

SECTION 03 40 00

PRECAST THIN-SHELL CONCRETE WALLS

ECOLITE'S PREFABRICATED WALL SYSTEM uses thin-shell precast cellular concrete on cold-formed steel stud framing. It is economical, lightweight, and fire resistant; can be made in almost any size and configuration; and can be installed quickly and easily to get your building enclosed sooner.

DRAWING COORDINATION: Show locations and sizes of walls, openings in walls, items to be built into walls, extent of finishes (if more than one type is required), and coordination with adjacent construction.

STRUCTURAL ENGINEERING COORDINATION: If wall manufacturer is to provide engineering design, Contract Documents must indicate applicable building code, nature and magnitude of design loads, deflection, story drift, and conditions effecting connections of walls to other structural elements.

SPECIFICATION COORDINATION: Edit this guide specification section in accordance with project requirements; delete, modify, or add text as required. Text in boxes is notes to specifier and should be removed before publishing project documents.

NOTES TO SPECIFIER: Use Hidden Text option in your word processor to view or conceal notes.

SUSTAINABILITY CONSIDERATIONS: Indicate requirements for compliance with environmental requirements. Ecolite contains up to 50 percent recycled material content, can be used to create a superior building thermal envelope, reduces construction waste, reduces CO₂ emissions when compared to conventional precast concrete, is lightweight to minimize transportation impacts and to reduce loads on superstructure, can be manufactured locally with regionally extracted materials, does not contain VOCs, does not support mold or mildew, is recyclable, and is durable and almost maintenance-free for outstanding life-cycle performance.

DESIGN ASSISTANCE: Additional information is at www.EcoliteConcrete.com. Contact Ecolite Concrete USA, Inc. or an authorized fabricator for design assistance, pricing, and technical support. Call 760-804-1957 or email info@EcoliteConcrete.com.

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Precast thin-shell concrete [walls,] [partitions,] [shaft walls,] [curtainwalls,] [and] [_____].
2. [Factory-applied finishes.]
3. Accessories required for installation of walls.

B. Related Sections:

1. 03 00 00 – Concrete: Cellular concrete not included in Work of this Section.
2. 05 40 00 – Cold-Formed Metal Framing: Framing not included in Work of this Section.
3. 07 21 00 – Thermal Insulation: Thermal [and acoustic] insulation.
4. 07 90 00 – Joint Protection: Joint sealants not included in Work of this Section.
5. 09 00 00 – Exterior Finishes: Field-applied finishes.
6. 09 29 00 – Gypsum Board: Interior finishes.
7. 09 22 16 – Non-Structural Metal Framing: Non-structural metal framing not included in work of this Section.
8. 09 80 00 – Acoustic Insulation: Acoustic insulation blankets.

1.02 REFERENCES

A. ASTM International, Inc.:

1. ASTM A36 – Carbon Structural Steel.
2. ASTM A653 – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM B117 – Operating Salt Spray (Fog) Apparatus.
4. ASTM C39 – Compressive Strength of Cylindrical Concrete Specimens.
5. ASTM C150 – Portland Cement.
6. ASTM C494 – Chemical Admixtures for Concrete.

7. ASTM C618 – Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
 8. ASTM C665 – Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 9. ASTM C869 – Foaming Agents Used in Making Preformed Foam for Cellular Concrete.
 10. ASTM C920 – Elastomeric Joint Sealants.
 11. ASTM C954 – Steel Drill Screws for the Application of Gypsum Panel Products to Steel Studs.
 12. ASTM C979 – Pigments for Integrally Colored Concrete.
 13. ASTM C1199 – Steady-State Thermal Transmittance of Fenestration Systems Using Hot Box Methods.
 14. ASTM C1513 – Steel Tapping Screws for Cold-Formed Steel Framing Connections.
 15. ASTM E72 – Strength Tests of Panels for Building Construction.
 16. ASTM E90 – Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
 17. ASTM E330 – Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 18. ASTM E413 – Classification for Rating Sound Insulation.
 19. E1886 – Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials
 20. E1996 – Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
 21. ASTM F1267 – Metal, Expanded, Steel.
- B. ICC Evaluation Service, Inc.:
1. ICC-ES AC11 – Acceptance Criteria for Cementitious Exterior Wall Coatings.
 2. ICC-ES AC46 – Acceptance Criteria for Steel Studs, Joists and Tracks.
 3. ICC-ES AC219 – Acceptance Criteria for Exterior Insulation and Finish Systems.
 4. ICC-ES AC282 – Acceptance Criteria for Thin-Shell, Cementitious-Coated, Cold-Formed Steel Stud Wall Panels.
- C. Precast/Prestressed Concrete Institute: PCI MNL 135 – Tolerance Manual for Precast and Prestressed Concrete Construction.
- D. Structural Engineers Association of Southern California (SEAOSC): Cyclic (Reversed) Load Test for Shear Resistance of Framed Walls for Buildings.

