

Technical Design Guide: 07 42 00

GUIDE SPECIFICATION FOR SLENDERWALL[®] PREFABRICATED WALL PANEL/SYSTEM

THIS DOCUMENT

This document provides a basis for specifying in-plant fabrication, including product design, not shown in contract documents, and the field erection of the *SLENDERWALL*[®] Prefabricated Wall Panel/System. It does not include structural precast concrete, coatings, or sealing the joints between units.

DRAWINGS AND SPECIFICATIONS

Drawings:

The Fabricator's drawings show the location and details of applied and embedded items. The drawings illustrate the details of structure corners and interfacing with other materials. The drawings identify the requirements for design and design loads, and indicate load support points and space allowed for connections.

The Engineer of Record needs to be aware of the magnitude and direction of all anticipated loads to be transferred to the building structural framing and their point of application. It is especially critical that the Engineer of Record provide stiffeners and bracing that are required to transfer the loads imposed by *SLENDERWALL*[®] to the structural frame of the building.

Coordination:

The *SLENDERWALL*[®] fabricator may be responsible to supply *SLENDERWALL*[®] support items to be placed on or in the structure in order to receive the *SLENDERWALL*[®] units, depending on the type of structure. This is dependent upon local codes, practice, and building superstructure design.

SECTION 07 42 00 SLENDERWALL[®] PREFABRICATED WALL PANEL/SYSTEM

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. Contract Drawings
- B. Contract General Provisions
- C. General & Supplementary Conditions

1.2 SUMMARY

- A. This section includes the performance criteria, materials, production, and erection of the *SLENDERWALL*[®] Prefabricated Wall Panel System for the entire project.
- B. This Section includes the following:
 - 1. Prefabricated *SLENDERWALL*[®] wall panels, factory fabricated with light-gauge metal framing backup.
 - 2. Reinforcement of fabricated units, including anchorages, reinforcing bars, supports, etc.
 - 3. Structural steel inserts, lifting hooks, anchor units, plates, dowels, etc., required for handling and for connections of the light-gauge metal framing to the structural framework of the building.

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4. Preparation of engineering design calculations, for the *SLENDERWALL*® prefabricated units and connections, and preparation of shop and erection drawings.
5. Testing and inspection of the *SLENDERWALL*® units and erection work; provided and paid for by the Owner.

1.3 DEFINITIONS

- A. Intentionally left blank.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide *SLENDERWALL*® units and connections capable of withstanding design loads within limits and under conditions indicated.
 1. Design framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live load deflection, shrinkage and creep of primary building structure, and other building movements as follows:
 2. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 80° F (27 ° C).
 3. Fire Resistance Rating: Select material and minimum thicknesses to provide one hour fire rating.

1.5 SUBMITTALS

- A. Product Data: Retain quality control records and certificates of compliance for 1 year or period of warranty, whichever is greater. Submit fabricator's specifications, data, and instructions for manufactured materials and products, including the following:
- B. Design Mixes: For each concrete mix along with compressive strength and water-absorption tests.
- C. Shop (Erection) Drawings: Detail fabrication and installation of *SLENDERWALL*® Prefabricated Wall Panel units. Indicate member locations, plans, elevations, dimensions, shapes and cross sections. Indicate aesthetic intent including joints, reveals, and extent and location of each surface finish. Indicate details at building corners.
- D. Samples: Submit two (2) design reference samples for initial verification of design intent, approximately 12 by 12 by 1-1/2 inches (300 by 300 by 38 mm), representative of finishes, color, and textures of exposed surfaces of *SLENDERWALL*® units.
- E. Samples for each Architectural Precast Concrete Brick (APCB) unit required, showing the full range of color and texture expected. Supply sketch of each corner or special shape with dimensions. Supply sample showing color and texture of joint treatment.
- F. Welding Certificates: Copies of certificates for welding procedure specifications (WPS) and personnel.
- G. Product Information: Submit name of manufacturer and/or supplier of the following as sources of materials:
 1. Cement (each type)
 2. Aggregate (each type)
 3. Reinforcing Bars
 4. Welded Wire Fabric
 5. Concrete
 6. Welding Electrodes
 7. Stud Framing
 8. Inserts, Mechanical Fasteners, and Anchors
 9. Non-Shrink Grout

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10. Neoprene Pads
11. Form Release Agents and Coatings
- H. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.
 1. Concrete materials, cement identified by lot.
 2. Reinforcing materials.
 3. Admixtures.
 4. Anchors, bolts, shear studs, welding electrodes, concrete inserts, neoprene pads, shop paint, field paint, and non shrink grout.
 5. Structural-steel shapes and hollow structural sections and members.

