



Building with conscience.

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## **Sto Guide Specification 6200 StoPowerwall® ci for Frame Wall Construction (Insulation Inbound of Sheathing)**

### **Section 09 24 23 – Portland Cement Stucco**

*This guide specification is intended for use by the design/construction professional and any user of Sto products to assist in developing project specifications for a stucco wall assembly applied to code compliant steel frame wall construction. Notes in Italics, such as this one, are explanatory and intended to guide the design/construction professional and user in the proper selection and use of materials.*

*The StoPowerwall ci (continuous insulation) incorporates Sto GPS Board, a graphite enhanced polystyrene (GPS) insulation board, as the ci component of the wall assembly, positioned inbound of glass mat faced gypsum sheathing directly over steel studs. StoGuard air and water-resistive barrier is applied over sheathing, and functions in tandem with other compatible air barrier and flashing components of the building envelope to resist air and water infiltration. A code compliant asphalt saturated felt or paper WRB is included in the assembly and similarly functions in tandem with flashing to resist water infiltration. Sto DrainScreen creates a cavity behind the stucco cladding to promote drainage and drying of the wall assembly in the event of incidental water infiltration through the stucco.*

*StoPowerwall Stucco is an ASTM C926 compliant stucco and is applied over code compliant metal plaster base. Sto exterior primers and finishes, including Sto textured finishes, Sto specialty finishes, and StoCast finishes, complete the exterior stucco wall assembly. The StoPowerwall ci (Inbound) System has been tested in accordance with NFPA 285 for use on noncombustible construction and can be installed on non-load bearing steel frame 1-hour rated base wall assembly designs without reducing the 1-hour rating. A 2-hour rating can be achieved with two layers of  $5/8$ -inch (16mm) Type X gypsum sheathing on the exterior and two layers of  $5/8$ -inch (16mm) Type X gypsum wallboard on the interior.*

*Portland cement stucco has limitations, for example, efflorescence is a normal occurrence in portland cement-based materials and can affect final appearance of finish products installed over stucco. Some degree of cracking is normal in portland cement stucco and should be expected. Cracking is generally not caused by a material defect in the stucco and can be minimized by following sound design and construction practice such as the proper installation of lath, the proper incorporation of stress relief joints in the construction, properly graded sand for field mixed stucco, moist curing of the stucco after it has been applied, and proper sequencing of construction to avoid stresses in the freshly placed stucco. Surface alkalinity (pH) is an important consideration for stucco surfaces that will receive acrylic or acrylic elastomeric finishes and should be checked to verify pH less than 10 before primer or finish is applied. StoPrime Hot is the preferred primer for use on stucco surfaces to "mask" surface alkalinity. Refer to Sto Tech Hotline No. 1202-CF, [Alkaline Substrates and Polymeric Finishes](#).*

*StoPowerwall ci, as with any exterior wall assembly, requires proper design detailing and integration with other components, in particular flashing and air barrier transition materials, to provide a wall assembly that resists air leakage and water infiltration. The weather protection afforded by StoPowerwall ci should be evaluated by the design/construction professional in relation to building design, height, orientation, climate zone, and any other factors that affect the severity of exposure to rain and water infiltration. Refer to Sto Tech Hotline Nos. 0403-BSc, [Critical Detail Checklist for Wall Assemblies](#), 0603-BSc, [Moisture Control Principles for Design and Construction of Wall Assemblies](#), and 1001-BSc, [Effects of Temporary Heating on Construction Materials in Cold Weather](#). Modifications should be made to this specification as deemed necessary by the design/construction professional to ensure a watertight building envelope without water entry or accumulation within the wall assembly, an airtight building envelope, and control of condensation from water vapor diffusion.*

*Other StoPowerwall Systems: for wall assemblies without ci, refer to StoPowerwall DrainScreen specifications where a drainage gap is required, and StoPowerwall specifications where no drainage gap is required. Refer to StoPowerwall HVHZ System approvals where resistance to High Velocity Hurricane Zone wind is necessary, such as Miam-Dade County, FL. Refer to StoPowerwall ExtraSeal*

*specifications for direct application to concrete or concrete masonry (CMU) substrates. For complete technical information on these stucco systems, refer to the technical information available at [www.stocorp.com](http://www.stocorp.com).*

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

- A. Materials and installation of exterior stucco wall covering with continuous insulation inbound of sheathing, air and water-resistive barrier (AWRB), and drainage mat for use on frame wall construction

### 1.02 RELATED SECTIONS

*Add/delete, depending on specific project requirements*

- A. Section 03 30 00 Cast-In-Place Concrete
- B. Section 04 20 00 Unit Masonry
- C. Section 06 16 00 Sheathing
- D. Section 07 21 00 Thermal Insulation
- E. Section 07 26 00 Vapor Retarders
- F. Section 07 27 00 Air Barriers
- G. Section 07 50 00 Membrane Roofing
- H. Section 07 62 00 Sheet Metal Flashing and Trim
- I. Section 07 84 00 Firestopping
- J. Section 07 92 00 Joint Sealants
- K. Section 08 40 00 Entrances, Storefronts, and Curtain Walls
- L. Section 08 50 00 Windows

