

GUIDE SPECIFICATION FOR

SLENDERWALL®

Architectural Precast Concrete/Steel Stud Building Panels

PREFABRICATED EXTERIOR WALL PANEL/SYSTEM

OVERVIEW

Scope:

This document addresses design, in-plant fabrication, and field installation for the SLENDERWALL® cladding system. It does not include precast concrete coatings or sealing the joints between panels.

Construction Drawings:

Construction drawings: Elevations should graphically illustrate and define the SLENDERWALL® panel relationships, shape, size, locations, surface features/finish, joint treatment, type, size and locations of connection points of each unit to the structure. Vertical/Horizontal sections should indicate special edge conditions, feature details, interface of units with other materials and interior finishes. Connection details should specify the mechanisms, attachment details, material identification and loads being transferred to the supporting structure. Anchor plan layouts should also be provided locating and identifying all anchoring hardware that will need to be cast into or fastened to the structure and referenced to the established building controls indicated on the contract documents.

Engineer of Record Responsibility:

The Engineer of Record (EOR) shall be responsible for ensuring that the magnitude and direction of all anticipated loads transferred to the building structural framing and their point of application are consistent with the requirements contained in the applicable national and local building codes, latest revision. Special consideration should be given to tolerances and deflections as referenced in the Technical Design Guide - Design Considerations Section, which may be more restrictive than the applicable national and local building codes. It is especially critical that the Engineer of Record provide stiffeners and/or bracing, as required, to transfer the loads imposed by SLENDERWALL® on the structural frame of the building. Stiffeners and/or bracing required to strengthen the structure or to prevent panel rotation are not part of the fabricator's scope.

Design Coordination:

Depending upon the type of structure, the SLENDERWALL® fabricator's contract may specify that they supply certain SLENDERWALL® support items or cast-in embeds to be placed on or in the structure in order to receive the SLENDERWALL® units. For Design-Build projects, the SLENDERWALL® fabricator's design team should closely coordinate with the Architect and EOR from early on to maximize the benefit of the SLENDERWALL® System. The Design-Build team should have periodic face-to-face meetings or conference calls to discuss significant coordination issues, which would then be used for developing the contract drawings and documents. Other trades like window or curtain wall designers, plumbing and HVAC sub-contractors should follow these Design-Build documents and drawings to seamlessly and efficiently interface with their own products.

SECTION 07 42 43
COMPOSITE WALL PANELS
(SLENDERWALL® Prefabricated Exterior Wall Panel/System)

PART 1 – GENERAL

1.1 SUMMARY

A. Section Includes:

1. Part 1 - General Information:

a. Summary; References; System Descriptions; Submittals; Quality Assurance; Delivery, Storage and Handling; and Sequencing

2. Part 2 - Products:

a. Manufacturers; Materials; and Fabrication

3. Part 3 - Execution:

a. Preparation; Installation; Tolerances; Repairs; and Cleaning

B. Related Sections:

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1.2 PRIMARY REFERENCES (latest revisions)

A. SLENDERWALL® Technical Design Guide

B. IBC – International Building Code

C. ASCE 7 – Minimum Design Loads for Buildings and Other Structures

D. ACI 318 – Building Code Requirements for Structural Concrete and Commentary

E. PCI Design Manual with special emphasis on MNL-117, MNL-122, MNL-132, and MNL-135

F. AISC Steel Construction Manual

G. AWS D1.1, AWS D 1.3 & AWS D 1.4 – American Welding Society

H. ASTM Standards Volume 4.02 Concrete and Aggregates

I. ACI 301 Specifications for Structural Concrete

J. NPCA QCM Quality Control for Plants and Production of Architectural Precast Concrete Products

K. RCSC (Research Council on Structural Connections) Specification for Structural Joints Using High-Strength Bolts

NOTE: Additional references may be included in other Sections, as appropriate

1.3 SYSTEM DESCRIPTION

A. Design Requirements

1. Refer to contract documents.

B. Performance Requirement

1. Structural Performance: Provide SLENDERWALL® units and connections capable of withstanding design loads in accordance with applicable codes and conditions specified in the contract documents. In some instances, the SLENDERWALL® Technical Design Guide may be more restrictive.