1.6 QUALITY ASSURANCE

- A. Erector Qualifications:
 1. A precast concrete erector Qualified by the Precast/Prestressed Concrete Institute (PCI) prior to beginning work at the project-site and with at least 5 years experience in setting architectural pre-cast concrete. Submit a current Certificate of Compliance furnished by PCI designating qualification in Category A (Architectural Systems) for non-load-bearing members, and/or Category S2 (Complex Structural Systems) for load-bearing members or equal reviewed by EASI-SET® Industries.
 2. An erector with a minimum of 5 years of experience who has completed *SLENDERWALL*® work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance and who meets the following requirements:
- B. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing *SLENDERWALL*® units similar to those indicated for this Project and with a record of successful in-service performance.
- C. Design Standards: Comply with ACI 318 (ACI 318M) and the design recommendations of PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to types of *SLENDERWALL*® units indicated.
- D. Quality Control Standard: For manufacturing procedures and testing requirements, quality control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of *SLENDERWALL*® Products."
- E. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."
- F. Sample Panels: After sample approval and before fabricating *SLENDERWALL*® units, produce a minimum of one sample panels approximately 16 square feet (48" x 48") in size for review by Architect.
- G. Range Samples: After sample panel approval and before production fabrication of *SLENDERWALL*® units, produce a minimum of three samples, approximately 16 square feet in size, representing anticipated range of color and texture on project's units. Following range sample acceptance by the Architect, maintain samples at the manufacturer's plant as color and texture acceptability reference.
- H. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination," if required.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, staining, and to prevent cracking, distortion, warping or other physical damage.
- B. Store units, unless otherwise specified, with non-staining, resilient supports.

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- C. Place stored units so identification marks are clearly visible and product can be inspected.
- D. Deliver all *SLENDERWALL*[®] units to the project site in such quantities and at such times to assure compliance with the agreed project schedule and proper setting sequence so as to limit unloading units temporarily on the ground.
- E. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F. Lift and support units only at designated points shown on the Shop Drawings.
- G. Place non-staining resilient spacers of even thickness between each unit.
- H. Support units during shipment on non-staining shock absorbing material.

1.8 SEQUENCING

- A. Furnish loose connection hardware and anchorage items, as required, to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 – PRODUCTS

2.1 FABRICATORS

- A. Fabricators: Subject to compliance with requirements of EASI-SET[®] Industries, may provide the *SLENDERWALL*[®] product:
 - 1. Smith-Midland Corporation, Virginia
 - 2. BPDF, Inc., Canada
 - 3. Opticretos (Socsa, Inc.), Mexico

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; non-reactive with concrete and suitable for producing required finishes.
- B. Form Liners: Units of face design, texture, arrangement, and configuration to match precast concrete design reference sample. Provide solid backing and form supports to ensure that form liners remain in place during concrete placement. Use with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- C. Surface Retarder: Chemical set retarder capable of temporarily delaying hardening of newly placed concrete mix to depth of reveal specified.

2.3 REINFORCING MATERIALS

- A. Reinforcing Bars - Steel Reinforcement: ASTM A 615/A 615M, Grade 60 (Grade 420), galvanized or epoxy coated, deformed except where plain bars are indicated.
- B. Plain Steel Welded Wire Reinforcement: ASTM A 185, fabricated from galvanized and chromate wash, treated steel wire into flat sheets. Triple coated, hot-dipped galvanized, 3.6 Mils
- C. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet fabricated from galvanized and chromate wash, treated steel wire into flat sheets. Triple coated, hot-dipped galvanized, 3.6 Mils.