### 1.03 REFERENCED DOCUMENTS

*Add/delete depending on specific project requirements*

- A. ASTM Standards:
  - 1. A641 Standard Specification for Zinc-Coated (Galvanized ) Carbon Steel Wire
  - 2. A653 Specification for Sheet Steel Zinc coated (Galvanized) by the Hot-Dip Process, Commercial Quality
  - 3. B69 Specification for Rolled Zinc
  - 4. C144 Specification for Aggregate for Masonry Mortar
  - 5. C297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
  - 6. C578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
  - 7. C612 Specification for Mineral Fiber Block and Board Thermal Insulation

8. C847 Standard Specification for Metal Lath
9. C897 Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters
10. C920 Standard Specification for Elastomeric Joint Sealants
11. C926 Standard Specification for Application of Portland Cement-Based Plaster
12. C954 Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in Thickness
13. C1002 Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
14. C1063 Standard Specification for Installation of Lathing and Furring for Portland Cement Plaster
15. C1177 Specification for Glass Mat Gypsum for Use as Sheathing
16. C1513 Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections
17. D226 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
18. D1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
19. C1861 Standard Specification for Lathing and Furring Accessories, and Fasteners, for Interior and Exterior Portland Cement-Based Plaster
20. D4541 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
21. E84 Test Method for Surface Burning Characteristics of Building Materials
22. E96 Standard Test Methods for Water Vapor Transmission of Materials
23. E283 Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
24. E330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
25. E331 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
26. E783 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
27. E2178 Standard Test Method for Air Permeance of Building Materials
28. E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
29. E2430 Standard Specification for Expanded Polystyrene ("EPS") Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems ("EIFS")
30. F1667 Standard Specification for Driven Fasteners: Nails, Spikes, and Staples
31. G154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

**B. APA Engineered Wood Association**

1. PS 1 Voluntary Product Standard, Structural Plywood
2. PS 2 Performance Standard for Wood-Based Structural-Use Panels
3. E 30 APA Engineered Wood Construction Guide

**C. AISI (American Iron and Steel Institute)**

1. AISI S200-2016 North American Standard for Cold-Formed Steel Framing-General Provisions

**D. ICC (International Code Council)**

1. 2018 and 2021 IBC (International Building Code)
2. 2018 and 2021 IRC (International Residential Code)

**E. ICC-ES (International Code Council Evaluation Service)**

1. AC11, Cementitious Exterior Wall Coatings
  2. AC38, Acceptance Criteria for Water-resistive Barriers
  3. AC212, Acceptance Criteria for Water-resistive Coatings used as Water-resistive Barriers over Exterior Sheathing
  4. ICC ESR-1233: StoGuard Air and Water-Resistive Barrier System and StoEnergy Guard (StoGuard with Continuous Insulation)
  5. ICC ESR-2323: StoPowerwall One Coat Stucco System
- F. IAPMO (International Association of Plumbing and Mechanical Officials)
1. IAPMO ER 2017: Structalath No. 17 SFCR Twin Track 2.5
  2. IAPMO ER 382: Western 1-Kote Exterior Stucco System
- G. National Fire Protection Association (NFPA) Standards
1. NFPA 285, Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Non-Load-Bearing Wall Assemblies containing Combustible Components Using the Intermediate-Scale, Multistory Test Apparatus
  2. NFPA 268, Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
- H. 2022 New York City Building Code
- I. South Coast Air Quality Management District (South Coast AQMD)
1. Rule 1113 (2019) – Building Envelope Coatings, Architectural Coatings
- J. Sto Corp. Publications
1. Sto RapidGuard: Installation Guide
  2. StoGuard Conformable Membrane: Installation Guide
  3. StoPowerwall ci Design Guide and Detail Booklet
  4. StoShield Self-Adhered Membrane: Installation Guide
  5. StoCast Brick: Application Guide
  6. StoCast Wood: Application Guide
- K. US EPA (United States Environmental Protection Agency)
1. 40 CFR Part 59 (Code of Federal Regulations Title 40 Part 59 – National Volatile Organic Compound Emission Standards for Consumer and Commercial Products)

## **1.04 DESIGN REQUIREMENTS**

- A. Structural (wind and axial loads)
1. Design for maximum allowable deflection, normal to the plane of the wall of L/360
  2. Design for wind load in conformance with code requirements
  3. Metal framing: minimum 18 gage (43 mils [1.09mm]), maximum 1-5/8-inch flange width, cold formed steel stud framing in conformance with AISI Standard S200-16
  4. Maximum stud spacing: 16-inches (406mm) on center
  5. Sheathing: minimum 5/8-inch (19mm) glass mat faced gypsum sheathing in conformance with ASTM C1177
  6. Insulation board: minimum 1-inch (25 mm), maximum 3-inch (76 mm) graphite enhanced polystyrene (GPS) in conformance with ASTM C578 Type 1 requirements