2. Accommodation Requirements: Design framing system and connections to maintain clearances at openings and to accommodate: fabrication and construction tolerances; live load deflection, shrinkage and creep of the primary building structure; and other anticipated building movements. Live load deflections exceeding 3/8" may require special design considerations.
3. Thermal Movements: Allow for in-plane thermal movements resulting from a minimum of 80° F (26 ° C) annual ambient temperature range or as applicable, based on geographical location and project specific requirements.
4. Fire:

Flame Propagation

NFPA 285 Engineering Compliance Analysis – 4/11/19 - COMPLIANT

Fire Resistance

ASTM E-119 Fire Test Report – 9/6/18 – ONE-HOUR FIRE RATING

ASTM E-2226 Application of Hose Stream – 9/6/18 - PASSED

1.4 SUBMITTALS

A. Retain quality control records and certificates of compliance for five years or period of warranty, whichever is greater.

B. Submit mix designs, shop drawings, samples and certifications as indicated below:

1. Mix Designs: For each mix designed for a compressive strength of 5,000 psi (34.47 megapascals) @ 28 days when tested in accordance with ASTM C39, provide test results & other required data in accordance with ACI 301 and ACI 318.
2. Shop Drawings: Detail the fabrication and installation of SlenderWall® Prefabricated Exterior Wall Panel units. Indicate member locations, plans, elevations, dimensions, shapes & cross sections, aesthetic intent (including joints, reveals, extent & location of each surface finish), details at building corners, interfaces with other materials, and connection details.
3. Samples: For initial verification of aesthetic design intent, submit two (2) design reference samples approximately 12 X 12 X 1-1/2 inches (300 X 300 X 38 mm), representative of finishes, color, and textures of exposed surfaces for SLENDERWALL® units. For each Architectural Precast Concrete Brick (APCB) finish, show the full range of color and texture expected.
4. Welding Certificates: Copies of welding procedure, specifications, and personnel certification per applicable AWS (American Welding Society) standards, Latest Edition.
5. Material Compliances: Provided by manufacturer and/or supplier certifying that each of the following items complies with requirements.
 - a. Cement (each type) - location of source mill or pit
 - b. Aggregate (each type)
 - c. Reinforcing Bars
 - d. Welded Wire Fabric
 - e. PVA Fiber
 - f. Welding Electrodes
 - g. Steel Framing
 - h. Inserts, Mechanical Fasteners, and Anchors
 - i. Form Release Agents, Coatings and Paint

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications:

1. A firm that is licensed by Easi-Set Industries® and
2. A member of either PCI (Precast/Prestressed Concrete Institute) or NPCA (National Precast Concrete Association) with a certified plant and who could be licensed by Easi-Set Industries®

B. Erector Qualifications:

1. Precast concrete erectors certified by PCI (Precast/Prestressed Concrete Institute) in Category A or S1 or S2, or
2. Precast concrete erectors certified by another national or international certification organization, or
3. Precast concrete erectors who have a minimum of 5-years' experience installing SLENDERWALL® or have shown competence to work to standards for the erection of architectural precast concrete panels

C. Design Standards: Comply with ACI 318 (ACI 318M), AISC requirements, and Easi-Set Worldwide® SLENDERWALL® Technical Design Guide.

D. Quality Control Standard: Manufacturing processes, testing requirements, quality control procedures, and dimensional tolerances for SLENDERWALL® units are required to be in accordance with NPCA's Quality Control Manual for Precast and Prestressed Concrete Plants," or PCI's MNL 117, "Manual for Quality Control for Plants and Production."

E. Welding: Qualify procedures and personnel according to AWS D1.1, AWS D1.3, and AWS D1.4 "Structural Welding Code – Steel.

F. Sample Panels: After the sample is approved and before fabrication of SlenderWall® units begins, produce per Project Specification, a minimum of one sample panel approximately 16 square feet (48" x 48") in size or the first-cast production panel for review by the Architect. This panel will be viewed at the SLENDERWALL® fabricator's plant.

G. Pre-installation Conference: Conduct conference at project site in accordance with requirements contained in contract provisions.

H. Source Quality Control

1. **Quality Control Testing:** Test and inspect precast concrete in accordance with plant certification or contract requirements.
2. **Quality Control Inspection:** QC personnel must have met the minimum training requirements as defined in NPCA's Quality Control Manual, Section 1.1.3, Latest Edition, or equivalent.
3. **Strength of precast concrete units** will be considered deficient, if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.
4. **Testing:** If there is evidence that the concrete strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, in accordance with ASTM

C42/C42M, Precaster will prepare and test cores from hardened concrete to determine compressive strength.