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- D. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117. Use epoxy coated, annealed type tie wire, 16.5 gauge or heavier.

2.4 METAL FRAMING MATERIALS

- A. General: Provide all steel framing members with ASTM A 525 G-90 galvanized coating, unless otherwise indicated.
- B. Light-gauge Metal Framing:
1. Stud Framing Members: 16 Gauge formed from steel that corresponds to requirements of ASTM A 570-50, with a minimum yield of 50,000 psi.
 2. Track, Bridging, and Accessories: 14 Gauge galvanized formed steel members.
 3. Bent Plates: HR1020 (35,000 psi yield-strength) conforming to AISI requirements
 4. Provide welded stud connectors with thermal break non-corrosive coating.

2.5 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I, II or III.
- B. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Provide and stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for entire project.
- C. Backup Concrete Aggregates: ASTM C33 or C330.
- D. Integral water repellent admixture.
- E. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable and non-fading.
- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- G. Air Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures, with not more than 0.1% of soluble chloride ions by weight of cement.
- H. Water-Reducing Admixture: ASTM C 494/C494M, Type A, if required.
- I. Retarding Admixture: ASTM C 494/C494M, Type B, if required.
- J. Water-Reducing and Retarding Admixture: ASTM C 494/C494M, Type D, if required.
- K. High-Range, Water-Reducing Admixture: ASTM C 494/C494M, Type F, if required.
- L. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C494M, Type G, if required.
- M. Plasticizing Admixture for Flowable Concrete: ASTM C 1017/C1017M, if required.
- N. Admixtures containing calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture are not permitted.

2.6 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M except silicon (Si) content in the range of 0 to 0.03% or 0.15 to 0.25% for materials to be galvanized. Steel with chemistry conforming to the formula $Si + 2.5P < 0.09$ is also acceptable.
- B. Stainless-Steel Headed Studs: ASTM A 276, Proprietary grade, cold finished; AWS D1.1, with arc shields.
- C. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
- D. Deformed Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M, if required.

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- E. Carbon Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6) carbon-steel, hex-head bolts and studs; carbon steel nuts (ASTM A563/A563M, Grade A); and flat, unhardened steel washers (ASTM F844), if required.
- F. High Strength Bolts and Nuts: ASTM A 325/A 325M or ASTM A490/A490M, Type 1, heavy hex steel structural bolts, heavy hex carbon steel nuts, (ASTM A563/A563M) and hardened carbon steel washers (ASTM F436/F436M), if required for steel framing connections.
- G. Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M, after fabrication, and/or ASTM A 153/A 153M, as applicable and/or electro-deposition according to ASTM B 633, SC 3, Type 1 and 2.
- H. Shop Primed Finish: Prepare surfaces of non-galvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 1 followed by SSPC-SP 3 and shop-apply SSPC-Paint 25 according to SSPC-PA 1.
- I. Welding Electrodes: Comply with AWS standards.

2.7 STAINLESS STEEL CONNECTION MATERIALS (Optional Materials);

- A. Stainless Steel Plate: ASTM A 666, Type 304, of grade suitable for application, if required.
- B. Stainless Steel Bolts and Studs: ASTM F 593, alloy 304 or 316, hex-head bolts and studs; stainless steel nuts; and flat, stainless steel washers. Lubricate threaded parts of stainless steel bolts with an anti-seize thread lubricant during assembly.
- C. Stainless Steel Framing Material: ASTM A 570-50 and bearing the minimum yield of 50,000 psi mechanical properties for light gauge metal framing.

2.8 CONCRETE MIXES

- A. Prepare design mixes to match Architect's sample for each type of concrete required.
- B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at *SLENDERWALL®* fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested in accordance with ASTM C1218/C1218M.
- D. Normal-Weight Concrete Face and Backup Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1 and or ACI 301, with materials to be used on project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
- G. Mix Adjustments: Provided that no additional expense to the owner is involved, the fabricator may submit for architect's approval requests for adjustment to approved concrete mixes when circumstances such as availability of materials, weather, or unfavorable test results occur. Include laboratory test data substantiating performance characteristics with mix adjustment requests.
- H. Integral water repellent admixture.
- I. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.