7. Drainage mat:  $\frac{1}{4}$ -inch or  $\frac{3}{8}$ -inch (6mm or 10mm) thick tangled filament core with fabric facing
8. Metal Lath: minimum 2.5 lb / yd<sup>2</sup> (1.4 kg / m<sup>2</sup>) self-furred galvanized steel diamond mesh metal lath in conformance with ASTM C847 or equivalent self-furring welded wire lath
9. Lath fasteners and plates: corrosion resistant fasteners in conformance with ASTM C954, ASTM C1002, or ASTM F1667 with minimum three thread penetration through steel framing members, and minimum 1- $\frac{1}{4}$ -inch (32mm) corrosion resistant lath plates. Minimum fastener size and length:
  - #8 x 3-inch (76mm) for 1-inch (25mm) insulation board thickness
  - #10 x 3- $\frac{1}{2}$  -inches (89mm) for 1- $\frac{1}{2}$ -inch (38mm) insulation board thickness
  - #10 x 4-inch (102mm) for 2-inch or 2- $\frac{1}{8}$ -inch (51mm or 54mm) insulation board thickness
  - # 10x 5-inch (127mm) for 2- $\frac{1}{2}$ -inch or 3-inch (64mm or 76mm) insulation board thickness
  - Wood Framing--minimum #10 Type S wafer head corrosion resistant screws with minimum 1-inch (25 mm) penetration into studs.
10. Lath fastener spacing: maximum 6-inches (152mm) vertically along studs
11. Stucco:  $\frac{3}{4}$ -inch (19mm) or  $\frac{7}{8}$ -inch (22mm) StoPowerwall portland cement stucco in conformance with ASTM C926 of uniform thickness applied in two coats, scratch and brown coat.

**B. Moisture Control**

1. Prevent the accumulation of water into or behind the stucco, either by condensation or leakage into the wall construction, in the design and detailing of the wall assembly:
  - a. Provide corrosion resistant flashing to protect exposed elements and to direct water to the exterior, including, above window and door heads, beneath window and door sills, at floor lines, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, and at the base of the wall.
  - b. Air Leakage Prevention-prevent excess air leakage in the design and detailing of the wall assembly. Provide continuity between air barrier components in the wall assembly, and connections and tie-ins with foundation and roof air barrier components.
  - c. Vapor Diffusion and Condensation - perform a dew point analysis of the wall assembly to determine the potential for accumulation of moisture in the wall assembly as a result of water vapor diffusion and condensation. Adjust wall assembly components accordingly to minimize the risk of condensation. Avoid the use of vapor retarders on the interior side of the wall in hot, humid climates.
  - d. Provide StoGuard air and water-resistive barrier over sheathing.
  - e. At through wall expansion joints and at joints formed with back-to-back casing beads, back joints with StoGuard Conformable Membrane. Refer to Sto Guide Details at [www.stocorp.com](http://www.stocorp.com).
  - f. Seal stucco terminations and accessory butt joints with appropriate sealant. Seal all penetrations through the stucco wall assembly with appropriate backer and sealant, as dictated by joint type.

**C. Grade Condition**

1. Do not specify stucco for use below grade or on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 4-inch (100mm) clearance above earth grade, minimum 2-inch (51 mm) clearance above finished grade (pavers/sidewalk). Provide increased clearance in freeze/thaw climate zones.

**D. Sloped surfaces, Including GPS or EPS Foam Trim and Projecting Architectural Features Attached to Stucco.**

1. Avoid the use of stucco on build-outs or weather exposed sloped and horizontal surfaces (refer to 2 and 3 below).
2. Build out trim and projecting architectural features from the stucco wall surface with code compliant GPS or EPS foam. All foam trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All foam horizontal reveals must have a minimum 1:2 [27°] slope along their bottom surface. Increase slope for northern climates to prevent accumulation of ice/snow and water on surface.

Where trim/feature or bottom surface of reveal projects more than 2-inches (51mm) from the face of the wall plane, protect the top surface with waterproof base coat. Limit foam thickness to a maximum of 4-inches (102mm). Periodic inspections and increased maintenance may be required to maintain surface integrity of finishes on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate maintenance and minimize maintenance burden. Refer to Sto Guide Details at [www.stocorp.com](http://www.stocorp.com)

3. Do not use foam on weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing. Refer to Sto Guide Details at [www.stocorp.com](http://www.stocorp.com)

E. Joints and Accessories

1. Provide two-piece expansion joints or back-to-back casing beads in the stucco system where building movement is anticipated: at joints in the substrate or supporting construction, where the system is to be installed over dissimilar construction or substrates, at changes in building height, at floor lines, at columns and cantilevered areas. Where casing bead is used back-to-back at the expansion joint, back the joint with StoGuard Conformable Membrane.
2. Provide one piece expansion joints every 144 ft<sup>2</sup> (13m<sup>2</sup>). Cut and wire tie lath to the expansion joint accessory so lath is discontinuous at or beneath the accessory. Do not exceed length to width ratio of 2-1/2:1 in expansion joint layout and do not exceed more than 18 feet (5.5m) in any direction without an expansion joint. Where casing bead is used back-to-back as the expansion joint, back the joint with StoGuard Conformable Membrane.
3. Provide one piece expansion joints at through wall penetrations, for example, above and below doors or windows.
4. Provide minimum 1/2-inch (12mm) wide joints where the system abuts windows, doors and other through wall penetrations.
5. Provide appropriate accessories at stucco terminations and joints.
6. Avoid the use of channel reveal accessories which can interfere with proper drainage and proper stress relief.
7. Provide appropriate sealant at stucco terminations and at stucco accessory butt joints.
8. Indicate location of joints, accessories and accessory type on architectural drawings.

