

Precast Large Concrete Panel System

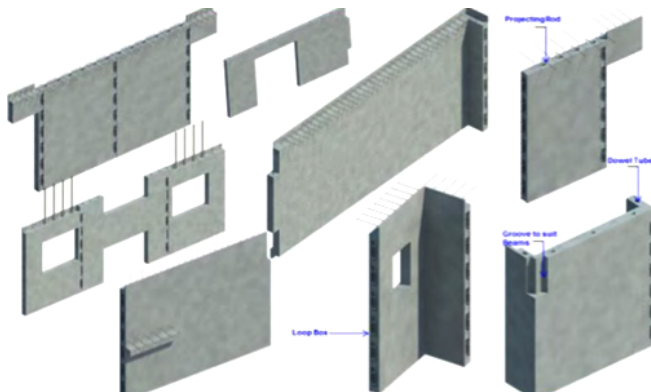


Figure 01: Typical Wall Mould



Figure 02: Battery Mould

Overview

Precast construction system is generally a large panel system, modular system or a combination of both. Precast Large Construction Panel (PLCP) system consists of various precast elements such as walls, beams, slabs, columns, staircase, landing and some customized elements that are standardized and designed for stability, durability and structural integrity of the building. Precast residential building construction involves design, strategic yard planning, lifting, handling and transportation of precast elements. This building system is suitable for construction of high rise buildings resisting seismic and wind induced lateral loads along with gravity loads. The building framing is planned in such a way that maximum number of repetitions of molds is obtained. These elements are cast in a controlled factory condition. The factory is developed at or near the site which provides an economical solution in terms of storage and transportation. Two main types of precast concrete elements, namely precast reinforced concrete elements and precast pre-stressed concrete elements are used as per requirement.

CATEGORY	ATTRIBUTE	INPUT	SOURCE	
Resource Efficiency	Embodied energy	1781.8 MJ/m ²	Calculations based on material specifications Source: Supertech Ltd., India Construction Materials Database of Embodied energy and Global Warming Potential	
	CO ₂ emissions	64.8 kgCO ₂ /m ²		
	Critical Resource Use	48.9		Source: Calculations based on criticality index (0-100)
	Current Recycled content	Nil		
	Future reusability	High		
	Water use during construction and manufacturing	234 L/m ²	Calculated from material specifications	
Operational performance	Durability	High: If build according to IS 456:2000 and IS 13920:2016	Source: Compendium of prospective Emerging Technologies for Mass Housing, Second Edition, BMTPC, April 2017	

	Ease and frequency of maintenance	High ease of maintenance	<i>Source: Data from surveys</i>
	Impact on cooling or heating loads	Cooling energy (kWh/m ² /y) savings under different climatic zones Composite: 0.9 (2%) Warm & humid: 0.93 (2%) Hot & dry: 0.97 (2%) Temperate: 0.41 (3%) Heating energy savings in cold climate: 0.98 (2%)	<i>Source: Based on simulations. Values in savings from base case: 225mm solid burnt clay brick with 12.5mm plaster on both sides.</i>
	Noise transmission	49dB sound reduction for 150mm panel	<i>Source: <u>Acoustic Properties of precast concrete panels, National precast society, AU</u></i>
	Thermal mass (absorption, storage and release of heat)	246.8 kg/m ²	<i>Calculated from material specifications</i>
	Thermal performance (flow of heat)	2 W/m ² K U-value for 100mm thick panel with 12mm plaster on both sides.	<i>Source: Compendium of prospective Emerging Technologies for Mass Housing, Second Edition, BMTPC, April 2017</i>
User Experience	Familiarity with the material	Medium	<i>Source: Data from surveys</i>
	Modification ability	Low: Less flexibility due to standardization of units	<i>Source: Compendium of prospective Emerging Technologies for Mass Housing, Second Edition, BMTPC, April 2017</i>
Economic impact	Cost of construction	<i>No data available</i>	
	Skill requirement	Medium: Special training required to obtain necessary skill set. Less labour intensive due to Computer Integrated Manufacture (CIM)	<i>Source: <u>BMTPC Precast Large Concrete Panel System</u></i>
	Supply chain	High: Materials are easily available and manufactured throughout India.	<i>Source: <u>Prefabricated Construction for mass housing in Mumbai, IJIRAE issue 9</u></i>
	Duration of construction	One day production 90m ² . Erection of walls: 15 pieces a day; Stairs and elevator shafts 2 floors/day	<i>Source: <u>SuperCast (From Supertech) wall manufacturing unit capacity</u></i>
	Job creation	0.08 mandays/m ² . Labour requirement at Pragati Towers site was found to be 30% less when compared to a similar conventional construction project.	<i>Source: <u>Calculated Value; L&T Construction of Pragati Towers, Mumbai</u></i>