While in-situ concrete is a loadbearing form of construction, precast concrete can be formed as either loadbearing walls or as non-loadbearing cladding panels. Loadbearing panels are increasingly popular since they provide a weather tight structural wall with high fire resistance combined with high acoustic insulation and thermal mass. In loadbearing construction, panels are stitched together to form a monolithic structural wall. Non-loadbearing cladding panels have maintained their popularity by providing greater freedom in design, from the visual point of view, than the structural constraints imposed on loadbearing panels.

Loadbearing types consist of units stacked together to support floors by transferring their own weight and a floor loading to a foundation. The unit/floor connection is usually made with a pin joint rather than a moment (rigid) joint since these are difficult to create in precast concrete, as the amount and length of built-in reinforcement is high, as well as the fact that the tensile forces within the unit can be high. The horizontal stability, which is not provided by the pin joint, is usually provided by service cores elsewhere in a building. In addition to floor-height loadbearing panels, loadbearing precast spandrel panels are used. These are in effect structural beams spanning between columns. Principles of connections to floor slabs are the same as for full-height panels, but loads from the panels and floors are taken back to structural columns rather than down through the wall panels.

Non-loadbearing cladding panels are fixed back to the primary structure either by concrete brackets forming an integral part of the panel, by stainless steel brackets, or by a combination of both. Typically panels are supported on an edge beam at the base of each panel and are restrained at the top with stainless steel brackets. Some cladding panels are top hung in order to benefit from the tensile qualities of the steel reinforcement or framing. Cladding panels are usually made to span one storey high, with a width or height of panel up to a maximum of 3600mm in order that the panel can be transported on a standard flat trailer. In addition, weight usually has a maximum of around 10 tonnes to prevent cracking during lifting and to allow a regular site crane to be used.

Panel types

Precast concrete panels are formed mainly by either forming the finish in the bottom of the mould, the top of the mould with another material to the face of the panel, or as an insulated sandwich panel.

Bottom formed panels, where the finish is set on the bottom of the mould, are used where additional linings, typically polystyrene board, polyurethane sheet or silicone rubber sheet, as described in the text on in-situ cast concrete, are used to create a textured surface in the face of the panel. Sometimes, ceramic tiles or stones are laid in the bottom of the panel in order to bond to the concrete poured on top. The small size of terracotta or ceramic tiles allows them to be laid at the bottom of the mould and be individually bonded to the concrete.

In top formed panels, an additional decorative layer is applied to the top of the poured concrete. The thickness of the decorative layer is usually 25mm – 30mm. The
Cutaway 3-D view of wall clad in precast concrete cladding panels showing wall construction.

Horizontal section 1:10. Wall with precast concrete cladding panels, showing junction with window.

Vertical section 1:10. Wall clad with precast concrete panels.