F. Fire Protection

1. Provide 15-minute thermal barrier, typically minimum 1/2-inch (51mm) thick interior gypsum wall board, to separate foam plastic insulation from interior.
2. Noncombustible Type Construction:
  - a. Provide full width interior wall firestops at floor lines, typically 4 pcf (64 kg/m<sup>3</sup>) semi-rigid mineral wool, where metal framing runs continuously past floor line
  - b. Provide exterior fireblocking where required by local code jurisdiction
  - c. Provide minimum 3/4-inch (19mm) uniform stucco thickness (exclusive of finish).
3. Non-load Bearing Fire Resistant-Rated Wall Assemblies:
  - a. 1-hour rating: provide minimum 3/4-inch (19mm) uniform stucco thickness (exclusive of finish).
  - b. 2-hour rating: provide two layers of 5/8-inch (16mm) Type X gypsum sheathing on the exterior and two layers of 5/8-inch (16mm) Type X gypsum wallboard on the interior.
  - c. Provide minimum 3/4-inch (19mm) uniform stucco thickness (exclusive of finish) based on the applicable fire-resistance rated test wall, base wall assembly design, building code or UL listed design.

*Refer to ICC ESR 1233 for compliance with NFPA 285 and use on noncombustible wall construction. Refer to Sto Detail 62s.FP for the NFPA 285 listed assembly and a 1-hour non-load bearing fire resistance-rated assembly. The StoPowerwall ci Inbound System maintains the hourly fire-resistance rating of non-load bearing steel frame base wall assembly designs. Other assemblies may also be rated with the StoPowerwall ci Inbound System based on engineering judgements on file at Sto Corp. or by way of modeling or rational analysis applied to the particular assembly in question.*

- G. Stucco Thickness (does not include primer or textured finish coat)
  - 1. Application to Metal Plaster Bases: stucco thickness shall be uniform  $\frac{3}{4}$ -inch or  $\frac{7}{8}$ -inch (19mm or 22mm). Stucco thickness shall not exceed  $\frac{7}{8}$ -inch (22mm).
  - 2. Stucco shall be applied in 2 coats, scratch and brown coat, to achieve the prescribed thickness.
  - 3. Thickness shall be uniform throughout the wall area.

## 1.05 PERFORMANCE REQUIREMENTS

- A. Continuous Insulation
  - 1. GPS Insulation: compliance with ASTM C578 Type 1 requirements and listed by an approved agency
- B. Air and Water-Resistive Barrier
  - 1. Compliant with ICC ES Acceptance Criteria AC 212 (ICC ESR 1233)
  - 2. Material Air Leakage Resistance, ASTM E 2178: less than 0.02 L/s·m<sup>2</sup> (0.004 cfm/ft<sup>2</sup> at 1.57 psf)
  - 3. Assembly Air Leakage Resistance, ASTM E 2357: less than 0.2 L/s·m<sup>2</sup> (0.04 cfm/ft<sup>2</sup> at 1.57 psf)
  - 4. Vapor Permeable: Water Vapor Permeance, ASTM E 96, Method B: greater than 10 perms [572 ng/(Pa·s·m<sup>2</sup>)]
  - 5. Vapor Impermeable: Water Vapor Permeance, ASTM E96, Method A: less than 0.1 perm [5.72 ng/(Pa·s·m<sup>2</sup>)]
  - 6. Surface Burning, ASTM E84: Flame Spread less than 25, Smoke Developed, less than 450, Class A Building Material
  - 7. Tensile Adhesion, ASTM C297: greater than 15 psi (103kPa)
  - 8. VOC, calculation:
    - a. Less than 50 g/L
    - b. Compliant with US EPA 40 CFR 59 for Waterproofing Sealer
    - c. Compliant with South Coast AQMD Rule 1113 for Building Envelope Coating
- D. Drainage Mat
  - 1. Surface Burning, ASTM E 84: Flame Spread less than 25, Smoke Developed less than 450, Class A Building Material
  - 2. Flame Propagation, NFPA 285: meets requirements for use on noncombustible construction, Types I and II
- C. Stucco Base

*Review and select one based on job conditions. Pre-blended stucco provides greater quality control than stucco concentrates by eliminating field mixing of sand at the job site.*

- 1. Portland cement stucco pre-bend with properly graded sand in compliance with ASTM C926
- 2. Portland cement stucco concentrate in compliance with ASTM C926 and AC11 with field added sand in compliance with ASTM C897 or ASTM C144
- 3. Portland cement stucco scratch and brown coat concentrate in compliance with ASTM C926 with field added sand in compliance with ASTM C897 or ASTM C144.

### D. Stucco Primers

*Review and select one based on desired attributes. Refer to Product Bulletins for more detailed information*

- 1. Alkaline resistant acrylic-based primer for freshly placed (minimum 4 day old) stucco surfaces with alkaline resistance up to pH13, Class A building material with VOC less than 50 g/L

2. Standard acrylic-based primer for fully cured (minimum 28 day old) or stucco surfaces with pH less than 10, Class A Building Material with VOC less than 50 g/L

E. Stucco Textured Finishes

*Review and select one of the textured finishes based on desired attributes. Refer to Product Bulletins for more detailed information*

1. Super-hydrophobic vapor permeable acrylic textured finish with Lotus-Effect® Technology, Class A building material with VOC less than 50 g/L
2. Hydrophobic vapor permeable acrylic textured finish, Class A building material with VOC less than 50 g/L
3. Flexible vapor permeable acrylic textured finish, Class A building material with VOC less than 50g/L
4. Standard vapor permeable acrylic textured finish, Class A building material with VOC less than 50 g/L
5. Silicone enhanced acrylic elastomeric textured finish, Class A building material with VOC less than 50 g/L
6. Acrylic elastomeric textured finish, Class A building material with VOC less than 50 g/L

