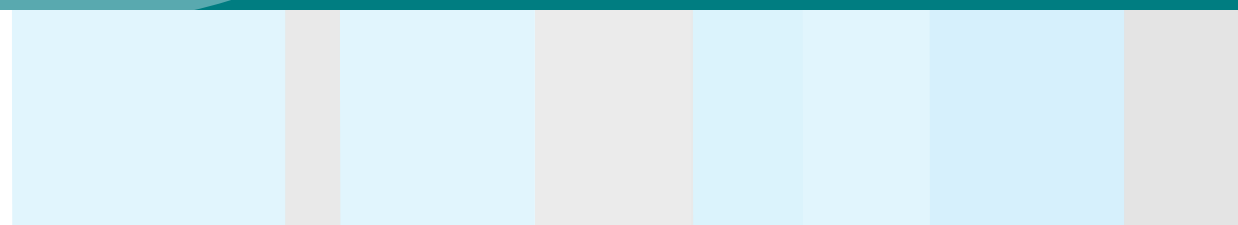


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# Interfacing **Mechanical** & Electrical Services Works





# Interfacing Mechanical & Electrical Services Works

One of the important aspects of precast activities is to consider the interfacing trades such as mechanical and electrical (M & E) services. To enhance the aesthetic appearance of the interior, services are often concealed or embedded wherever possible. The idea of incorporating M & E services into precasting works is to minimise unnecessary hacking and cutting for recesses as can be seen in the in-situ brick or block construction. However, it would entail that the final study and location of the building services must be completed much earlier than usual.

## 3.1 APPROACH IN CO-ORDINATING M & E SERVICES WORKS

The incorporation of services at the planning and design stage of project development is critical to avoid unnecessary delays during installation and construction. Locations of the building services especially those that need to be embedded or concealed in the precast components, should be determined early to facilitate precast panel production. Once the locations of the services are determined, block-outs and recesses can be formed into panels as they are cast. Openings and conduits can be incorporated in the panels for the services to pass through. With a host of different building services, co-ordination works are essential to ensure that the provision of such services

