PCI MIDWEST
A Chapter of Precast/Prestressed Concrete Institute

PRECAST FOCUS

PRECAST CONCRETE WALL PANELS

The exterior façade of a building is its signature. But a building envelope's materials are more than just a visual appearance. Aesthetics, function, and cost play a significant role in achieving a successful project. Precast concrete not only offers design freedom of architectural expression, but it also contributes to durability, sustainability, energy efficiency, versatility, resiliency, and improved occupant comfort and safety. At the same time, the plasticity of precast concrete allows the designer to achieve a degree of architectural expression and freedom that cannot be matched by conventional brick, glass, or metal wall panel systems.

THERE ARE THREE BASIC TYPES OF PRECAST CONCRETE WALL PANELS.

- Solid Walls: which consist of one solid concrete wythe or layer and are usually 4 to 8 inches thick.
- Insulated Sandwich Wall Panels: which consist of an exterior and interior wythe of concrete separated by a layer of rigid foam board insulation.
- Thin-shell: which consist of one exterior wythe of concrete typically 1.5 to 3 inches thick, supported by a frame system, usually made from steel. Some systems can also incorporate insulation. Glass fiber reinforced concrete (GFRC) is an example of a thin-shell system. There are other proprietary systems as well. One of the advantages of thin-shell walls is the significant reduction in weight of the panel.

These precast concrete wall panels can be non-load bearing or load bearing and are available in essentially any shape and finish. Some of the most common shapes for precast wall panels are:

- Window Walls: these are typically larger wall sections that can span one or more stories.
- Spandrels: these are typically rectangular sections that span from column to column and are often used in parking structures or with ribbon window designs.
- Column covers, mullions, and other smaller shapes which can be combined to create various façades.

ADVANTAGES AND BENEFITS

- Load bearing panels that are both architectural and structural offer the best design economy. The most economical total precast structural system utilizes an integrated, architectural, and structural exterior shear wall system.
- Durable, aesthetically pleasing exterior building enclosure that is virtually air and watertight with minimal maintenance and does not require painting.
- Pre-glazing of window openings at the precast concrete plant reduces field labor costs and jobsite risks.

Thin-shell

WHO WE ARE PCI Midwest is a not-for-profit trade association that promotes precast/prestressed concrete, provides precast/prestressed concrete education, and facilitates relationships between its members and the construction and design communities.

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Insulated Sandwich

- The inherent thermal mass inertia of precast concrete reduces peak heating and cooling loads, thus saving energy year-round by reducing large daily temperature swings.
- Precast panels provide a barrier wall or face-sealed system with minimal panel joints unlike cavity wall systems where moisture penetration is always a concern.

Insulated sandwich wall panels are one of the most used precast wall systems and provide numerous design advantages and benefits.

- Sandwich panels may be designed fully composite where both concrete wythes act together to resist applied loads, non-composite where both wythes act independently with the structural wythe being the thicker of the two, or partially composite.
- Minimum wythe thickness for flat panels is generally three inches and both wythes are typically prestressed for better crack control and panel durability.

Solid

- Insulation types consist of expanded or extruded polystyrene or polyisocyanurate.
- Insulation thickness can vary depending upon the desired panel R-Values and is continuous from top to bottom and side to side of the panel.
- Wythe connectors are typically non-metallic to reduce or eliminate thermal bridges.
- Joints between panels are filled with a high-quality elastomeric sealant and closed cell foam backer rod to create a barrier, face-sealed wall system.
- Exceptionally durable interior concrete finish ideal for manufacturing or warehouse facilities.
- Continuous insulation, air, and vapor barrier in one highly efficient enclosure system
- Interior concrete finish that is ready for painting, with no furring, insulation and drywalling required.

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