1.03 PERFORMANCE REQUIREMENTS

- A. Wall Axial Load Capacity (ASTM E72):
1. Ultimate Load: 19,300 lbs. minimum.
 2. Load at h/240 Deflection: 12,100 lbs. minimum.
- B. Racking Shear Capacity (SEAOSC):
1. Top of Wall Force: 10,500 lbs. minimum.
 2. Top of Wall Displacement: 0.44 inch maximum.
- C. Wall Transverse Load Capacity (ASTM E330):
1. Ultimate Positive Load: 120 psf minimum.
 2. Ultimate Negative Load: 90 psf minimum.
 3. Positive Load at h/240 Deflection: 70 psf minimum.
 4. Negative Load at h/240 Deflection: 60 psf minimum.
- D. Concrete Compressive Strength (ASTM C39): 1060 psi minimum at 28 days.

- E. Water Resistive Barrier (ICC-ES AC219, Section 4.8): No water intrusion through wall panel.
- F. Freeze-Thaw Resistance (ICC-ES AC11, Section 4.2): No cracking, checking or crazing.
- G. Thermal Resistance (ASTM C1199): Wall tested with gypsum board interior finish shall provide R=4 thermal insulation.
- H. Fire Resistance (ASTM E119): One hour minimum when tested in load-bearing condition without gypsum board on interior surface.
- I. Sound Transmission Class (ASTM E413): [STC-49 when tested with 5/8 inch gypsum board] [STC-52 when tested with 3-1/2 inch glass fiber insulation batts (compressed to fill wall cavity) and 5/8 inch gypsum board] according to ASTM C90.

1.04 SUBMITTALS

- A. Comply with Section [01 33 00 – Submittal Procedures] [_____].
- B. Product Data:
 - 1. Manufacturer’s data showing compliance with ICC-ES AC282.
 - 2. Manufacturer’s standard installation instructions.
 - 3. Manufacturer’s quality control manual.
- C. Environmental Submittals: Submit letter certifying [recycled materials content of cellular concrete and steel,] [location of wall fabrication,] [location of sources of material extraction for cement, fly ash, and steel,] [and] [_____].
- D. Shop Drawings: Shop drawings shall be sealed by registered professional engineer and shall show:
 - 1. Elevations, sections, and details showing sizes and shapes of wall, fabrication details, and types and extent of finishes.
 - 2. Floor plans and elevations showing wall markings, locations of walls and accessories, connections between walls, and method of attachment of walls to other components of building.
 - 3. Details as necessary to show relationship of panels to adjacent materials.
 - 4. Installation Instructions: Show lift and support points and other instructions as required to supplement manufacturer’s standard installation instructions.
- E. Samples: Submit samples not less than [12 inches x 12 inches] [_____] showing general fabrication of walls, [factory-applied finishes,] [and] [_____].
- F. Closeout Submittals: Provide as-built drawings if necessary to show changes made to walls to accommodate field conditions. Structural changes shall be sealed by registered professional engineer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm shall have a quality control manual approved under ICC-ES AC282.
- B. Regulatory Requirements: Comply with ICC-ES AC282.
- C. Structural Design Requirements:

1. Calculate structural properties of cold-formed metal framing and accessories in accordance with this Section and standards referenced in ICC-ES AC282.
 2. Provide structural design calculations sealed and signed by a Professional Engineer licensed in the state where the Project is located.
- D. Installer Qualifications: Installer shall be firm acceptable to wall manufacturer.
- E. Mockups: Comply with Section [01 43 39 - Mockups] [_____]:
1. Provide mockup of demonstrating [_____].
 2. Size: [_____] feet high by [_____] feet wide minimum plus at least one corner.
 3. Construct mockup [on building at location acceptable to Architect. Accepted mockup may remain part of Work,] [at location on site separate from building and acceptable to Architect. After Work of this Section is accepted, remove mockup.]
- F. Pre-Installation Meeting: Comply with Section [01 31 19 – Project Meetings] [_____]:
1. Convene meeting at Project site prior to installation with representatives of [Owner,] Architect, Contractor, wall manufacturer, and installer.
 2. Review Project conditions, access to Project site for erection, requirements of related work, installation instructions, storage and handling procedures, and protection measures.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Section [01 65 00 – Product Delivery Requirements and Section 01 66 00 – Product Storage and Handling Requirements] [_____].
- B. Follow manufacturer’s instructions. Protect walls against damage. Lift or support at points shown on Shop Drawings. Do not store where walls could be stained or damaged by mud or splashing. Provide all-weather unloading and storage areas and temporary access roads suitable for intended erection equipment.

1.07 WARRANTY

- A. Provide manufacturer’s standard 25-year limited warranty.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Ecolite Concrete USA, Inc., 760-804-1957, www.EcoliteConcrete.com.
- B. Substitutions: Substitutions will [not be considered.] [be considered in accordance with [Section 01 25 00 – Substitution Requirements] [_____]. Submit data indicating compliance with reports [10] [_____] days prior to bidding.]

2.02 COMPONENTS

- A. Studs and Tracks:
1. Standard: Comply with ICC-ES AC46.
 2. Steel: ASTM A653 SS (Structural Steel) Grade 33 with 33 ksi minimum yield strength and 45 ksi tensile strength steel unless otherwise required by structural design.
 3. Coating: [G60] [G90] galvanized.
 4. Type: Channel shaped with lipped flanges and holes in web for utilities. Fabricate with notched flanges, swaged ends, and dimpled screw-holes as required for assembly and to create a nearly flush interior surface.

5. Depth: Framing members shall be 3-1/2 or 5-1/2 inches deep as shown on Drawings and as required by structural design.
 6. Steel Thickness: As required by structural design.
 7. [Recycled content of steel shall be [25] [_____] percent minimum.]
- B. Expanded Metal: ASTM A36 steel, 1/2 inch X 1/2 inch nominal SWD/LWD, 0.39 inch overall thickness, not flattened, and complying with ASTM F1267.
- C. Fasteners: ASTM C1513.
- D. Cellular Concrete:
1. Ingredients:
 - a. Portland Cement: ASTM C150.
 - b. Fly Ash: ASTM C618, 100 percent recycled content.
 - c. Water: Potable.
 - d. Synthetic Fibers.
 - e. Expansion Agent: Foam from recycled bio-based materials, ASTM C869.
 - f. Chemical Admixtures: ASTM C494.
 2. Mix Design:
 - a. Recycled Content: Cementitious material content shall contain 50 percent fly ash.
 - b. Air Content: Approximately 50 percent air in form of spherical closed-cell bubbles.
 - c. Density: 40 to 90 pcf.
 3. Form Release Agent: Use product compatible with required finish.
- E. Cementitious Coating (Plaster) for Curved Walls: [_____].]