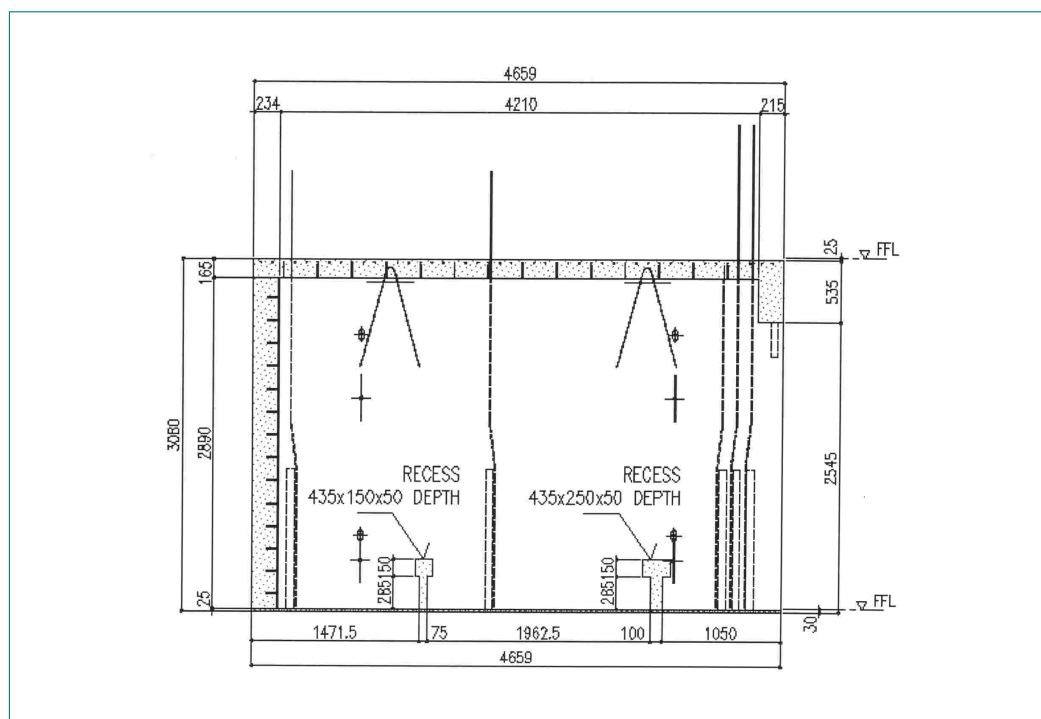


Fig. 3.1 – Example of PC wall element drawing showing the recesses required

can be contained within the limited zone without affecting the structural integrity of the precast wall and slab panels. The details of the services to be incorporated in each precast panel should be reflected in the precast element drawings for easy reference and construction.

For private residential development, the possible locations for services routing can be found in the spaces between floor and false ceiling, within floor structure, within floor screed and within wall structure. The use of vertical service cores and service ducts is common for concealment and distribution of services.

There are basically three groups of services that need to be taken into account when planning for precast panel production : Electrical, plumbing and sanitary services and air-conditioning services. Concealed electrical works for telecommunications, power and lighting can be easily catered for by casting conduits and necessary terminations needed during the precast panel production. Provisions for other



Fig. 3.2 – Cast in conduits for electrical services within the wall panels

building services such as sanitary, water supply and air conditioning could come in the form of recesses or grooves formed in the precast panel. These recesses or grooves would allow the service piping and ducts to be embedded at a later stage. They can be reinstated with structural grout to level with the wall finishes after installation of the services.

The approach to incorporate M & E services into precasting activities depends on whether the buildings or areas are designed to have false ceiling.

**AREAS THAT DO NOT HAVE FALSE CEILING:** The approach is to embed services within the floor slab or floor screed. These services are extended up and above the floor level for the connection with the M & E terminations or piping within wall panels. Appropriate cast-in termination items, or preferred recesses would be provided in precast wall panels. Provision of recesses in wall panels should preferably be done vertically so that the load carrying capacity of walls would not be reduced unnecessarily. The depths of these recesses usually range from 30mm to 50 mm depending on the services or thickness of termination items. Similarly, floor recesses at the interface connection are to be provided as appropriate.

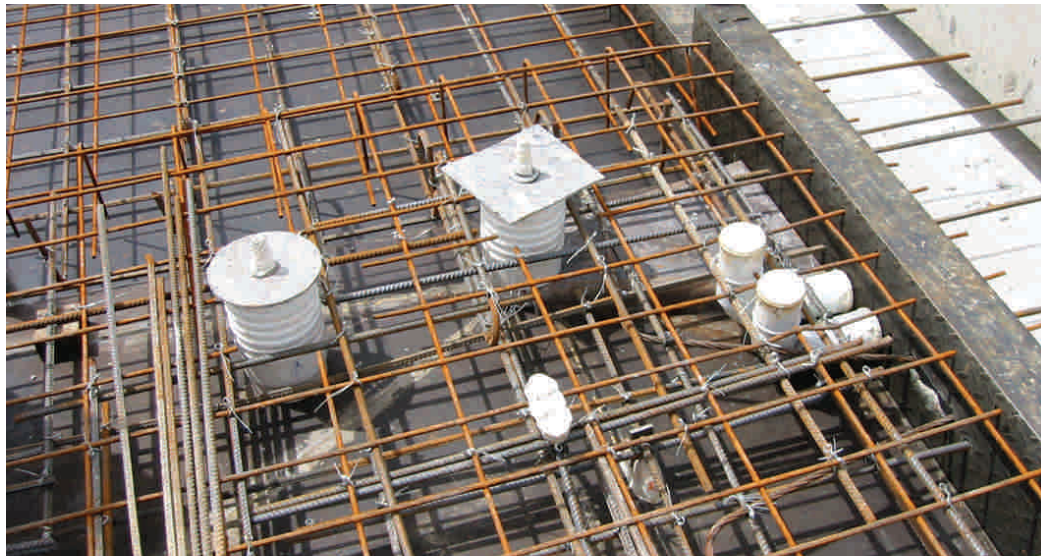


Fig. 3.3 – Services can be embedded within the floor slab and extended up and above floor level for connection

