

Precast Concrete Architectural Insulating Panels

Specifications Section 034500



A Chapter of the
Precast/Prestressed Concrete Institute

DATE ISSUED
April 25, 2011



Precast/Prestressed Concrete Institute Northeast

SPECIFICATIONS FOR PRECAST CONCRETE ARCHITECTURAL INSULATED WALL PANELS

SECTION 034500

1. GENERAL

1.01 Description

- A. Work Included:
 - 1. Precast insulated concrete panels.
 - 2. Supplementary devices, anchors, fasteners, and other components required for installation of assemblies, including the devices that are to be cast-in the structure.
 - 3. Grouting at sill joints.
 - 4. Caulking of Joints.

- B. Related Sections:
 - 1. 033000- Cast-in-Place Concrete: Site cast concrete.
 - 2. 051200- Structural Steel Framing: Adjacent structural frame.
 - 3. 076200- Sheet Metal Flashing and Trim: Metal copings.
 - 4. 079200- Joint Sealants: Joint fillers and sealants at exterior and interior joints.

- C. Work Installed but Furnished by Others:
 - 1. Anchoring devices to receive mechanical and electrical work; Divisions 15 and 16, respectively, as indicated on contract documents.

- D. Drawings, the provisions of the Agreement, the General Conditions, and Division 1 specification sections apply to all work of this section.

1.02 Quality Assurance

- A. Manufacturer Qualifications: The Precast Prestressed Concrete Institute (PCI) Plant Certification Program and shall be certified in category A1 or C1A.

- B. Erector Qualifications: **Precast Prestressed Concrete Institute PCI Qualified Erector** program and regularly engaged for at least 5 years in the erection of precast structural concrete similar to the requirements of this project.

- C. Welder Qualifications: In accordance with AWS D1.1.

- D. Codes and Standards: Comply with provision of following codes, specifications and standards, except as otherwise indicated.
 - 1. ACI 301 "Specifications for Structural Concrete".
 - 2. ACI 318 "Building Code Requirements for Structural Concrete".
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
 - 4. Precast Prestressed Concrete Institute MNL 116, Manual for Quality Control for Plants and Production of Precast Concrete Products".
 - 5. Precast Prestressed Concrete Institute MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products".
 - 6. Precast Prestressed Concrete Institute MNL 135, "Tolerance Manual for Precast and Pre-stressed Concrete Construction".
 - 7. Precast Prestressed Concrete Institute MNL – 127 "Erection Manual Standards and Guidelines for the erection of precast concrete products."
 - 8. Precast Prestressed Concrete Institute MNL 120, "PCI Design Handbook".
 - 9. Precast Prestressed Concrete Institute MNL 122, "PCI Architectural Precast Concrete Manual".
 - 10. Precast Prestressed Concrete Institute MNL – 124, "Design for Fire Resistance of Precast Prestressed Concrete."
 - 11. American Welding Society, AWS D1.1 "Structural Welding Code-Steel", D1.4 "Structural Welding Code – Reinforcing Steel", D1.6 "Structural Welding Code - Stainless Steel", C5.4, "Recommended Practices for Stud Welding".
 - 12. ASTM Specifications – As referred to in Part 2-Products, of this Specification.

- E. Performance Requirements:
 - 1. Design wall panels to resist erection stresses, thermal stresses, and in place live and dead loads in accordance with the requirements of the jurisdictional code authorities. Include design of anchorage systems.
 - 2. Design and fabricate panels to permit structural frame movement caused by air temperature changes and applied loads.
 - 3. Panels and anchorage systems designed, by a structural engineer licensed to practice, in the state where the project is located.
 - 4. Fire rating shall be _____ hour(s). MNL-124 maybe used to determine fire rating.

- F. Mock-up:
 - 1. After approval of finished samples, provide a mock-up panel per the drawings if required. Panels viewed at the fabricators plant to exhibit the quality, tolerances, corner conditions, and the exterior and interior finishes.
 - 2. Production of panels shall not be processed until mock-up has been approved.

1.03 Submittals and Design

- A. Shop Drawings: Include the following:
 - 1. Elevation view, plan view, and location of each panel; include panel identification numbers.
 - 2. Dimensions and finishes.

3. Sections and details showing connections, cast-in items, and their relations to the structure.
 4. Descriptions of materials for loose and cast-in anchoring devices.
 5. Field installed anchor locations.
 6. Erection sequences and handling requirements.
 7. Indicate sizes and locations of blockouts required for devices recess mounted within the panels which will be installed by other trades.
 8. Shop drawings shall be stamped, and signed by the design professional engineer.
- B. Product Data: Submit product literature for brick inlay system, insulation, and all accessories.
- C. Finish Samples:
1. Submit composite samples indicating proposed concrete composition, reveal/false joint and each proposed finish, not less than 12 x 12 inch size.
 2. Submit a minimum of three samples 4 ft. x 4 ft panels. The panels are to show the range of anticipated color and texture to be used as quality control of the project.
- D. Product Design Criteria:
1. Design Data:
 - a. Submit design calculations prepared, stamped and signed by structural engineer.
 - b. Include calculations for panels and connections used as shear walls.
 2. Mix Designs: Submit concrete mix designs.
 3. Field Report:
 - a. Manufacturer's structural engineer shall review the erections welds and bolted connections to verify that they are in compliance with the precast design drawings and calculations.
 - b. For record purposes, submit written report immediately following installation of all assemblies affirming field observations and recommended corrections.

