



WHAT YOU NEED TO KNOW ABOUT..... **PREFABRICATED BATHROOM UNIT (PBU)**

INTRODUCTION

The bathroom is usually one of the smallest rooms in a dwelling unit. Nevertheless, it is also one of the most labour intensive elements to be constructed. It involves almost all building trades such as waterproofing, finishes, accessories, plumbing, sanitary and electrical works.

The construction of a bathroom demands a very high standard of workmanship especially in the area of waterproofing. Should there be any water leakage, the amount of time, cost and inconvenience caused could be extensive. Rectification work may require removing the existing tiles, re-applying waterproofing system and re-tiling.

PREFABRICATED BATHROOM UNIT

(A) Definition

The prefabricated bathroom unit (PBU) is constructed using dry installation method. The unit is pre-assembled in factory and delivered to site for installation.

There are three common types of prefabricated bathroom unit:-

- a. Full precast concrete
- b. Steel panel wall and concrete floor tray
- c. Cement board wall and either concrete or fibre glass floor tray

These bathrooms are delivered to site in the following forms:-

- a. The wall panels and floor tray are pre-assembled in the factory as a complete unit
- b. The wall panels and floor tray are fabricated separately in factory and assembled together on site

This brochure will focus on fully pre-assembled PBUs. All finishes and fittings are done in the factory to achieve better quality and productivity.



(B) Trades involved

Constructing a conventional bathroom unit entails many work trades. These include:

1. Bricklaying
2. Plastering
3. Waterproofing
4. Sanitary works
5. Plumbing works (including accessories like tap, shower head and heater)
6. Electrical works
7. Painting
8. Ceiling
9. Tiling (wall & floor)
10. Joinery Work (cabinet, shelf)
11. Door
12. Window
13. Shower screen

(C) Benefits of PBU

i. Save time

- Construction time can be shortened as fabrication of PBUs can proceed in parallel in the factory while other worksite activities are ongoing
- Only three to four workers are required to install one PBU in half a day on site

ii. Reduce the need for skilled workers

- Do not require skilled workers on site

iii. High quality and many choices of finishes

- Stringent quality control in factory ensures uniform and superior quality
- Inspection and approval of the prototype eliminates potential quality and site installation problems
- Wide selection of materials to suit all homeowners

iv. Ready to install

- “Just-in-time” delivery of bathroom can be adopted

(D) Fabrication of PBU

Two types of PBU are explained here. They are (i) fully precast concrete volumetric PBU and (ii) steel panel walls with concrete floor tray PBU.

The manufacturing processes are shown below:

(i) Floor: Concrete Wall : Concrete

The sequence of factory production is as follows:



1. Casting of concrete shell



2. Curing of concrete and storage



3. Laying of waterproofing system to floor and wall



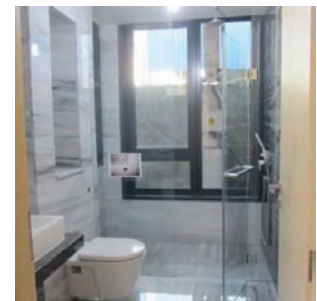
4. Tiling



5. Installing finishes and fittings



6. Quality checks



7. Completed unit

Courtesy of Dragages Singapore

The sequence of installing the PBU on site is as follows:



8. Completed units are ready for delivery



9. Transporting PBUs to site

10. Hoisting of PBU



11. Preparation to receive the PBU

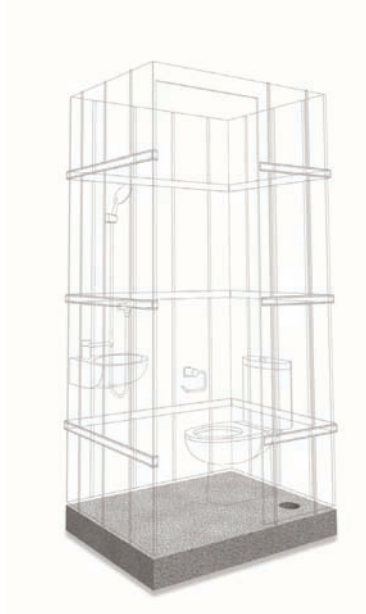
12. Hoisting of PBU into location

13. Final adjustment

Courtesy of Dragages Singapore

(i) Floor : Concrete
Wall : Steel Panel

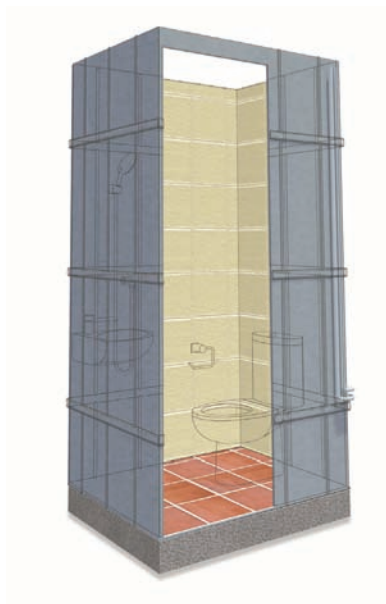
The sequence of manufacturing in the factory is as follows:



Stage 1- Casting of concrete base



Stage 2 - The wall is made of galvanised steel sheets and assembled together with steel frames. Mechanical and Electrical (M&E) services are installed at this stage



Stage 3- Application of waterproofing to the wall and floor. The first water ponding test is done before the installation of wall and floor finishes.



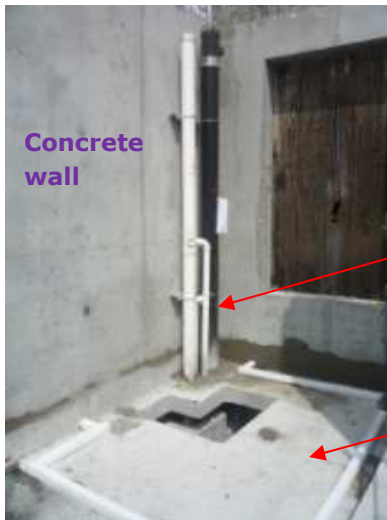
Stage 4- Install sanitary wares such as basin and water closet. Once PBU is completed, it is protected and ready for delivery to site

Courtesy of Robin Village Developments Pte Ltd

(E) Location of services shaft

The location of services shaft is important to ease future maintenance.

Layout 1 shows the services shaft located next to a reinforced concrete wall. With such layout, it is difficult to install services during construction stage. It is also not accessible for workers to repair or maintain the services in future.



Layout 1

X The services shaft is not accessible once the PBU is placed into position

Location of the PBU

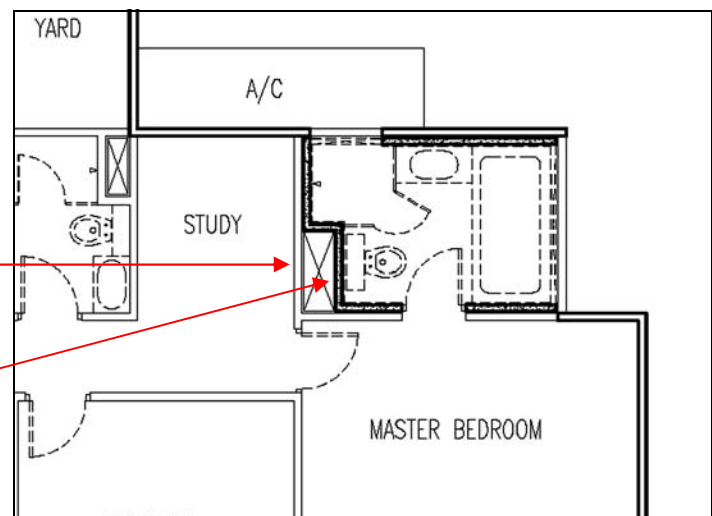
Layout 2 shows the services shaft located next to the bedroom and study room separated by dry wall partition. The shaft is therefore accessible to facilitate future repair and maintenance works.