**AREAS WHICH HAVE FALSE CEILING:** The approach is to make use of the ceiling space to cater for M&E services routing. All terminations and connections can be concealed within the ceiling space. In this way, maintenance of services can be accessed within the ceiling area. Where services are connected to the precast wall, the required services affixed to the ceiling can be redirected and embedded into the precast wall panels. All routing works can be kept clear off the floor slab. This will benefit homeowners who want to upgrade or alter the existing services without having to remove floor finishes or risk hacking critical structural elements.



Fig. 3.4 – With add-on ceilings, all services can be concealed within the ceiling space after installation

## 3.2 ELECTRICAL SERVICES

For lighting and power routing, it has been a practice to have cast-in conduits from which the electrical wiring can be pulled through these embedded conduits. These conduits can be incorporated in the precast floor slab or cast-in situ topping as well as precast wall panels to eliminate the need to chase or embed the services at a later stage.



Fig. 3.5 – Electrical conduits laid within cast in-situ flat plate or structural topping or precast elements before casting

**CONDUITS JOINT BETWEEN WALL PANEL AND FLOOR SLAB:** There are essentially two approaches to connecting the conduits between the precast wall panels and slabs. The first approach is to rout the power and low level wiring from the floor slab up to the wall panel. This means the electrical routing is run within the unit's floor slab. The floor slab is normally cast prior to installation of wall panel on the unit concerned. Therefore, provision is required by means of recesses on the side of wall panel as well as on top of floor slab for connecting the conduit from the wall back to the floor conduit as illustrated in the Fig. 3.6.