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2.9 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete placement and vibration operations and temperature changes. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement by release agent. Rust on form surfaces is acceptable.
- B. Maintain molds to provide completed *SLENDERWALL*® units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.

2.10 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement. Do not relocate without the architect's prior approval.
 - 1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1 and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
- C. Cast in reglets, slots, holes, and other accessories in the *SLENDERWALL*® units as indicated on contract drawing.
- D. Cast in openings larger than 10 inches (250 mm) in any dimension. Smaller openings may be field cut as required with prior approval of Architect.
- E. Reinforcement: Comply with recommendations in PCI MNL 117 for fabrication, placing, and supporting reinforcement.
- F. Metal Stud Framing: Accurately position metal framing backup and anchorages and secure to form work. Locate anchorages where they will not affect the position of reinforcement or the placing of concrete.
- G. Reinforce *SLENDERWALL*® units to resist handling, transportation, and erection stresses.
- H. Mix concrete according to PCI MNL 117 and requirements in this Section. After concrete batching, no additional water may be added.
- I. Place concrete to a minimum thickness after consolidation of 1 inch (25 mm), but not less than the minimum reinforcing cover as indicated on contract drawings.
- J. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in *SLENDERWALL*® units. Comply with requirements in ACI 304 and/or PCI MNL 117 for measuring, mixing, transporting, and placing concrete.
- K. Thoroughly consolidate placed concrete by internal and/or external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing or entrapped air on surfaces. Provide as-cast or float finishes for surfaces which are concealed. Use equipment and procedures complying with PCI MNL 117.
- L. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- M. Comply with ACI 305R recommendations for hot-weather concrete placement.
- N. Identify pickup points of *SLENDERWALL*® units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each *SLENDERWALL*® unit on a surface that will not show in finished structure.

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- O. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until the compressive strength is high enough to ensure that stripping does not have an effect on the performance or appearance of the final product.
- P. Repair damaged *SLENDERWALL*® units to meet acceptability requirements of PCI MNL 117.

2.11 FABRICATION TOLERANCES

- A. Fabricate *SLENDERWALL*® units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. Fabricate *SLENDERWALL*® units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with the following product tolerances.
 - 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. 10 feet (3 m) or under, Plus or Minus 1/8 inch (3 mm).
 - b. 10 to 20 feet (3 to 6 m), Plus 1/8 inch (3 mm), Minus 3/16 inch (5 mm).
 - c. 20 to 40 feet (6 to 12 m), Plus or Minus 1/4 inch (6 mm).
 - d. Each additional 10 feet (3 m), Plus or Minus 1/16 inch (1.5 mm).
 - 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. 10 feet (3 m) or under, Plus or Minus 1/4 inch (6 mm).
 - b. 10 to 20 feet (3 to 6 m), Plus 1/4 inch (6 mm), Minus 3/8 inch (10 mm).
 - c. 20 to 40 feet (6 to 12 m), Plus or Minus 3/8 inch (10 mm).
 - d. Each additional 10 feet (3 m), Plus or Minus 1/8 inch (3 mm).
 - 3. Total Thickness or Flange Thickness: Plus 1/4 inch (6 mm), Minus 1/8 inch (3 mm).
 - 4. Rib Thickness: Plus or Minus 1/8 inch (3 mm).
 - 5. Rib to Edge of Flange: Plus or Minus 1/8 inch (3 mm).
 - 6. Distance between Ribs: Plus or Minus 1/8 inch (3 mm).
 - 7. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or Minus 1/8 inch per 72 inches (3 mm per 2 m) or 1/2 inch (13 mm) total, whichever is greater.
 - 8. Length and Width of Block-outs and Openings within One Unit: Plus or Minus 1/4 inch (6 mm).
 - 9. Location and Dimension of Block-outs Hidden from View and Used for HVAC and Utility Penetrations: Plus or Minus 3/4 inch (19 mm).
 - 10. Dimensions of Haunches: Plus or Minus 1/4 inch (6 mm).
 - 11. Haunch Bearing Surface Deviation from Specified Plane: Plus or Minus 1/8 inch (3 mm).
 - 12. Difference in Relative Position of Adjacent Haunch Bearing Surfaces from Specified Relative Position: Plus or Minus 1/4 inch (6 mm).
 - 13. Bowing: Plus or Minus L/360, maximum 1 inch (25 mm).
 - 14. Local Smoothness: 1/4 inch per 10 feet (6 mm per 3 m).
 - 15. Warping: 1/16 inch per 12 inches (1.5 mm per 300 mm) of distance from the nearest adjacent corner.
 - 16. Tipping and Flushness of Plates: Plus or Minus 1/4 inch (6 mm).
 - 17. Dimensions of Architectural Features and Rustications: Plus or Minus 1/8 inch (3 mm).
- C. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
 - 1. Weld Plates: Plus or Minus 1 inch (25 mm).
 - 2. Inserts: Plus or Minus 1/2 inch (13 mm).