Layout 2

Dry wall partition



The vertical shaft is accessible for repair and maintenance from bedroom or study room



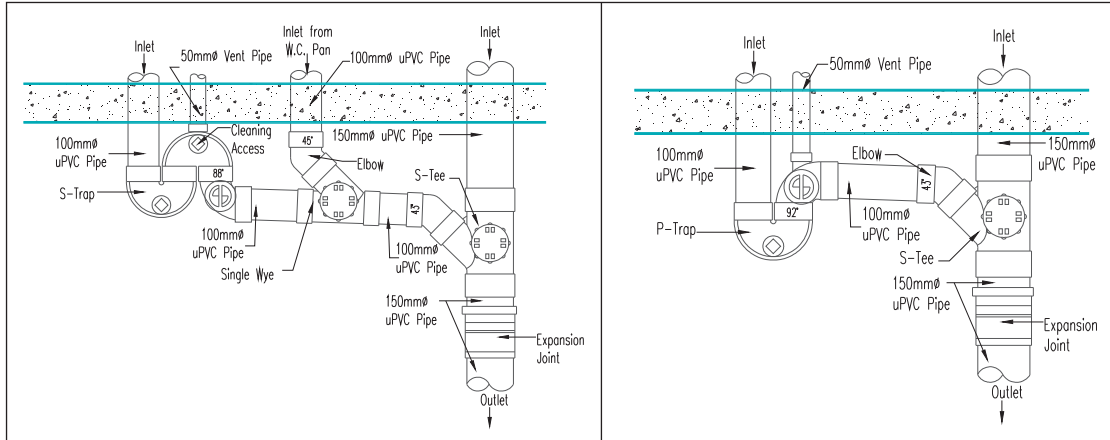
Courtesy of ADDP Architects

(F) Types of Floor Traps

Both the conventional floor trap and the shallow floor trap can be used for the PBUs.

(i) Conventional Floor Trap

With conventional floor trap, the sanitary pipes are connected below the slab of the bathroom unit.



Details of conventional S-trap

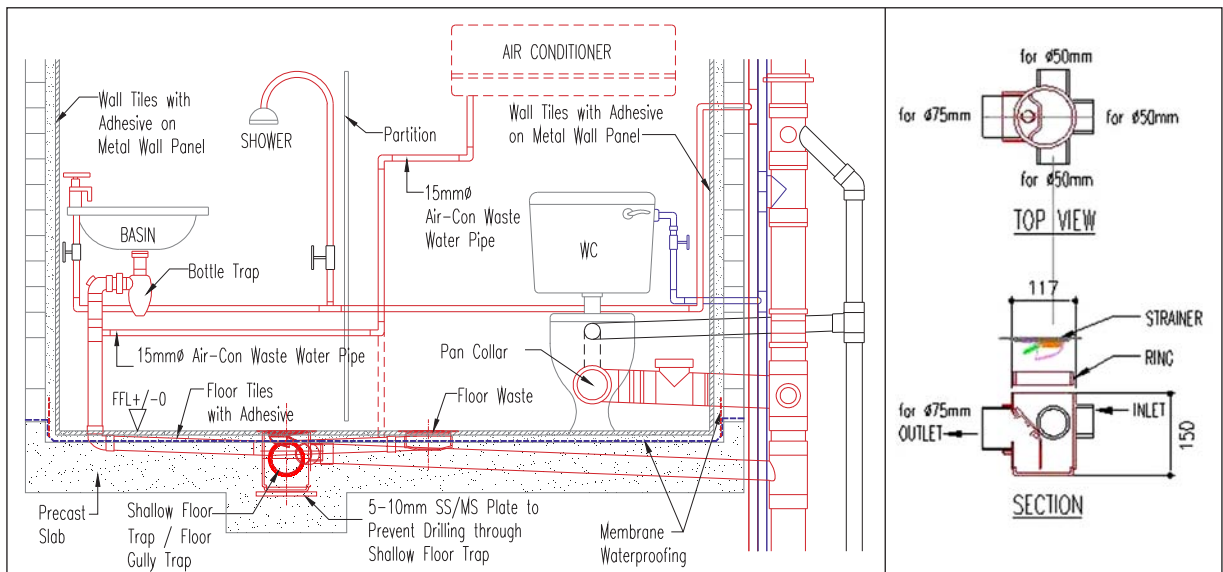
Details of conventional P-trap

Courtesy of SsangYong Engineering & Construction Co Ltd

(ii) Shallow Floor Trap for PBU

Shallow floor trap and sanitary pipes have the advantage of being installed within the PBU slab. They are connected horizontally to the main discharge stack in the services shaft. This avoids exposing the unsightly sanitary pipes under the slab as seen in conventional bathrooms. It also eases future maintenance as no pipes are protruding into the dwelling unit below. All maintenance or repairing works can be done within the affected unit avoiding the need to disturb the neighbour below.