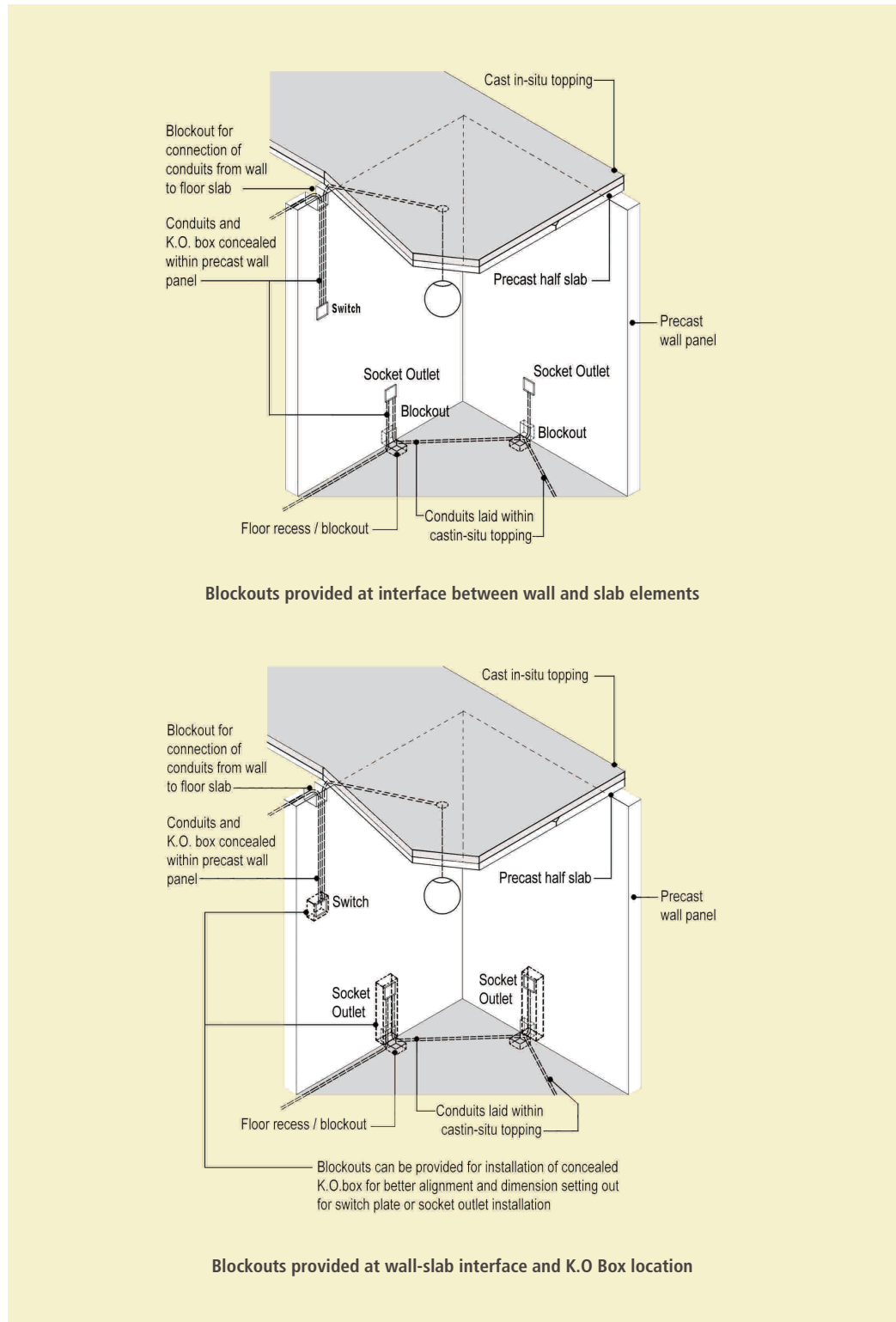


Fig. 3.6 – Connection of conduits between precast wall panels and slab using the first approach

In the second approach, power and low level wiring system is routed to the floor slab above the unit or within the false ceiling space (see Fig. 3.7). In this case, the conduits are all run from the floor slab above the unit to be connected to the cast-in conduits at the top of wall panel. Following the installation of wall panel and floor slab, the connection of conduit from the wall to the floor slab can be done straight away. The blockout can be reinstated and cast together with the casting of floor slab or in-situ topping.

