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CONCRETE PIPE

This present invention relates to a concrete pipe, and more particularly to the making of a concrete pipe having a protective
5 resinous coating.

It is known that sewer concrete pipes with a chemical-resistant protective coating are used as drainpipes in sanitary drainage or chemical plants. In this art, there has been developed a pipe which
10 is made of concrete or ceramic material and on which is coated an epoxy resin layer or adhered a layer of PVC sheet to prevent it from erosion. However, it is found that those pipes can be caused to fail as the epoxy resin layer will be peeled off from the inner surface of the pipes when the bonding force between the pipe and the epoxy layer
15 is reduced, such as by the deterioration of the concrete. Thus, a further improvement in such concrete pipes has to be attempted, and although some alternative structural forms have been proposed in the prior art there is still scope for improvements.

20 In accordance with the present invention a method of fabricating a concrete pipe, such as for example a sewer concrete pipe, includes the steps of,

- (a) placing freshly mixed concrete into a cylindrical mold;
- (b) rotating said cylindrical mold about a longitudinal axis to
25 form a hollow cylindrical concrete body;
- (c) placing granules of a coarse granular anti-corrosion material into said mold containing said concrete structure;
- (d) further rotating said mold such as to cause said granules to be partially embedded by centrifugal action in the concrete of
30 said hollow cylindrical concrete structure before the concrete has set, thereby to form an interposition layer;
- (e) removing concrete dust to expose said interposition layer after the concrete is set;
- (f) preparing a resinous protective coating composition;
- (g) placing said coating composition into said mold; and
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- (h) rotating said mold to cause said resinous coating

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composition to form a coating layer on said interposition layer.

The present invention also provides a concrete pipe manufactured by the method defined above.

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Preferably, the granules of the coarse granular anti-corrosion material are made of glass or of an earthen material, i.e. coarse aggregate.

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The resinous protective coating material can be made from an epoxy resin composition blended with granules of further granular anti-corrosion material which may be a mixture of relatively fine and coarse granules, or glass fibres may be added to the composition.

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In carrying out the method specified above, after step (d) the mold containing the concrete body may be placed in a steam chamber until the concrete is set. Also, after step (h) the formed structure may be placed in a curing tank.

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By way of example an embodiment of the present invention will be further described with reference to the accompanying drawings, in which:

Fig. 1 is a sectional view of a concrete pipe made in accordance with the present invention; and

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Fig. 2 is a schematic view illustrating the process of fabricating a concrete pipe in accordance with the invention.

Referring now to Fig. 1, there is shown a sectional view of a concrete pipe 1, made in accordance with the present invention, which includes an outer tubular concrete layer 2, an interposition layer 3 and an epoxy coating 4. The thickness of the hollow cylindrical concrete layer 2 is reduced by 5-6mm when compared with a conventional concrete pipe of the same nominal size. The coarse granules 10, of glass in this example, are partly embedded near the inner surface of the hollow cylindrical outer concrete layer 2 to form interposition

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layer 3. These granules can be in a size range of about 3-6mm. A chemical-resistant, i.e. anti-corrosion, resinous coating 4 which comprises an epoxy resin composition and coarse as well as fine glass granules 10, 11 blended therewith is applied on the surfaces of the granules 10 of the interposition layer 3 not covered by the concrete. Alternatively, granules of an earthen material, i.e. coarse aggregate, can be used instead of glass.

In Fig. 2, there is shown two rollers 8, a motor 7 and a transmission belt 9 which are mounted for mutual cooperation on a support 6. A cylindrical mold 5 is placed on the two rollers 8 for fabricating the concrete pipe 1. Through the transmission belt 9, the motor 7 drives a roller 8 which in turn drives the cylindrical mold 5 to rotate in the direction which is different from that of the roller 8.

In operation, up to the stage of finally applying the resinous coating, freshly mixed concrete is placed in the cylindrical mold 5 and is subjected to a centrifugal force caused by rotation of the cylindrical mold 5 so as to form the concrete into a hollow cylindrical shaped structure on the inner wall of the mold 5. During the beginning of the setting of the concrete, i.e. after the mold has been rotated for 30-40 minutes, the coarse granules 10 are added into the mold 5. The coarse granules 10 are uniformly spread out and are then forced to become partially embedded in the inner surface of the hollow cylindrical concrete body 2 by the centrifugal force to form interposition layer 3.

The rotation of the mold 5 is continued until the concrete is set. Afterwards, the mold 5 is put into a steam chamber for the concrete to attain a required strength. Then, the mold 5 is placed again on the rollers 8 and concrete dust on the inner surface of the concrete pipe is blown out by compressed air. The glass granules 10 are thus respectively partially embedded in the concrete to form the interposition layer 3 which is then exposed on the concrete surface before receiving the final resinous protective coating.

CLAIMS

1. A process of forming a concrete pipe comprising:
 - (a) placing freshly mixed concrete into a cylindrical mold;
 - 5 (b) rotating said cylindrical mold about a longitudinal axis to form a hollow cylindrical concrete structure;
 - (c) placing granules of a coarse granular anti-corrosion material into said mold containing said concrete structure;
 - (d) further rotating said mold such as to cause said granules to
 - 10 be partially embedded by centrifugal action in the concrete of said hollow cylindrical concrete structure before the concrete has set thereby to form an interposition layer;
 - (e) removing concrete dust to expose said interposition layer after the concrete is set;
 - 15 (f) preparing a resinous protective coating composition;
 - (g) placing said coating composition material into said mold; and
 - (h) rotating said mold to cause said resinous coating composition material to form a coating layer on said
 - 20 interposition layer.
2. A process of forming a concrete pipe according to claim 1, further comprising placing said mold in a steam chamber until the concrete is set after said step (d).
- 25 3. A process of forming a concrete pipe according to claim 1 or 2, further comprising placing the formed structure into a curing tank after said step (h).
- 30 4. A process of forming a concrete pipe according to any of the preceding claims, wherein said step (f) includes adding a granular material comprising a mixture of relatively fine and coarse granules to said coating composition.
- 35 5. A process of forming a concrete pipe according to any of claims 1 to 3, wherein said step (f) includes adding glass material into said



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coating composition.

6. A process of forming a concrete pipe substantially as herein described with reference to and as shown in Figure 2 of the accompanying drawing.

7. A concrete pipe made by a process as claimed in any one of the preceding claims.

8. A concrete pipe as claimed in Claim 7 and comprising:
a tubular said cylindrical concrete structure;
a said protective coating of a synthetic resinous material provided over the inner surface of said concrete structure; and
between said inner surface and said resinous coating, a said interposition layer formed by coarse granular material directly bonded to said protective resinous coating, the granules of the coarse granular material making up said interposition layer being partially embedded within the concrete of the concrete structure by which they are held in place.

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9. A concrete pipe according to Claim 8, wherein said granules are made of earthen material, i.e. coarse aggregate.

10. A concrete pipe according to Claim 8, wherein said granules are made of glass material.

11. A concrete pipe according to any of claims 8 to 10, wherein said protective resinous coating is an epoxy resin composition.

12. A concrete pipe according to Claim 11, wherein said protective resinous coating further includes relatively coarse and fine granules of granular material mixed therein.

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