesaid shallow depressions of the brick as illustrated in Figure 4(c), depicts this section of the said shallow depression to be substantially 'C'-shaped. Figure 6, which shows a view of longitudinal section B4-B4 made through the centre of the brick as depicted in Figure 4(d), illustrates that the said two shallow depressions are located respectively to the left and to the right of the central axis of the brick and are in the shape of a shallow, moderately-wide 'U'. As shown in Figure 4(b) to (e), the lower surface of the brick and the side surfaces thereof are substantially planar.

A brick having the novel configuration as defined above may be produced by means of the manufacturing process for the production of non-burnt load bearing bricks described in this invention.

Claims

1. A method for the manufacture of non-burnt load bearing bricks, comprising the steps of:-
 - (a) breaking up the earth to produce fine particles;
 - 5 (b) mixing 85 to 92% (by weight) earth, which consists of at least 60% sand, with 7 to 15% (by weight) ordinary silicate cement and 1 to 10% (by weight of ordinary silicate cement) cement strengthening admixture;
 - 10 (c) placing the resultant mixture into a mould and pressing the mixture into shape in the mould using a 60 to 120 tonne pressure brick press;
 - (d) removing the shaped material from the mould and allowing the resultant non-burnt load bearing bricks to cure for not less than 15 days.
- 15 2. The method as claimed in claim 1, wherein the admixture used may be selected from any of the following compounds:-
 - (a) sulphate compound;
 - (b) sulphate-calcium chloride compound;
 - (c) sulphate-triethanolamine compound;
 - 20 (d) naphthyl compound;or from a combination of any of the aforesaid compounds.
3. A non-burnt load bearing brick manufactured according to the process claimed in any of claims 1 or 2.
- 25 4. A brick wherein the upper surface thereof is formed with at least one indented region, which may be in the form of a shallow depression, preferably located in the central region of the upper surface of the brick.

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5. A brick as claimed in claim 4, having one shallow depression located in the central region of the upper surface of the brick and extending length-wise along the surface thereof.
6. A brick as claimed in claim 4, having two shallow depressions located respectively to the left and to the right of the central axis of the upper surface of the brick.
7. A brick as claimed in any of claims 4 to 6 manufactured according to the process claimed in claim 1.