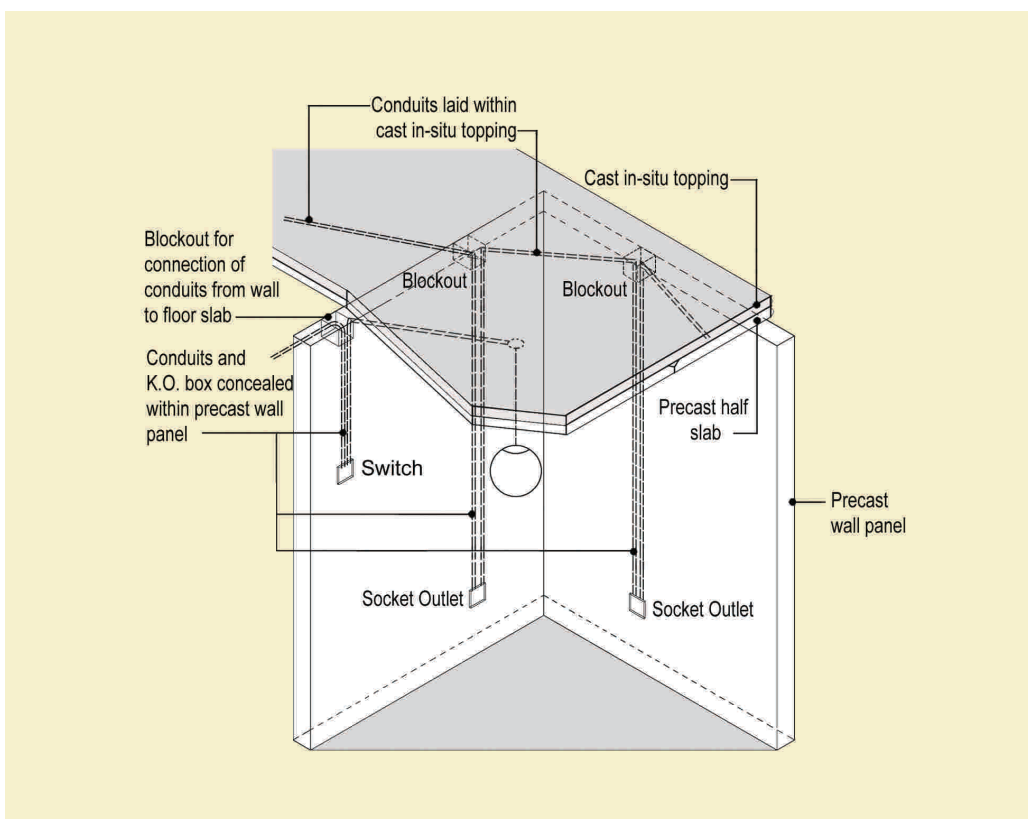


Fig. 3.7 – Connection of conduits between wall plan and floor slab using second approach

The main advantage of using the second approach is that there is only one recess required. It is located on top of the wall and the recess can be filled up together with casting of floor slab or in-situ topping. In other words, it saves the trouble of second operation to cover the recesses as deemed necessary in the first approach. Moreover, better and consistent wall finishes can be achieved using the second approach.

The first approach is still commonly used, as it requires less material cost for the electrical outlets located at low level. Precautions against chances of damaging the installed electrical wiring in the event of drilling works for fixing items to the wall tend to favour the first approach. This concern, however, can be addressed by planning the routing of vertical conduits along areas less likely to have wall drilling, such as the areas near to corners of wall.

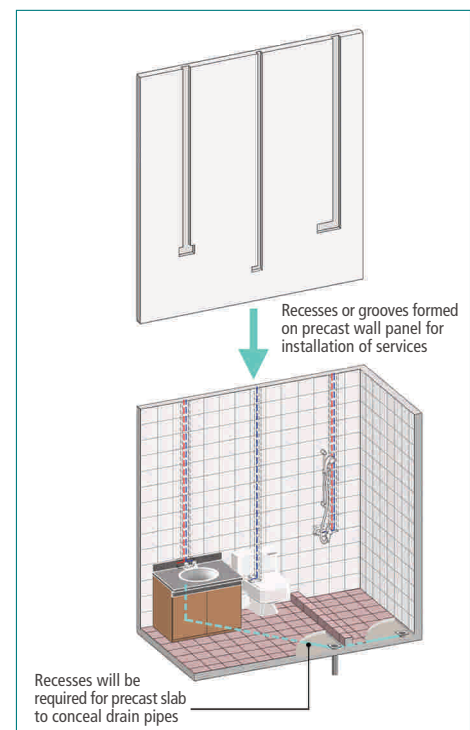


**Table 3.1 – Technical Details for Electrical Services**

<p><b>Ceiling Lighting Points</b></p> <ul style="list-style-type: none"> <li>• Provide connection rings at precast slab or plank</li> <li>• Conduits and junction box to be included in precast slab during prefabrication or embedded and cast-in together with slab topping</li> </ul> <p><b>Switches and Wall Light Points</b></p> <ul style="list-style-type: none"> <li>• Conduits to be included in precast wall panels during prefabrication</li> <li>• The necessary terminations can be cast-in together with the precast wall panels or to be installed at later stage in designated recess and groove formed on the wall panels</li> </ul> <p>The above details are applicable for other electrical services such as power /SCV/ telephone.</p> <p><i>Note : Refer to TR 13 – Technical Reference for Performance Standard for embedding conduits in concrete where good practices in the laying, arrangement and overlapping of conduits for various electrical services within in-situ topping are highlighted.</i></p>	<p>Points to note:</p> <ul style="list-style-type: none"> <li>• To provide block-out of about 200mm by 200mm (on floor slab) at the junction in connection with the cast in conduits in precast wall panels (for connection using first approach)</li> <li>• To provide block-out of about 200mm by 100mm (on wall panels) at the junction in connection with the cast-in conduits in floor slab</li> <li>• All block-outs and grooves to be reinstated with structural grout after installation and connection</li> </ul>
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### 3.3 PLUMBING AND SANITARY SERVICES

For maintenance purposes, plumbing and sanitary services should not be cast in. However, for aesthetic purposes, these services can be concealed by having recesses or grooves formed on the precast wall panels. These recesses can be reinstated using structural grout after the installation of the services.