F. Pre-Formed Veneer Units

1. StoCast Brick, vapor permeable wood grain resin cast Class A building material
2. StoCast Wood, vapor permeable resin cast thin brick Class A building material

G. Specialty Finishes

1. Sto Signature Series or Sto Specialty aggregate finishes, Class A building materials

## **1.06 SUBMITTALS**

- A. Manufacturer's specifications, details, installation instructions and product data.
- B. Manufacturer's code compliance report and UL Listing for continuous insulation component
- C. Manufacturer's code compliance report for air and water-resistive barrier or supporting data
- D. Manufacturer's NFPA 285 assembly report or ICC ES Evaluation Report indicating compliance of stucco assembly, including continuous insulation, exterior fireblocking (where required by local code jurisdiction), air and water-resistive barrier, and drainage mat, with requirements of NFPA 285 for use on noncombustible construction.
- E. Manufacturer's standard warranty
- F. Samples for approval as directed by architect or owner
- G. Fastener manufacturer's pull-out or withdrawal capacity for applicable substrates
- H. Prepare and submit project-specific details (when required by contract documents)

## **1.07 QUALITY ASSURANCE**

- A. Manufacturer requirements
  1. Stucco and air barrier products manufacturer for a minimum of thirty (30) years.
  2. Stucco finish products and air and water-resistive barrier products manufactured under ISO 9001 Quality System and 14001 Environmental Management System.



- B. Contractor requirements
  - 1. Licensed, insured and engaged in application of portland cement stucco for a minimum of three (3) years.
  - 2. Knowledgeable in the proper use and handling of Sto materials.
  - 3. Employ skilled mechanics who are experienced and knowledgeable in portland cement stucco application, and familiar with the requirements of the specified work.
  - 4. Successful completion of minimum of three (3) projects of similar size and complexity to the specified project.
  - 5. Provide the proper equipment, manpower and supervision on the job site to install the system in compliance with Sto's published specifications and details and the project plans and specifications.
- C. Foam plastic insulation board manufacturer requirements
  - 1. Listed by an approved agency. Label insulation board with information required by Sto, the approved listing agency, and the applicable building code.
- D. Testing
  - 1. Construct full-scale mock-up of typical stucco/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E283, E331 and E330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
  - 2. Conduct air barrier adhesion testing in accordance with ASTM D4541.
  - 3. Conduct air barrier assembly testing in accordance with ASTM E783.
  - 4. Verify adequacy of pull-out or withdrawal capacity of fasteners used for frame construction with manufacturer in relation to negative design wind pressures.
  - 5. Conduct pH testing to check stucco surface alkalinity before application of primer or finish materials. Where alkaline resistant primer is used pH testing may be waived.
  - 6. Conduct wet sealant adhesion testing in accordance with sealant manufacturer's field quality control test procedure.
  - 7. Notify design professional minimum 7-days prior to testing.
- E. Inspections
  - 1. Provide independent third-party inspection where required by code or contract documents.
  - 2. Conduct inspections in accordance with code requirements and contract documents.

## **1.08 DELIVERY, STORAGE AND HANDLING**

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product.
- B. Protect foam plastic insulation materials from prolonged UV exposure, keep away from sources of heat, sparks, flame, flammable or volatile materials. Store on a clean, flat surface, off the ground in a dry area. Store mineral wool insulation inside off the ground on pallets. Keep dry and away from direct sun exposure. If stored outside, cover with tarps and ventilate to prevent water infiltration and extended exposure to sun. Store on a solid, flat surface at least 4 inches (102mm) above dry ground. Protect from mechanical damage.
- C. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32°C). Store away from direct sunlight.

- D. Protect portland cement-based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.
- E. Protect gun grade air barrier detailing products and sealant products from freezing and temperatures in excess of 90°F (32°C). Store away from direct sunlight and from sources of ignition.
- F. Handle and store all products as directed on labeling.

## **1.09 PROJECT/SITE CONDITIONS**

*Weather conditions affect application, drying time and curing requirements. Hot or dry conditions limit working time and accelerate drying and may require adjustments in application, scheduling and curing to achieve desired results; cool or damp conditions extend working time and retard drying (except for STPE products which cure faster with moisture) and may require added measures of protection against wind, dust, dirt, rain and freezing*

- A. Maintain ambient and surface temperatures above 40°F (4°C) during application and for 24 hours after set of stucco, and during application and curing of air and water-resistive barrier and finish materials.
- B. Provide supplementary heat for installation in temperatures less than 40°F (4°C) such that material temperatures are maintained as in 1.09A. Prevent concentration of heat on uncured stucco and vent fumes and other products of combustion to the outside to prevent contact with stucco.
- C. Prevent uneven or excessive evaporation of moisture from stucco during hot, dry or windy weather. For installation under any of these conditions provide special measures to properly moist cure the stucco. Do not install stucco if ambient temperatures are expected to rise above 100°F (38°C) within a 24-hour period.
- D. Provide protection of surrounding areas and adjacent surfaces from application of materials.

