



PREFABRICATED ENCLOSURE

FIELD OF THE INVENTION

The present invention relates to a system for prefabricating enclosure for
5 the construction industry. In particular, the present invention pertains to a
method and apparatus for manufacturing and assembling wall panels for
prefabricated enclosure which meets the weight, acoustic, cost and aesthetic
requirements of modern high density dwellings.

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BACKGROUND OF THE INVENTION

The requirement for low cost, prefabricated enclosure in public housing
schemes is well known. Various types of prefabricated enclosure are
commercially available. With respect to prefabricated toilets, there are three
main types: (1) unitized toilets molded entirely in a synthetic shell; (2) unitized
15 toilets that consist of galvanized metal wall panels; and (3) pre-assembled
panels constructed from calcium boards mounted on metal frames. The first
category enclosures scores high on the weight and cost criteria and is truly
unitized but their shell's poor acoustic or hollow characteristics limit their
acceptance by the average home owners. The latter two types meet the
20 acoustic and aesthetic requirements but they require the contractors onsite to
add additional walls (usually external brick walls) to complete the enclosures.

The prior art prefabricated toilets are delivered to the work site with the
mechanical and electrical conduits fully exposed. As a result, the piping and
electrical connections are often damaged, either accidentally in transit or
25 subjected to vandalism. The need to add an external wall conceals the
exposed mechanical and electrical conduits but add further to the thickness of

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the panel walls. The additional external wall provides the enclosure with better acoustic insulation and the user with a "robust" feel of the same.

OBJECT OF THE INVENTION

5 It is an object of the present invention to create a comprehensive prefabricated enclosure by minimising the labor input after it is delivered to work site.

It is also an object of the present invention to reduce the overall thickness and weight of a prefabricated enclosure after it is installed while improving its
10 acoustic characteristics.

It is a further object of the present invention to improve the overall quality of prefabricated enclosure by standardising the manufacture and assembly of key components.

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It is yet another object of the present invention to reduce the overall cost of delivering prefabricated enclosure while ensuring the integrity of essential mechanical and electrical services.

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SUMMARY OF THE INVENTION

The present invention is a system for manufacturing and assembling prefabricated enclosures from standardised, modular, composite wall panels. The panel features insulation sandwiched between a rib wall panel and a non-corrosive sheet. Mechanical and electrical conduits are concealed in the cavity
25 of the rib wall panel and among the insulation. Tiles or wall coverings are then laid over the non-corrosive sheet. In the preferred embodiment of the present invention, a prefabricated enclosure is formed off site when the wall panels are



anchored to a reinforced concrete base. Similarly the wall panels are joined with bolts along the edges to form the corners of the enclosure. When installed on site, the present invention imposes less loading on the foundation slab and is half the thickness of prior art prefabricated enclosure. Because all the key components of the prefabricated enclosure according to this invention are manufactured and assembled off site, the overall quality of the enclosure is preserved. Above all, the present invention offers an overall solution which improves over the acoustic characteristics and space usage of prior art prefabricated enclosures.



BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 illustrates an exploded, perspective, right side, top, elevational view of an enclosure according to the present invention.

- 5 FIG. 2 shows in one embodiment how the wall panels of the enclosure in FIG. 1 can be joined to form the corners of the enclosure.

FIG. 3 is a top, plan, elevational view of two adjacent enclosures and one embodiment of how they can share a common wall panel.

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FIG. 4 is a side, cross sectional, elevational view of the common wall panel according to Section A-A of the adjacent enclosures in FIG. 3.

- 15 FIG. 5 is an exploded, cross sectional view of the common wall panel of the adjacent enclosures in FIG. 4.

FIG. 6 is a cross sectional, elevational view of the interface between the common wall panel and the bases of the adjacent enclosures in FIG. 4.

- 20 FIG. 7 is a flow chart illustrating the steps for manufacturing and assembling an embodiment of the present invention.



DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates an exploded, perspective, right side, top, elevational view of an enclosure according to the present invention. Prefab enclosure 1 comprises at least a base 2, wall panels 4, 6, 8 and 10 and a ceiling 12 (not shown in figure but in FIGS. 4 and 5). The base comprises a re-enforced concrete floor slab cast in sanitary piping and waterproofing (both not shown in figures). The ceiling 12 can be of any durable sheet such as calcium ceiling board. The wall panels are the subject matters of the present invention and shall be elaborated further below.