- a. A minimum of three representative samples will be taken from units of questionable strength.
- b. Cores will be tested in an air-dry condition.
- c. Strength of concrete for each series of three 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.

5. Non-Conforming Work: SLENDERWALL® units that do not comply with project acceptability requirements including concrete strength, manufacturing tolerances, and color & texture range are unacceptable. Chipped, spalled or cracked units may be repaired, if the repaired units are restored to meet or exceed the original design specifications and they match the visual mockup.

I. Field Quality Control

1. Testing: Owner/Contractor to engage a qualified independent testing and inspecting agency to perform field tests and inspections, at owner's expense.
2. Field welds will be subject to visual weld inspections per applicable AWS standards, Latest Edition, and non-destructive testing in accordance with ASTM E165/165M or ASTM E709/E709M in conformance with the requirements of the contract documents.
3. Testing agency will report test results promptly and in writing to Erector, General Contractor and Fabricator.
4. Repair or remove and replace work that does not comply with specified requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Store units in a vertical position (not flat on concrete surface of frame) with adequate dunnage, bracing, and protection to prevent contact with soil or potentially staining materials and to prevent cracking, distortion, warping or other physical damage.
- B. Store units, unless otherwise specified, using non-staining resilient supports. Ensure that panels rest on the precast concrete edge and not the steel stud frame, unless special loading design considerations have been incorporated into the systems to accept frame loading.
- C. Position stored units so that identification marks are clearly visible, and product can be inspected.
- D. Deliver SLENDERWALL® units to the project site in such quantities and at such times to ensure compliance with the agreed-to construction schedule and in the proper setting sequence so as to limit temporary unloading of the units.

E. Handle and transport units in a vertical position consistent with their shape and design to avoid excessive stresses which would cause cracking or damage.

F. Lift and support units only at designated points as 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.

1.7 SEQUENCING

A. Furnish loose connection hardware and anchorage items, as required by contract, to be embedded in or attached to support structure “by others” without delaying the work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

A listing of currently approved licensed producers can be found at www.SlenderWall.com, “Contact” tab then “Locate Manufacturer” tab.

2.2 MATERIALS

A. Molds (Forms)

1. Molds: Use rigid, dimensionally stable, non-absorptive and non-reactive to concrete, and warp and buckle-free materials which can provide continuous, true precast concrete surfaces with required finishes within the fabrication tolerances indicated.

2. Liners: Resulting face designs, textures, arrangements, and configurations are to match the precast concrete design reference sample. Provide solid backing and form supports to ensure that form liners remain in place during concrete placement. Use 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. For guidance on liner relief depth, see Technical Design Guide - Design Considerations.

3. Surface Retarder: Utilize chemical-set retarder capable of temporarily delaying hardening of newly placed concrete mix to depth of specified reveal.

B. Reinforcing

1. Reinforcing Bars - Steel Reinforcement: ASTM A615/A 615M, Grade 60 or A706, Grade 60 galvanized or epoxy coated, deformed except where plain bars are indicated.

2. Plain and Deformed Zinc Coated (Galvanized) Steel Welded Wire Reinforcement: ASTM A1060 chromate treated.

3. PVA fiber: Nycon Corp. PVA RECS 15 8mm, or equivalent.

4. Supports: Use chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place according to NPCA's "Quality Control Manual for Precast and Prestressed Concrete Plants," or PCI's MNL 117, "Manual for Quality Control for Plants and Production.". Use epoxy coated annealed type tie wire or stainless steel tie wire 16.5 gauge or heavier.

C. Metal Framing

1. General: Provide all steel framing members with ASTM A924/A924M, G90, galvanized coating unless otherwise indicated.

2. Metal Framing and Associated Hardware:

a. Stud Framing Members: 16 Gauge 6" or 14 Gauge 4" typical, formed from steel that corresponds to requirements of ASTM C955/C955M, A653/A653M, with a minimum yield of 50,000 psi. Use heavier gauge, if required by design. In some instances, stud framing may vary in thickness or structural members may be used to accommodate specific design requirements.

b. Track: 14 Gauge 6" or 12 Gauge 4" typical, galvanized formed steel members. Use heavier gauge, if required by design. In some instances, track framing may vary in thickness or structural members may be used to accommodate specific design requirements.

c. Bridging and Accessories: additional structural members which may vary in thickness to meet specific design requirements

d. Provide stainless steel headed-stud fasteners or stainless steel refractory fasteners, as required.