## **1.10 COORDINATION/SCHEDULING**

*The work in this section requires close coordination with related sections and trades. Sequence work to provide protection of construction materials from weather deterioration and damage from trades*

- A. Sequence work and schedule trades to allow for continuous insulation to be installed inbound of sheathing and in tandem with sheathing installation to prevent damage or deterioration of continuous insulation.
- B. Protect sheathing from climatic conditions to prevent weather damage.
- C. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.
- D. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier and continuous moisture protection. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall and provide sill flashing. Coordinate installation of air and water-resistive barrier components with window and door installation to provide weather proofing of the structure and to prevent moisture infiltration and excess air infiltration.
- E. Install window and door head flashing immediately after windows and doors are installed.
- F. Protect air and water-resistive barrier with paper or felt WRB within the period allowed by the manufacturer. Refer to manufacturer's published information. Protect paper or felt WRB from damage during construction
- G. Protect continuous insulation from prolonged UV exposure. Protect with wall covering within 30 days of installation.

- H. Protect mineral wool fireblocking (where required by local code jurisdiction) from water damage.
- I. Protect drainage mat with stucco cladding within 30 days of installation.
- J. Commence the stucco installation after completion of all floor and roof construction, and other construction that imposes dead loads on the walls to prevent excessive deflection (and potential cracking) of the stucco.
- K. Sequence interior work such as drywall installation prior to stucco installation to prevent stud distortion (and potential cracking) of the stucco.
- L. Provide site grading such that the stucco terminates above earth grade minimum 4-inches (100 mm) and above finished grade (pavers/sidewalk) minimum 2-inches (51 mm). Provide increased clearance in freeze/thaw climate zones.
- M. Install copings and sealant immediately after installation of the stucco and when finish coatings are dry.
- N. Attach penetrations through stucco to structural support and provide air-tight and watertight seals at penetrations.

#### **1.11 WARRANTY**

- A. Provide manufacturer's standard warranty.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Air and Water-Resistive Barrier, Exterior Fireblocking, Drainage Mat, Portland Cement Stucco, Stucco Primers, Stucco Finishes, Joint Sealant
  - 1. Sto Corp., 3800 Camp Creek Parkway, Building 1400, Suite 120. Atlanta, GA 30331
- B. Continuous Insulation
  - 1. GPS Board: Sto GPS Board as manufactured by Atlas Molded Products, A Division of Atlas Roofing Corporation, 8240 Byron Center SW, Byron Center, Michigan 49315, and furnished by Sto Corp.

#### **2.02 AIR AND WATER-RESISTIVE BARRIER**

- A. StoGuard Detail Components:
  - 1. Sto Gold Fill -- ready mixed acrylic based flexible joint treatment for rough opening protection, joint treatment of wall sheathing, CMU crack repair, and detail component for shiplap connections with flashing, weep screed, and similar ship lap details.
  - 2. StoGuard Mesh -- nominal 4.2 oz/yd<sup>2</sup> (142 g/m<sup>2</sup>), self-adhesive, flexible, symmetrical, interlaced glass fiber mesh, with alkaline resistant coating for compatibility with Sto materials, used with Sto Gold Fill to reinforce rough openings, inside and outside corners, sheathing joints, and shiplap connections with flashing, weep screed, and similar shingle lap details
  - 3. StoGuard Fabric -- nonwoven cloth reinforcement used with AWRB coatings for rough opening protection, joint treatment of wall sheathing, and detail component for shiplap connections with flashing, weep screed,

- and similar shingle lap details. StoGuard Redicorner is a preformed fabric piece used in the corners of rough openings in tandem with StoGuard Fabric for quicker installation
4. StoGuard Conformable Membrane - self-adhered membrane flashing used to: seal joints and seams in wall sheathing, seal static joints between dissimilar materials, flash exterior wall openings and protect rough openings, seal between window flange and wall sheathing, connect to above grade foundation waterproofing, connect to roof membrane, seal around wall penetrations such as pipes, scuppers, vents, back masonry wall ties, and seal dynamic joints in wall construction
  5. Sto RapidGuard® - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other static transitions in above grade wall construction such as: shingle lap over flashing, wall to balcony floor slab or ceiling, and through wall penetrations – pipes, electrical boxes, and scupper penetrations

*Note: verify adhesion to foundation waterproofing, roof membrane, and other proprietary substrates with lab and/or field adhesion tests*

B. Air & Water-Resistive Barrier Coating

*Choose one coating and select application by substrate, medium-Build, or high-build as indicated*

1. Sto Gold Coat: ready mixed vapor permeable air and water-resistive barrier coating applied,
  - a. By substrate as follows:
    - Glass Mat Gypsum: apply one coat at minimum 10 mils WFT
    - Plywood: apply one coat at minimum 10 mils WFT
    - Cement Board: apply one coat at minimum 10 mils WFT
    - OSB: apply one or two coats at minimum 20 mils WFT. If applied by roller, apply two coats. Touch up any bare spots and raised OSB strands.
    - CMU: apply two or three coats at minimum 20-60 mils WFT.
    - Concrete: apply one coat at minimum 10 mils WFT
  - b. To a medium build in one or two coats to achieve minimum 20 mils WFT. If applied by roller apply two coats to achieve minimum 20 mils WFT. For CMU substrates apply two or three coats to achieve 20-60 mils WFT.
  - c. To a high film build in two or three coats to achieve 40 mils WFT. If applied by roller apply three or more coats as needed. For CMU substrates apply multiple coats to achieve 40-60 mils WFT.
2. Sto AirSeal: ready mixed vapor permeable air and water-resistive barrier coating applied,
  - a. By substrate as follows:
    - Glass Mat Gypsum: apply one coat at minimum 20 mils WFT
    - Cement Board: apply one coat at minimum 20 mils WFT
    - OSB: apply one or two coats at minimum 20 mils WFT. If applied by roller, apply two coats. Touch up any bare spots and raised OSB strands.
    - Plywood: apply one coat at minimum 20 mils WFT
    - CMU: apply two or three coats at minimum 20-65 mils WFT.
    - Concrete: apply one coat at minimum 20 mils WFT
  - b. To a Medium-Build in one or two coats to achieve minimum 40 mils WFT. If applied by roller apply two coats to achieve minimum 40 mils WFT. For CMU substrates apply two or three coats to achieve 40-65 mils WFT.
  - c. To a High-Build in one, two or three coats to achieve minimum 65 mils WFT. If applied by roller apply minimum three coats to achieve minimum 65 mils WFT.