**Fig. 3.8 – Services can be concealed within the precast wall or slab panels using recesses**

**Table 3.2 – Technical Details for Plumbing and Sanitary Services**

<p><b>Hot &amp; Cold Water Pipes</b></p> <ul style="list-style-type: none"> <li>• Provide 40 mm depth recesses/ grooves in precast wall panels for the embedment of the hot/cold water pipes at a later stage.</li> <li>• Depending on the water distribution run and room layout, horizontal water pipes may be required at certain areas. Designated recesses/grooves can be provided in precast full slab for the embedment of these pipes. For precast half slab and in-situ flat plate, these pipes can be concealed within the cast in-situ topping or slab.</li> </ul> <p><b>Basin/Sink Waste Pipes</b></p> <ul style="list-style-type: none"> <li>• Provide 50 mm depth recesses/ grooves in precast wall panels for the embedment of the basin/sink waste pipes at later stage.</li> <li>• Provide designated recesses/grooves for the running of the horizontal waste pipes to the floor trap or floor waste for precast full slab system. For precast half slab or in-situ flat plate, these pipes can similarly be concealed within the cast-situ topping or slab. A minimum topping of 90 mm would generally be required to conceal these horizontal waste pipes.</li> </ul>	<p>Points to note:</p> <ul style="list-style-type: none"> <li>• All recesses/grooves to be reinstated with structural grout after installation and connection.</li> </ul>
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### 3.4 ACMV SERVICES

Basically, the provision for ACMV services in precasting works is similar to that for plumbing and sanitary services. The refrigerant pipes and insulated condensed drain pipes can be concealed within the wall panels using recesses or grooves formed. These pipes are then connected to the same embedded within the floor slab and topping to condenser units and floor trap.

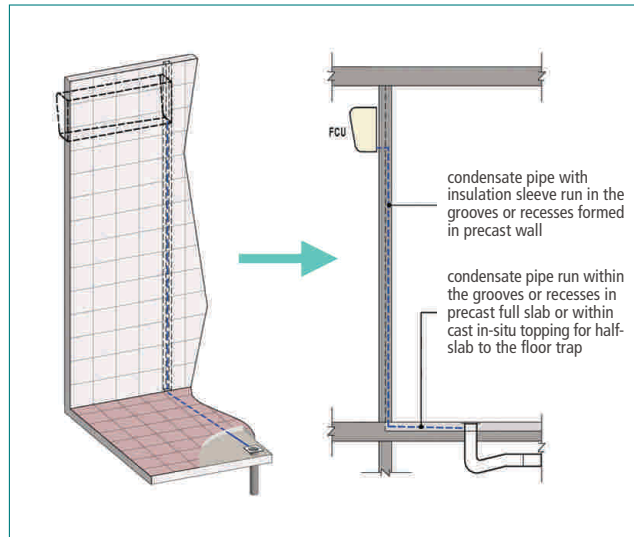


Fig. 3.9 – Condensate pipes can be concealed within wall panels using recesses

Table 3.3 – Technical Details for ACMV Services

#### Refrigerant Pipes

- Provide appropriate openings on precast wall panels for running of refrigerant pipes from condenser units to respective fan coil units.

#### Condensate Drain Pipes

- Provide 40-50 mm depth recesses/grooves in precast wall panels for the embedment of insulated condensate drain pipes from the fan coil units
- Provide designated recesses/grooves for the running of the horizontal insulated condensate drain pipes to the floor trap.

#### Points to note:

- It is common to run the refrigerant pipes within false ceiling area for ease of installation and easy maintenance.
- The distance from condensate drain pipes dropper to floor trap should be kept minimum (within the range of 3 m to 4 m) so that the floor slab need not be thickened unnecessarily.
- All recesses/grooves to be reinstated with structural grout after installation and connection.