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3. Handling Devices: Plus or Minus 3 inches (75 mm).
4. Reinforcing Steel and Welded Wire Reinforcement: Plus or Minus 1/4 inch (6 mm) where position has structural implications or affects concrete cover; otherwise, Plus or Minus 1/2 inch (13 mm).
5. Reinforcing Steel Extending out of Member: Plus or Minus 1/2 inch (13 mm) of plan dimensions.
6. Tendons: Plus or Minus 1/4 inch (6 mm), vertical; Plus or Minus 1 inch (25 mm), horizontal.
7. Location of Rustication Joints: Plus or Minus 1/8 inch (3 mm).
8. Location of Opening within Panel: Plus or Minus 1/4 inch (6 mm).
9. Location of Flashing Reglets: Plus or Minus 1/4 inch (6 mm).
10. Location of Flashing Reglets at Edge of Panel: Plus or Minus 1/8 inch (3 mm).
11. Reglets for Glazing Gaskets: Plus or Minus 1/8 inch (3 mm).
12. Electrical Outlets, Hose Bibs: Plus or Minus 1/2 inch (13 mm).
13. Location of Bearing surface from End of Member: Plus or Minus 1/4 inch (6 mm).
14. Allowable Rotation of Plate, Channel Inserts, Electrical Boxes: 2-degree rotation or 1/4 inch (6 mm) maximum over the full dimension of the unit.
15. Position of Sleeve: Plus or Minus 1/2 inch (13 mm).
16. Location of Window Washer Track or Buttons: Plus or Minus 1/8 inch (3 mm).

2.12 FINISHES

- A. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight and sharp. Finish exposed face surfaces of architectural precast concrete units to match approved design reference sample, sample panels, and/or mock-ups which ever is required and approved by the architect and as follows:
- B. Finish exposed top and bottom surfaces of architectural precast concrete units to match face-surface finish.
- C. Finish unexposed back of architectural precast concrete units by float and as cast finish.
- D. Finish unexposed surfaces of architectural precast concrete units by float finish.

2.13 SOURCE QUALITY CONTROL

- A. Quality Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete also test and inspect according to PCI Interim Guidelines for the Use of Self-Consolidating Concrete.
- B. Strength of precast concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.
- C. Testing: If there is evidence that the concrete strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, Precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C42M.
 1. A minimum of three representative cores will be taken from units of suspect strength from locations directed by Architect.
 2. Cores will be tested in an air dry condition.
 3. Strength of concrete for each series of 3 cores will be considered satisfactory if the average compressive strength is equal to at least 85 percent of the 28-day design compressive strength and no single core is less than 75 percent of the 28-day design compressive strength.
 4. Test results will be made in writing on the same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:

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- D. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mix that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- E. Non-Conforming Work: Architectural precast concrete units that do not comply with acceptability requirements in PCI MNL 117, including concrete strength, manufacturing tolerances, and color and texture range are unacceptable. Chipped, spalled or cracked units may be repaired, if repaired units match the visual mock-up. The Architect reserves the right to reject any unit if it does not match the accepted samples and visual mock-up. Replace unacceptable units with precast concrete units that comply with requirements.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Deliver anchorage devices that are embedded in or attached to the building structural frame or foundation before start of such work. Provide locations, setting diagrams, and templates for the proper installation of each anchorage device.