7. StoGuard VaporSeal: Class 1 vapor retarder coating for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, cementitious sheathing, and glass mat gypsum sheathing, applied by airless spray in one or two coats to achieve minimum 80 mils total WFT

*Silyl Terminated Polyether STPE AWRB limited to us on Type V, Combustible construction*

- C. Silyl Terminated Polyether (STPE) Air & Water-Resistive Barrier
  1. Sto Gold Seal STPE: vapor permeable moisture cured STPE air and water-resistive barrier coating applied in one or two coats by spray or roller at minimum 15 mils WFT to prepared vertical above grade glass mat gypsum sheathing, wood-based sheathing – plywood and OSB – cement board, concrete, and concrete masonry (CMU) wall construction.

*Self-Adhered AWRBs limited to us on Type V, Combustible construction*

- D. Self-Adhered Air and Water-Resistive Barrier
  1. StoShield SA VP: self-adhered vapor permeable membrane for use over prepared vertical above-grade glass mat gypsum sheathing, wood-based sheathing – plywood and OSB, cementitious sheathing, concrete, and concrete masonry wall construction
  2. StoShield SA NP: self-adhered vapor impermeable membrane for use over prepared vertical above-grade glass mat gypsum sheathing, wood-based sheathing – plywood and OSB – cementitious sheathing, concrete, and concrete masonry wall construction

## 2.03 CONTINUOUS INSULATION

- A. Sto GPS Board, nominal 1.0 lb/ft<sup>3</sup> (16 kg/m<sup>3</sup>) graphite enhanced polystyrene rigid foam plastic insulation board in compliance with ASTM C578 Type I requirements, R-4.7 per inch (RSI – 0.83 per 25mm), listed, labelled, and furnished in accordance with Section 1.07C.

## 2.04 FOAM ADHESIVE, CI SEAM AND GAP FILLER

- A. Sto TurboStick® – single component polyurethane foam adhesive for attaching foam insulation and filling seams and gaps in insulation board surface.

## 2.05 PAPER OR FELT WATER-RESISTIVE BARRIER

*Supplied by others*

- A. Minimum No. 15 asphalt saturated felt complying with ASTM D226, Type 1, or one layer of Grade D kraft building paper, or paper-backed stucco lath conforming with paragraph 2.08B.

## 2.06 DRAINAGE MAT

*Some building code jurisdictions require a 3/8-inch [10 mm] drainage gap. Check local codes and select Sto DrainScreen 10mm where required*

- A. Sto DrainScreen 6mm – nominal 1/4-inch (6mm) tangled filament core drainage mat with fabric facing
- B. Sto DrainScreen 10mm – nominal 3/8-inch (10 mm) tangled filament core drainage mat with fabric facing

## 2.07 LATH

*Supplied by others*

- A. Structalath SFCR Twin Track 2.5 self-furring welded wire lath. See IAPMO ER 2017.
- B. Minimum 2.5 lb./yd<sup>2</sup> (1.4kg/m<sup>2</sup>) self-furred galvanized steel diamond mesh metal lath in compliance with ASTM C847

*Note: metal lath is susceptible to corrosion in coastal environments. Provide weather protection to prevent moisture entry into wall construction as outlined in Design Requirements Section 1.04B. Consider the use of stainless steel lath for coastal environments. Exercise care when attaching metal lath and accessories through the air and water-resistive barrier so that fasteners go into [not between] framing supports. Do not use power, powder-actuated or other fastening tools/methods that can damage the air and water-resistive barrier or substrate.*

## 2.08 MECHANICAL FASTENERS FOR METAL LATH

*Supplied by others*

- A. Non-corroding fasteners in compliance with ASTM C954 or ASTM C1002:
  - 1. Wood Framing--minimum #10 Type S wafer head corrosion resistant screws with minimum 1-inch (25mm) penetration into studs.
  - 2. Steel Framing— corrosion resistant fasteners and plates with minimum three thread penetration beyond steel framing members, and with minimum fastener size and length of,
    - #8 x 3-inch (76mm) for 1-inch (25mm) insulation board thickness
    - #10 x 3-<sup>1</sup>/<sub>2</sub>-inches (89mm) for 1-<sup>1</sup>/<sub>2</sub>-inch (38mm) insulation board thickness
    - #10 x 4-inch (102mm) for 2-<sup>1</sup>/<sub>8</sub>-inch (54mm) insulation board thickness
    - # 10x 5-inch (127mm) for 2-<sup>1</sup>/<sub>2</sub>-inch or 3-inch (64mm or 76mm) insulation board thickness
    - Wood Framing--minimum #10 Type S wafer head corrosion resistant screws with minimum 1-inch (25mm) threaded penetration into studs.