Referring again to FIG. 1, each of the wall panels is virtually identical except for panel 6 where an opening is provided for accommodating a door or a window. As such, the discussion of the details for wall panel 10 applies equally to that of wall panels 4, 6 and 8 respectively. The wall panel 10 comprises at least one rib wall panel 14 featuring at least one cavity 15. Shown clearly in the exploded view of FIG. 1 is at least one layer of insulation 16 being disposed within the cavity 15 for dampening noise external to the panel 10. In the preferred embodiment of the present invention, the insulation comprises polystyrene foam or any equivalent material for retarding the transmission of noise signals. It should be understood by one skilled in the art that the insulation 15 also assists in regulating the ambient temperature within the enclosure. Next, a sheet of non-corrosive sheet 18 is shown installed over the cavity 15 and insulation 16. Preferably the sheet 18 is made of galvanised metal sheet or similar material. The sheet 18 not only shields the conduits (not shown in FIG. 1 but in FIG. 2) that runs through the cavity, but also provides a suitable surface for the contractors to lay tiles 20 or similar wall covering.

FIG. 2 shows in one embodiment how the wall panels of the enclosure 1 in FIG. 1 can be joined to form the corners of an enclosure. Wall panel 8 is



coupled at a substantially normal angle to wall panel 10, and bolts 22 joins them securely to each other along the edges of the panels. Although bolts have been employed as couplers in joining the wall panels, it should be understood by one skilled in the art that other couplers might also be used effectively. Again, in FIG. 2 the cross sectional view of conduits 24 and 26 running through the cavity 15 and insulation 16. Through the conduits 24 and 26, mechanical and electrical services as well as running water are provided to the user of the enclosure. The conduits 24 and 26 are concealed within the cavity 15 and further shielded by the non-corrosive sheet 18 and tiles (not shown in figure). Unlike other prior art prefab enclosures, the present invention features the rib wall panel 15 for protecting the conduit 24 against vandalism or accidental damage. As such, the integrity of the enclosure 1 is preserved as it is being transported to the work site. Referring again to FIG. 2, no additional brick wall is required to be laid externally of the wall panels 8 and 10. As such, the present invention when installed on site is half the thickness of prior art prefab enclosure walls. Yet, the acoustic characteristics of the enclosure 1 is superior to that of prior art prefab enclosures. Furthermore, the enclosure 1 of the present invention imposes much less load on the foundation slab when it is installed than that of the prior art.

FIG. 3 is a top, plan, elevational view of two adjacent enclosures and one embodiment of how they can share a common wall panel. Prefab enclosure 1 and 28 abuts each other and shares a common wall 30. In addition, windows 27 and 29 are provided on one of the wall panels. FIG. 4 is a side, cross sectional, elevational view of the common wall panel according to Section A-A of the adjacent enclosures in FIG. 3. Here, the enclosures 1 and 28 are shown being installed between two floor slabs 34 and 36 respectively. The common wall 30 comprises two sets of modular wall panels 38 and 40



respectively. The common wall 30 interposes between two ceiling boards 42 and 44 respectively. Unlike the single wall panel in FIGS. 1 and 2, the cavity of the wall panels 46 and 48 faces each other in the common wall configuration in FIGS. 4 – 6. The insulation 50 and 52 for the combined wall panels 46 and 48
5 forms a thicker layer, thus achieving enhanced acoustic characteristics even though it is comparable in thickness than that of the prior art wall panels. FIG. 6 is a cross sectional, elevational view of the interface between the common wall panel and the bases of the adjacent enclosures in FIG. 4. Here, upturns 60 and 62 meet the bottom of the common wall 30 and are securely joined with
10 bolts 54 and 56 respectively.

Finally, FIG. 7 is a flow chart illustrating the steps for manufacturing and assembling an embodiment of the present invention. In step 70, the base 2 of the enclosure 1 is precasted with concrete sanitary piping. Next, the rib wall panels are precasted in step 72. In the preferred embodiment of the present
15 invention, the rib wall panels are made of concrete. Once the rib wall panels are ready in step 74, they are joined at the base of the enclosure with bolts in the same manner as illustrated in FIG. 6. Thereafter in steps 76, conduits for mechanical and electrical services and water pipe are run through the cavity of the rib wall panels. Then in step 78 insulation fills the cavity followed by the
20 installation of non-corrosive sheet over the cavity and insulation to conceal the conduits. Next, windows and doors are installed through suitable openings in the wall panels and waterproofing membrane laid on the base as shown in FIG. 6 and in step 82. The contractor will then lay floor and wall tiles in step 84. Finally the ceiling board is installed in step 86 and shown in FIG. 86.
25 Optionally, sanitary wares and toilet fittings are installed in step 88 before the standard quality checks takes place.