D. Concrete Materials (as required)

1. Portland Cement: ASTM C150/C150M, Type I, II or III.

2. Normal-Weight Aggregates: Except as modified by ASTM C33/C33M, 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.

3. Integral water repellent admixture: BASF Masterbuilders MasterPel 200HD, or equivalent.

4. Coloring Admixture: ASTM C979/C979M, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable and non-fading.

5. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete.

6. Air Entraining Admixture: ASTM C260/C260M, certified by manufacturer to be compatible with other required admixtures, with not more than 0.1% of soluble chloride ions by weight of cement.

7. Water-Reducing Admixture: ASTM C494/C494M, Type A

8. Retarding Admixture: ASTM C494/C494M, Type B

9. Specific Performance Admixture ASTM C494/C494M Type S
10. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
11. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
12. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G
13. Plasticizing Admixture for Flowable Concrete: ASTM C1017/C1017M
14. Admixtures containing calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture are not permitted.

E. Concrete Mixes

1. Prepare mix design, per Architect's suggested sample, to develop an approved sample for each type of concrete required.
2. Mix designs may be prepared by a qualified independent testing agency or by qualified precast plant personnel at SLENDERWALL® fabricator's option.
3. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318/ACI 318M or NPCA "Quality Control Manual for Precast and Prestressed Concrete Plants" when tested in accordance with ASTM C1218/C1218M.
4. Water Absorption: 6 percent maximum by weight or 14 percent maximum by volume, tested according to NPCA's "Quality Control Manual for Precast and Prestressed Concrete Plants" or PCI's MNL 117 "Manual for Quality Control for Plants and Production."
5. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with NPCA Quality Control Manual for Precast and Prestressed Concrete Plants and PCI MNL117.
6. When included in design mixes, add other admixtures to concrete mixes according to manufacturer's written instructions.
7. Mix and Material Adjustments: Provided there is no additional expense to the owner, 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.

F. Steel Connections

1. Carbon-Steel Shapes and Plates: ASTM A36/A 36M
2. Stainless-Steel Headed-Studs and Stainless-Steel Refractory Fasteners: ASTM A276/A276M, Proprietary grade, cold finished; AWS D1.6.

3. Carbon-Steel Structural Tubing: ASTM A500/A500M, Grade B.
4. Deformed Steel Wire or Bar Anchors: ASTM A496/A496M or ASTM A706/A706M, if required.
5. Carbon-Steel Bolts and Studs: ASTM A307/A307M, Grade A carbon-steel, hex-head bolts and studs; carbon-steel nuts (ASTM A563/A563M, Grade A); and flat, unhardened steel washers (ASTM F844), if required.
6. High Strength Bolts and Nuts: ASTM F3125/F3125M 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.
7. 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 / A153A153M, as applicable and/or electro-deposition according to ASTM B633/B633M, SC 3, Type 1 and 2.
8. Shop-Primed Finish: Prepare surfaces of non-galvanized steel items according to requirements in SSPC-SP 1 followed by SSPC-SP 3 and shop- apply red oxide primer SSPC-Paint 15 according to SSPC-PA 1.
9. Welding Electrodes: Comply with AWS standards.

G. Stainless-Steel Connections (Optional)

1. Stainless Steel Plate: ASTM A666/A66M, Type 304, of grade suitable for application, if required.
2. Stainless Steel Bolts and Studs: ASTM F593/F593M, 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.
3. Stainless Steel Framing Material: ASTM C955/C955M, A653/A653M and bearing the minimum yield of 50,000 psi mechanical properties for light gauge metal framing.

2.3 ACCESSORIES

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2.4 FABRICATION

- A. Molds

1. Construct molds that are mortar tight and of sufficient strength to withstand pressures due to concrete placement, vibration operations and temperature changes. The contact surfaces of molds should be coated with a release agent before casting.
2. Molds are to produce SLENDERWALL® units with the shapes, lines, and dimensions indicated within fabrication tolerances specified.

- a. Verify that dimension between bottom surface of the form and top of side rails complies with stud thickness and air gap as described by the Shop Drawing.
- b. Verify overall mold dimensions, including squareness, etc.