Builders are to work with the approved shallow floor trap suppliers when using the shallow floor traps for PBU.



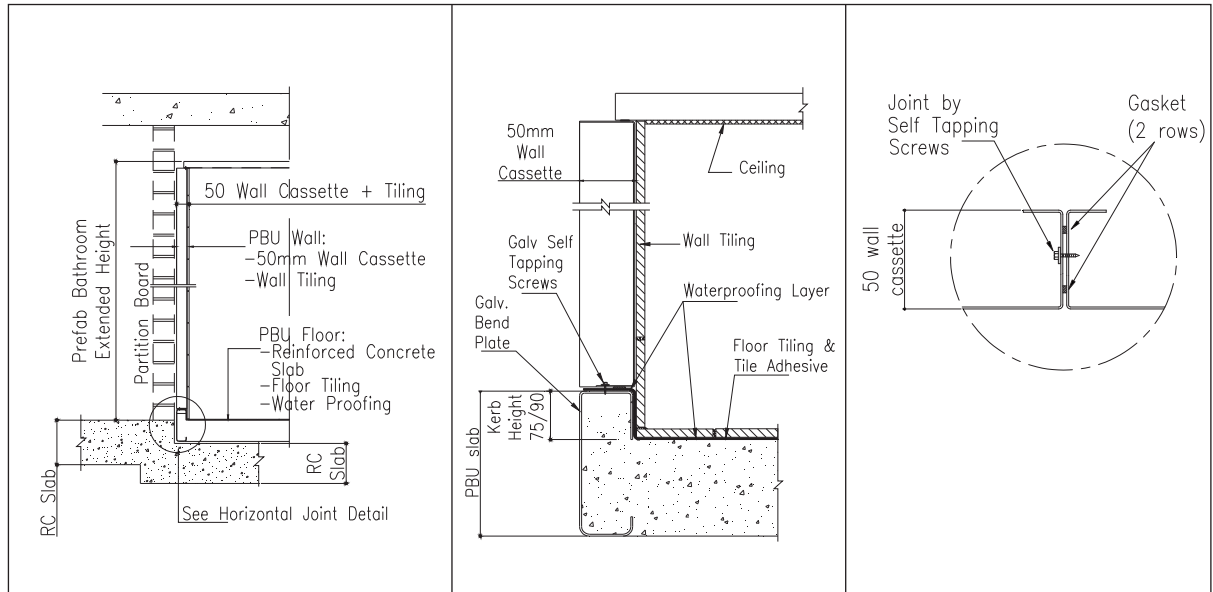
Section of a PBU with shallow floor trap

Details of shallow floor trap

Courtesy of SsangYong Engineering & Construction Co Ltd

(G) Joints and waterproofing

Example of horizontal joint between the floor and the wall adopted for the steel panel and concrete floor are as shown below:



Section between steel panel and concrete floor

Horizontal joint between steel panel and concrete floor

Vertical joint of wall panels

Courtesy of Eastern Pretech Pte Ltd

(H) Renovation and repair

(i) General

Homeowners are to consult PBU manufacturers or engage renovation contractors who are familiar with PBUs. Renovation contractors are to check the system or type of PBU before commencing work. If in doubt, the renovation contractor is to consult the manufacturer of the PBU in question.

(ii) Fixture on Wall

For fixing accessories on the PBU wall constructed using steel panels, use galvanized or stainless steel screws. Do not use nails as they are not strong enough to support the accessories and will break the tiles. The same applies to fixing accessories to the ceiling panels.