It is evident from the manufacturing and assembly steps of the present invention that the contractors who normally build enclosures are relieved of critical path constraints as far as the installation of enclosures are concerned. As such, the present invention free up the contractors' labor and supervisory
5 resources for other important aspect of construction. To the architects, the present invention offers simpler quality control. Similarly, the end users benefit from ease of maintenance and more space as a result of enhancement in overall quality of prefabricated enclosures. Finally the developers enjoy saving in foundation costs as the installed enclosures impose less load on the
10 foundation.

The present invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the
15 appended claims and all changes which come within the meaning and range of equivalency of the claims are, therefore, to be embraced therein.



CLAIMS

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I Claim:

1 1. A wall panel for assembling a prefabricated enclosure, said enclosure
2 having at least one base upon which said wall panel may rest substantially
3 vertically, said wall panel comprising:

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5 at least one rib wall panel, said rib wall panel having at least one cavity;

6

7 at least one layer of insulation disposed in said cavity for dampening the
8 noise external to said wall panel;

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10 whereby said wall panel when installed as an enclosure achieves
11 reduction in overall dimension thickness and foundation loading but
12 enhancement in acoustic characteristics.

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1 2. A wall panel as in claim 1 wherein said cavity and said insulation conceals
2 at least one conduit for mechanical and electrical services running through it.

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1 3. A wall panel as in claim 1 wherein said rib wall panel is joined to each
2 other along the edges with bolts.

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1 4. A wall panel as in claim 1 wherein said insulation comprises polystyrene
2 foam.

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1 5. A wall panel as in claim 1 wherein said rib wall panel comprises concrete.

2



1 6. A wall panel for assembling a prefabricated enclosure, said enclosure
2 having at least one base upon which said wall panel may rest substantially
3 vertically, said wall panel comprising:

4

5 at least one rib wall panel, said rib wall panel having at least one cavity;

6

7 at least one layer of insulation disposed in said cavity for dampening the
8 noise external to said wall panel;

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10 at least one non-corrosive sheet being laid over said cavity and said
11 layer of insulation for facilitating the laying over its exposed surface wall
12 covering or tiles;

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14 whereby said wall panel when installed as an enclosure achieves
15 reduction in overall dimension thickness and foundation loading but
16 enhancement in acoustic characteristics.

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1 7. A wall panel as in claim 6 wherein said cavity and said insulation conceals
2 at least one conduit for mechanical and electrical services running through it.

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1 8. A wall panel as in claim 6 wherein said non-corrosive sheet comprises
2 galvanised metal.

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1 9. A wall panel as in claim 6 wherein said insulation comprises polystyrene
2 foam

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1 10. A wall panel as in claim 6 wherein said rib wall panel comprises a
2 concrete.

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1 11. A method for prefabricating an enclosure, said method comprising
2 the steps of:

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4 precasting a base;

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6 precasting a panel wall, said wall panel further comprising at least one rib
7 wall panel, said rib wall panel having at least one cavity, at least one layer of
8 insulation disposed in said cavity for dampening the noise external to said wall
9 panel;

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11 assembling said wall panels onto said base and joining securely thereto
12 with bolts;

13

14 running at least one conduit for mechanical and electrical services
15 therethrough;

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17 filling said cavity with insulation; and

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19 laying floor and wall covering or tiling,

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21 whereby said enclosure is made off site without comprising its acoustic
22 characteristics and physical integrity.

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1 12. The method for prefabricating an enclosure as in claim 11, said insulation
2 comprises polystyrene foam.

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1 13. A method for prefabricating light weight enclosure, said method
2 comprising the steps of:

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4 precasting a base;

5

6 precasting a panel wall, said wall panel further comprising at least one rib
7 wall panel, said rib wall panel having at least one cavity, at least one layer of
8 insulation disposed in said cavity for dampening the noise external to said wall
9 panel;

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11 assembling said wall panels onto said base and joining securely thereto
12 with bolts;

13

14 running at least one conduit for mechanical and electrical services
15 therethrough;

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17 filling said cavity with insulation;

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19 installing at least one non-corrosive sheet over said cavity and insulation;

20 and

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22 laying floor and wall covering or tiling,

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24 whereby said enclosure is made off site without comprising its acoustic
25 characteristics and physical integrity.

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1 14. The method for prefabricating an enclosure in claim 13 wherein said
2 insulation comprised polystyrene foam.

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1 15. The method for prefabricating an enclosure in claim 13 wherein said non-
2 corrosive sheet comprises galvanised metal.

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