B. Panels/Units

1. Furnish loose hardware items, in accordance with approved plans, to include steel plates, clip angles, anchors, and other hardware shapes for securing SLENDERWALL® units to the structure.
2. Accurately position metal stud framing and anchorages and secure to formwork, as applicable.
3. Design SLENDERWALL® units to resist stripping, handling, transportation, and erection stresses.
4. Mix concrete according to the requirements of Section 2.2.E and this Section. After concrete batching, no additional water may be added.
5. Comply with requirements in ACI 304R for measuring, mixing, transporting, and placing concrete.
6. Place reinforcing, in the proper sequence, during the casting operation.
7. Thoroughly consolidate placed-concrete by internal and/or external vibration without dislocating or damaging built-in items.
8. Provide as-cast finishes for surfaces which are concealed.
9. Consolidate/trowel concrete around embedded anchors.
10. Finished concrete is to have a minimum total thickness after consolidation of 2 inches (50 mm), minus 3/8" (9.525 mm) max for rustications.
11. Comply with ACI 306.1R procedures for cold-weather concrete placement.
12. Comply with ACI 305R recommendations for hot-weather concrete placement.
13. Identify lift points for SLENDERWALL® units and orientation on 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.
14. Cure concrete 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.
15. Repair damaged SLENDERWALL® units to meet project acceptability requirements, in accordance with Section 1.5

NOTE: The sequence above defines the SLENDERWALL® Fabrication Best Practices. This sequence and process may be modified, if tests/products have been proven to perform as well as or better than the process defined above. Any new processes or deviations must be documented and submitted to Easi-Set for approval prior to use.

C. Fabrication Tolerances

1. Fabricate SLENDERWALL® units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with NPCA Quality Control Manual for Precast and Prestressed Concrete Plants MNL-135 (Latest Edition) position tolerances for cast-in items and the product tolerances identified below: Tolerances different than those contained in PCI MNL 117 and MNL-135 are identified.

a. Overall Height and Width of Units, Measured at the Face Exposed to View:
As follows:

1. 10 feet (3.048 m) or under, Plus or Minus 1/8 inch (± 3.175 mm).
2. 10 to 20 feet (3.048 to 6.096 m), plus or minus 3/16 inch (± 4.7625 mm) (different than PCI MNL-117 and MNL-135).
3. 20 to 40 feet (6.096 to 12.192 m), plus or minus 1/4 inch (± 6.35 mm).
4. Each additional 10 feet (3.048 m), plus or minus 1/16 inch (± 1.5875 mm).

b. Overall Height and Width of Units, Measured at the Face Not Exposed to View:
As follows:

1. 10 feet (3.048 m) or under, plus or minus 1/4 inch (± 6.35 mm).
2. 10 to 20 feet (3.048 to 6.096 m), plus or minus 5/16 inch (± 7.94 mm) (different than PCI MNL-117 and MNL-135).
3. 20 to 40 feet (6.096 to 12.192 m), plus or minus 3/8 inch (± 9.525 mm) (different than PCI MNL-117 and MNL-135).
4. Each additional 10 feet (3.048 m), plus or minus 1/8 inch (± 3.175 mm).

c. Overall Depth of Unit: Measured from Face of Precast to Back of Stud Frame varies as designed, plus 1/4 inch (+6.35 mm), minus 1/4 inch (-6.35 mm)

1. Architectural precast, plus 1/4 inch (+6.35 mm), minus 1/8 inch (-3.175 mm)
2. Thermal break, plus 1/8 inch (+3.175 mm), minus 1/4 inch (-6.35 mm)
3. Steel stud frame, ASTM C-955

d. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches (± 3.175 mm per 1.8288 m) or $\pm 1/2$ inch (± 12.7 mm) total, whichever is greater.

e. Length and Width of Bock-outs and Openings within One Unit: Plus or minus 1/4 inch (± 6.35 mm).

f. Bowing: Plus or minus $L/360$, maximum 1 inch (25.4 mm).

g. Local Smoothness: 1/4 inch per 10 feet (6.35 mm per 3.048 m).

h. Flatness: 1/16 inch per 12 inches (1.5875 mm per 304.8 mm) of distance from the nearest adjacent corner.

i. Dimensions of Architectural Features and Rustications: Plus or Minus 1/8 inch (\pm 3.175 mm).

j. Position Tolerances: For frame hardware as indicated on Shop Drawings.

k. Handling Devices: Plus or minus 3 inches (\pm 76.2 mm).