(iii) Re-tiling on wall and floor

When renovating PBUs with wall made of steel panels, the original tiles shall not be removed from the wall. Use only tile-on-tile method for re-tiling. However, it is recommended not to have more than two layers of tiles including the original layer. If the floor is made of concrete with tiled-finish, any replacement of tiles may damage the waterproofing membrane. Hence it is advisable to use tile-on-tile method for floor re-tiling as well. Homeowners are advised to engage renovation contractor who is familiar with PBUs to carry out work on PBUs.

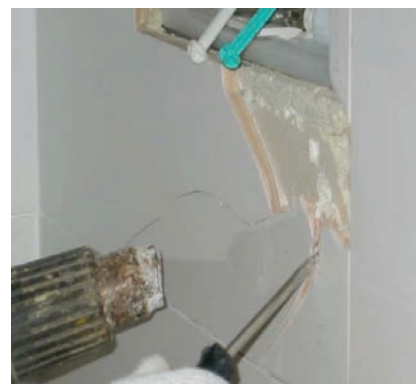
(iv) Replacement of defective tiles on wall

a. Tiles laid using adhesive

For replacing defective tiles that are laid on steel panel using adhesive, it is recommended to use heat to melt the adhesive.



Before removing the tiles, mark out the affected area. Use an industrial heater to heat up the defective tiles.



After heating for about 10 minutes, each tile can be removed with a hammer by first breaking the edges of the defective tile.



After the tile has been removed, continue to remove the remaining adhesive on the steel panel with heater and scraper. The area shall be cleaned and made ready to receive new tiles.

Courtesy of Eastern Pretech Pte Ltd

b. Tiles laid using cement mortar

For replacing defective tiles that are laid on the steel panel using cement mortar, it is recommended to break the first piece of tile into a few small pieces. This will make chiselling of other tiles along the sides easier. If the steel panel is damaged, part of the steel panel is to be cut out and replaced by a new panel with corrosion protection coating on all cut edges. The replaced section of the panel is to be covered with a fibre mesh and a waterproofing layer. New tiles shall be laid using cement mortar after repair.

(I) PBUs in private residential projects

More than 6,000 dwelling units in private residential projects including upmarket projects have used PBUs. Some of the projects are listed below.

Project Name	Project Name
Trellis Tower	Cliveden at Grange
Parc Emily	The Residences at W Singapore Sentosa Cove
The Sail @ Marina Bay	One Shenton
City Square Residences	Tribeca
St Regis Residences, Singapore	Wilkie Studio
Cube 8	The Arte
368 Thomson Road	Shelford Suites
Volari	The Oceanfront @ Sentosa Cove
NV Residences	Tree House
Livia	Hundred Trees

PBUs In Private Residential Projects



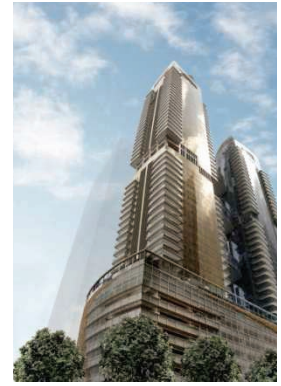
Cube 8



368 Thomson



The Arte



One Shenton



City Square Residences



Tribeca



The Sail@Marina Bay



Oceanfront@Sentosa



St Regis Residences,
Singapore



Parc Emily

Courtesy of City Developments Limited

Manufacturer of PBUs

Eastern Pretech Pte Ltd
15 Sungei Kadut Street 2
Singapore 729234
Tel: +65 6368 1366
Fax: +65 6368 2256

Nam Lee Pressed Metal Pte Ltd
31 Senoko Drive
Senoko Industrial Estate
Singapore 758216
Tel: +65 6257 5388
Fax: +65 6758 8134

Sunway Concrete Products (S)
Pte Ltd
4 Tampines Industrial Street 62
Singapore 528817
Tel: +65 6582 8089
Fax: +65 6581 0482

Qingjian International (South
Pacific) Group Development Co
Pte Ltd
47 Kallang Pudding Road
#12-01 Crescent@ Kallang
Singapore 349318
Tel: +65 6748 7117
Fax: +65 6748 7227

Robin Village Development
Private Limited
63 Tuas South Avenue 1, Tiong
Seng Prefab Hub, Singapore
637282
Tel: +65 6933 3100
Fax: +65 6861 2909