2. PRODUCTS

2.01 Materials

- A. Portland Cement; ASTM C150, Type I or III.
- B. Admixtures: Manufacturers and types as recommended by the fabricator.
- C. Aggregates; ASTM C33; severe weathering. To the greatest extent possible, provide aggregates which are local to the precast manufacturer and which are similar to the aggregates in the Architect's approved sample.
- D. Water: Potable and free from amounts of foreign materials harmful to concrete and embedded steel.
- E. Reinforcing Steel: ASTM A615, Grade 60.

- F. Thermal Insulation:
 - 1. Polystyrene: ASTM C578, Type IV, extruded polystyrene; 2 inch thickness; with aged R-value of 5 per inch at 75 degrees F. mean temperature.
- G. Connectors:
 - 1. Corrosion and Alkali resistant nonconductive connectors.
- H. Grout: Portland cement, sand, and water sufficient for placement and hydration; or a proprietary premixed non-shrink non-ferrous aggregate composition; minimum 3500 psi 28 day compressive strength.
- I. Cast-in and Loose Anchoring Devices:
 - 1. Steel Shapes: ASTM A36; galvanized in accordance with ASTM A123 when located within earthwork.
 - 2. Bolts: ASTM A307 or A325; galvanized when located within earthwork.
- J. Clay-Faced Thin Brick Inlay System: ASTM C216, Type TBX or ASTM C1088, Grade Exterior, manufactured for use in precast.
- K. Stone Clad Section to be added here
- L. Joint Sealants: Specified as work of section 079233 and 079266.

2.02 Concrete Mixes

- A. Concrete Mixes:
 - 1. Concrete Face Mix as per finished sample. Consists of Portland cement, local aggregates, air entrainment, and water reducing admixtures to produce 5,000 psi 28 day strength.
 - 2. Interior Concrete Mix: Consists of grey Portland cement, local aggregates, and water reducing admixtures to produce 5,000 psi 28 day compressive strength.

2.03 Fabrication

- A. Panels: Panel widths and shapes as shown. Panel sizes are sub-contractors option.
- B. Precast Trim: Steel reinforced; shapes as indicated.
- C. Verify and submit field measurements prior to fabrication.
- D. Cast-in anchorages and other embedded items.
- E. Provide joint alignment plates for adjacent panels with height differing more than 24 inches.
- F. Recess lifting hooks in panel edges.

- G. Mark each panel edge with the appropriate identification number in the locations shown on the shop drawings.
- H. Provide quirk at exterior corners, refer to details. Finish return surfaces to match panel facing.
- I. Cast panels with openings 10" square and larger for fire protection piping, hose bibs, overflow devices, electrical devices, electrical outlets, block outs for accessories, and other similar items shown on Drawings.
- J. Coordinate requirements for block out locations and sizes in precast panels with other trades, such as wall mounted pushbutton switches and overhead concealed closers at storefront entrance systems, and other similar conditions.
- K. Exterior Finishes:
 - 1. Sand blast, acid etch or inlays to match the architect's sample.
 - 2. Typical Panel Backside Finish:
 - i. Bull float finish for areas not exposed to view.
 - ii. Fine float (paintable) finish for areas exposed to view.
- L. Shop Painting of Exposed Metal Work; Apply 2.0 mil dry film thickness of zinc rich primer.
- M. Fabricating Tolerances:
 - 1. Comply with PCI manual MNL 117 for A1 products or MNL 116 for C1A Products.

2.04 Product Delivery, Storage, & Handling

- A. General; Protect panels against damage, distortion, and discoloration.
- B. Delivery:
 - 1. Deliver assemblies to the job-site in such quantities and at such times to ensure continuity of erection.
 - 2. Deliver assemblies at a time in sequence such that the components can be lifted from the truck and set in place.
- C. Storage:
 - 1. Store precast units off the ground.
 - 2. Place stored units so that identification marks are discernable.
 - 3. Store panels on edge such that the face is placed in vertical position.
 - 4. Storage areas shall be stable and provided with foundations that will prevent differential settlement, twisting or bowing of panels.
- D. Handling: Handle and transport units in a position consistent with their design and shape in order to avoid stresses which would cause cracking or damage.

3. EXECUTION

3.01 Erection

- A. Installation performed by a PCI qualified erector or one with minimum five years experience in precast concrete construction.
- B. Prior to starting work, carefully inspect installed work of other trades and verify that such work is complete to the point where work of this Section may properly commence. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.
- C. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.
- D. Preparatory Work: Provide anchors, bolts, plates, and dowels to receive panels with setting diagrams.
- E. Furnish loose anchoring devices to fasten precast to the structure.
- F. Lift, handle and erect panels per manufactures instruction. Install level, plumb, square, and true to line within allowable erection tolerances and without cumulative dimensional error.
- G. Stabilize panels securely and permanently as indicated on approved shop drawings. Provide temporary bracing as necessary. Remove temporary bracing upon completion.
- H. Erection Tolerances: Comply with PCI Manual MNL – 135.

3.02 Grouting

- A. Grouting of Sill Joints:
 - 1. Saturate concrete contact surfaces prior to grouting. Remove excess water.
 - 2. Compact grout thoroughly to eliminate air pockets. Do not vibrate.
 - 3. Cure with moisture for at least 24 hours.
 - 4. Do not retemper grout once set.
 - 5. Grout shall be continuous under panels.
- B. Grout all pick holes solid. Exposed patches shall match the adjacent panel finish.

3.03 Welding

- A. Welding: Comply with AWS D1.1.

3.04 Patching

- A. Concrete Patching will be acceptable providing structural adequacy and appearance are not impaired.

3.05 Cleaning

- A. After installation and sealant joint treatment, clean surface free of stains and other similar markings by use of detergent and water applied with a stiff fiber brush and followed with a clear water rinse.

END OF SECTION 034500