D. Finishes

1. 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 to match approved sample panels, first production panel and/or mock-ups, whichever is required and approved by the Architect.

a. Finish exposed top, bottom, and side surfaces of SLENDERWALL® units to match face-surface finish.

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 and anchor layouts showing the proper installation of each anchorage device.

3.2 INSTALLATION

A. Install connection hardware required for connecting SLENDERWALL® Prefabricated Exterior Wall Panel system to supporting members and backup structure.

B. Erect SLENDERWALL® units level, plumb and square within the specified tolerances as shown in Section 3.3. 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 Shop Drawings and Installation Notes. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting is 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 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 coat of galvanized repair paint to galvanized surfaces in conformance with ASTM A780 or re-prime damaged area as dictated by precast Shop Drawings.

4. Visually inspect all welds per AWS standard. Visually check all welds for completion and remove, re-weld or repair all defective welds

E. At bolted connections, use lock washers, tack welding, or other acceptable means to prevent loosening of nuts after final adjustment, per Erection Drawings, in accordance with the RCSC specification.

NOTE: Before welding, verify grade of the threaded rod. High strength materials, such as B7, cannot be welded without changing the material properties. In those instances, other methods of securing the nuts after final adjustment need to be used.

3.3 TOLERANCES

A. Erect SLENDERWALL® units level, plumb, square, true, and in alignment without exceeding the non-cumulative erection tolerances of NPCA's "Quality Control Manual for Precast and Prestressed Concrete Plants" or PCI's MNL 117, "Manual for Quality Control for Plants and Production" as shown below. Tolerances different than PCI MNL-117 and MNL-135 are identified.

1. Plan Location from Building Grid Datum: Plus or Minus 1/2 inch (± 12.7 mm).

2. Plan Location from Centerline of Steel: Plus or Minus 1/2 inch (± 12.7 mm).

3. Top Elevation from Nominal Top Elevation: As follows:
Exposed Individual Panel: Plus or Minus 1/4 inch (± 6.35 mm).
Non-exposed Individual Panel: Plus or Minus 1/2 inch (± 12.7 mm).

4. Support Elevation from Nominal Elevation: As follows:
a. Maximum Low: 1/2 inch (12.7 mm).
b. Maximum High: 1/4 inch (6.35 mm).

5. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet (30.48 m): 1 inch (25.4 mm).

6. Plumb in any 10 Feet (3.048 m) of Element Height: 1/4 inch (6.35 mm).

7. Maximum Jog in Alignment of Matching Edges: As follows:
a. Exposed Panel Relative to Adjacent Panel: 1/4 inch (6.35 mm).
b. Non-exposed Panel Relative to Adjacent Panel: 1/2 inch (12.7 mm).

8. Joint width (governs over joint taper): Plus or Minus 1/4 inch (± 6.35 mm).

9. Maximum Joint Taper: 3/8 inch (9.525 mm).

10. Joint Taper in 10 Feet (3.048 m): 1/4 inch (6.35 mm)..

11. Maximum Jog in Alignment of Matching Faces: 1/4 inch (6.35 mm).

12. Differential Bowing or Camber, as Erected, between Adjacent Members of Same Design: 1/4 inch (6.35 mm).

13. Opening Height between Spandrels: Plus or Minus 1/4 inch (\pm 6.35 mm).

3.4 REPAIRS

A. Structural repairs will be permitted provided they do not impact the structural adequacy of SLENDERWALL® units. Repair procedures to be as designed by the Precast Engineer and to be approved by the Engineer of Record.

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 dry conditions with 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 steel components with same type of shop primer.

E. Remove and replace damaged SLENDERWALL® units that, when repaired, do not meet requirements.

3.5 CLEANING

A. Clean all surfaces of SLENDERWALL® to be exposed to view in the final condition, as necessary, prior to shipping.

B. General contractor to protect and/or clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from precast concrete surfaces immediately.

C. Clean exposed surfaces of SLENDERWALL® units after erection to remove marks, and stains created during the shipping and erection processes.

NOTE: If you are designing SLENDERWALL® for use outside North America, contact Easi-Set Industries® to discuss your region-specific guidelines.



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