2.03 FABRICATION

- A. Shop Assembly:
1. Fabricate walls to size and configuration required. Use largest-size sections practical and locate joints [where shown on Drawings and] with consideration for appearance, delivery, storage, and handling.
 2. Make connections and reinforce to meet design requirements and withstand delivery, storage, and handling stresses.
- B. Framing:
1. Install studs at spacing as shown in shop drawings, at each side of openings, and at corners and abutting walls.
 2. Install supplementary framing or blocking to support work attached to framing.
 3. [Insulation: Install [unfaced glass fiber complying with ASTM C665] [_____] in spaces such as headers and sills that will be inaccessible after fabrication.
 4. Provide blocking, strapping, reinforcement for doors jambs, penetrations, and other features that must be incorporated in to wall.
- C. Expanded Metal: Secure expanded metal to framing.
- D. Joints:
1. Forming Flanges: Use flanges at edges of elements to hold framing at required height above casting bed and to create the required profile for concrete edges and joints. Remove forming flanges prior to wall erection.
 2. Vertical Joints: Fabricate vertical joints between wall sections with recess to accommodate joint sealer and chamfered corner.

3. Horizontal Joints: Fabricate with chamfered corner [except as otherwise shown on Drawings].
- E. Cellular Concrete:
1. Thickness: Two inches minimum [except as shown on Drawings].
 2. Embed expanded metal. Vibrate to minimize bugholes and voids and fill full dimensions of wall section.

2.04 FINISHES

- A. Exterior Face – Concrete to be [Exposed,] [Painted,] [or] [Coated]:
1. [Smooth Face: Provide smooth, as-cast finish using casting bed equal to [clean steel] [troweled concrete]. Mottling and variations in appearance are acceptable.]
 2. [Textured Surface: Use [] form liners.]
 3. [Integrally Color Cellular Concrete: Mineral oxide pigments, ASTM C979; color to match [].]
 4. [Exposed Aggregate: Place [] aggregate on casting bed prior to casting of concrete. After concrete has gained sufficient strength, brush surface to expose aggregate.]
- B. Factory-Applied Veneers: Use [thin brick] [ceramic tile] [stone veneer] as manufactured by []. Style, pattern, and color shall be [].
- C. [Exposed Interior Finish: Concrete shall have an as-poured surface. Mottling and variations in texture and appearance are acceptable. Concrete attached visible surfaces of framing [is acceptable.] [shall be removed.]]

2.05 ACCESSORIES

- A. Provide accessories as indicated on wall manufacturer's shop drawings.
- B. Connectors:
1. Acceptable Manufacturers:
 - a. CEMCO (California Expanded Metal Company).
 - b. Dietrich Metal Framing, Inc.
 - c. Simpson Strong-Tie Company, Inc.
 - d. The Steel Network, Inc.
 - e. Other firms acceptable to wall manufacturer.
 2. Material: ASTM A653 steel; SS Grade 50, Class 1, 50 ksi minimum yield strength, 65 ksi minimum tensile strength, G60 hot-dipped galvanized coating, except as otherwise noted.
 3. Stamp manufacturer's name on each accessory item.
 4. Provide screws with accessories designated for screw attachment.
- C. Screws, Fasteners, and Anchors: Corrosion resistant and of type and size shown on shop drawings or as required for condition of use.
- D. Shims and Grout: Type recommended by wall manufacturer for conditions of use.
- E. Patching Compound: Hydraulic cement-based patching compound that can be applied to a feathered edge or built-up to 1/2 inch thickness in a single pass; Rapidset WunderFixx by CTS Cement Manufacturing Co. or approved substitute.

2.06 FABRICATION TOLERANCES

- A. Comply with PCI MNL 135 tolerances for “Solid or Insulated Flat Structural Wall Panels.”

PART 3 - EXECUTION

3.01 INSTALLERS

- A. Installer Qualifications: See AC282 Installation Manual in installation of the type of products specified.

3.02 EXAMINATION

- A. Examine conditions upon which work will be installed. Notify Architect of conditions detrimental to satisfactory installation of walls.
- B. Do not install walls until conditions are satisfactory.

3.03 PREPARATION

- A. Install flashings, anchor bolts [and] [_____] in the proper sequence with wall installation.

3.04 INSTALLATION

- A. Erect architectural precast concrete units plumb, level, and square.
- B. Brace walls as required until securely held in place by permanent structure.
- C. Walls shall be connected to each other and to structure as shown on shop drawings.
- D. Install accessories as required.
- E. Repair: Repair damaged surfaces.

3.05 PROTECTION

- A. Protect walls from damage by other work.

END OF SECTION