3.2 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Do not install precast concrete units until supporting cast-in place concrete building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is structurally ready to receive the loads required from the *SLENDERWALL*® Prefabricated Wall Panel system.

3.3 ERECTION

- A. Install loose clips, hangers, bearing pads and other accessories required for connecting *SLENDERWALL*® Prefabricated Wall Panel system to supporting members and backup materials.
- B. Erect *SLENDERWALL*® level, plumb and square within the specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
- C. Connect *SLENDERWALL*® units in position by bolting, welding, grouting, or as otherwise indicated on approved Erection Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting are completed.
- D. Welding: Comply with applicable AWS D1.1 and AWS D1.4 requirements for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect *SLENDERWALL*® units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.
 - 2. Welds not specified shall be continuous fillet welds, using not less than the minimum fillet as specified by AWS.
 - 3. Clean weld affected metal surfaces with chipping hammer followed by brushing then apply a minimum 0.004 inch (100 µm) thick coat of galvanized repair paint to galvanized surfaces in conformance with ASTM A780 or re-prime damaged area as dictated by erection drawings.
 - 4. Visually inspect all welds critical to precast connections. Visually check all welds for completion and remove, reweld or repair all defective welds, if services of AWS-certified welding inspector are not furnished by Owner.
- E. At bolted connections, use lock washers, tack welding, or other acceptable means to prevent loosening of nuts after final adjustment.

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3.4 ERECTION TOLERANCES

- A. Erect *SLENDERWALL*[®] units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of PCI MNL 117, Appendix I.
- B. Erect *SLENDERWALL*[®] units level, plumb, square, and true, without exceeding the following non-cumulative erection tolerances.
 - 1. Plan Location from Building Grid Datum: Plus or Minus 1/2 inch (13 mm).
 - 2. Plan Location from Centerline of Steel: Plus or Minus 1/2 inch (13 mm).
 - 3. Top Elevation from Nominal Top Elevation: As follows:
 - a. Exposed Individual Panel: Plus or Minus 1/4 inch (6 mm).
 - b. Non-exposed Individual Panel: Plus or Minus 1/2 inch (13 mm).
 - c. Exposed Panel Relative to Adjacent Panel: 1/4 inch (6 mm).
 - d. Non-exposed Panel Relative to Adjacent Panel: 1/2 inch (13 mm).
 - 4. Support Elevation from Nominal Support Elevation: As follows:
 - a. Maximum Low: 1/2 inch (13 mm).
 - b. Maximum High: 1/4 inch (6 mm).
 - 5. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet (30 m): 1 inch (25 mm).
 - 6. Plumb in Any 10 Feet (3 m) of Element Height: 1/4 inch (6 mm).
 - 7. Maximum Jog in Alignment of Matching Edges: 1/4 inch (6 mm).
 - 8. Joint width (Governs over Joint Taper): Plus or Minus 1/4 inch (6mm).
 - 9. Maximum Joint Taper: 3/8 inch (10 mm).
 - 10. Joint Taper in 10 Feet (3 m): 1/4 inch (6 mm).
 - 11. Maximum Jog in Alignment of Matching Faces: 1/4 inch (6 mm).
 - 12. Differential Bowing or Camber, as Erected, between Adjacent Members of Same Design: 1/4 inch (6 mm).
 - 13. Opening Height between Spandrels: Plus or Minus 1/4 inch (\pm 6 mm).

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Field welds will be subject to visual inspections and non-destructive testing in accordance with ASTM E165 or ASTM E709.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Repair or remove and replace work that does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS

- A. Repairs will be permitted provided structural adequacy of units and appearance are not impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged *SLENDERWALL*[®] units when repairs do not meet requirements.

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3.7 CLEANING

- A. Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to shipping. All *SLENDERWALL*[®] units are delivered to the project site ready for installation clean and free of surface defects.
- B. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of *SLENDERWALL*[®] units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

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One or more patents may apply to the systems in this guide, including, without limitation: U.S. Patents 5699644 and 6216405; and Canadian Patent 2254382. Patents are pending for the 'H₂Out™' caulk joint drainage and street-level leak detection system.