*Note: pull-out or withdrawal capacity of the selected fastener must be verified with respect to design wind loads, required safety factor and building code requirements. Consult applicable code compliance report for specific assemblies and fastening schedules or conduct project specific testing to verify compliance with design wind pressure requirements*

- B. Tie Wire—18 gauge galvanized and annealed low-carbon steel in compliance with ASTM A641 with Class I coating.

## 2.09 ACCESSORIES

*Metal accessories supplied by others, select one type*

- A. Weep screed, casing bead, corner bead, corner lath, expansion and control joint accessories. All accessories shall meet the requirements of ASTM C1861 and its referenced documents
  - 1. PVC plastic in compliance with ASTM D1784, cell classification 13244C.
  - 2. Zinc in compliance with ASTM B69.
  - 3. Galvanized metal in compliance with ASTM A653 with G60 coating.
- B. All accessories shall have perforated or expanded flanges and shall be designed with grounds for the specified thickness of stucco.
- C. StoSeal® STPE joint sealant in conformance with ASTM C920: Type S, Grade NS, Use NT, A, M, Class 100/50

*Note: metal accessories are susceptible to corrosion in coastal environments. Consider the use of zinc alloy or PVC accessories in these environments. Metal corner beads with solid metal noses are susceptible to corrosion in exposed exterior applications. Consider the use of several layers of woven-wire mesh or other corner accessories in lieu of corner bead and completely encase*

*the metal in stucco. Care must be taken when attaching metal lath or other wall assembly components so that fasteners go into [not between] framing supports. Powder actuated or other fastening devices that can damage the air and water-resistive barrier, sheathing, or CI should be avoided. CAUTION: AVOID THE USE OF CHANNEL REVEAL ACCESSORIES THAT INTERFERE WITH PROPER DRAINAGE AND STRESS RELIEF.*

## 2.10 JOB MIXED INGREDIENTS

*Supplied by others*

- A. Water: clean and potable.
- B. Sand: in compliance with ASTM C897 or C 144, for use with ASTM C926 stucco concentrates

## 2.11 STUCCO

- A. 80102 StoPowerwall Stucco Pre-Blended: fiber reinforced portland cement stucco pre-blended with graded sand and in compliance with ASTM C926 and ICC AC11
- B. 80103 StoPowerwall Stucco: fiber reinforced portland cement stucco concentrate in compliance with ASTM C926 and ICC A11
- C. 80108 StoPowerwall Scratch & Brown: portland cement stucco concentrate in compliance with ASTM C926.

## 2.12 FOAM TRIM AND BUILD-OUTS

*Select one based on desired attributes. Refer to Product Bulletins for additional information.*

- A. Adhesive and Base Coat
  - 1. Sto BTS Xtra - lightweight one component dry polymer modified cement-based extra high build base coat material
  - 2. Sto BTS Plus - one component dry polymer modified cement-based high build base coat material
  - 3. Sto Primer/Adhesive-B - one component dry polymer modified cement-based base coat material
  - 4. Sto Primer/Adhesive – two component acrylic-based base coat material field mixed with portland cement
  - 5. Sto RFP – ready mixed non-cementitious fiber reinforced base coat material
  - 6. StoArmat Classic Plus – ready mixed non-cementitious fiber reinforced high build base coat material
  - 7. Sto Flexyl – two component fiber reinforced acrylic-based waterproof base coat material field mixed with portland cement (for use as a waterproof base coat to waterproof foundations, parapets, splash areas, trim and other projecting architectural features).
- B. Foam Insulation Board for Trim

*Note: minimum required thickness is 1-inch (25 mm) and maximum allowable thickness is typically 4-inches (102mm) for noncombustible type construction unless thicker dimensions are approved by the code official*

- 1. Sto GPS Board, nominal 1.0 lb/ft<sup>3</sup> (16kg/m<sup>3</sup>) graphite enhanced polystyrene rigid foam plastic insulation board in compliance with ASTM C578 Type I requirements, and ASTM E2430
  - 2. Sto EPS Insulation Board, nominal 1.0 lb/ft<sup>3</sup> (16kg/m<sup>3</sup>) polystyrene rigid foam plastic insulation board in compliance with ASTM C578 Type I requirements, and ASTM E2430
- C. Reinforcing Mesh

1. Sto Mesh--nominal 4.5 oz./yd<sup>2</sup> (153 g/m<sup>2</sup>), symmetrical, interlaced open-weave glass fiber mesh treated with alkaline resistant coating for compatibility with Sto materials (achieves Standard Impact Classification over foam insulation board).
2. Sto Detail Mesh--nominal 4.2 oz/yd<sup>2</sup> (143 g/m<sup>2</sup>), flexible, symmetrical, interlaced open-weave glass fiber fabric treated with alkaline resistant coating for compatibility with Sto materials (used for standard foam backwrapping and aesthetic detailing).

## 2.13 CRACK DEFENSE

*Sto Crack Defense is optional and uses the components listed below for added crack resistance*

### A. Base Coat

*Select one based on desired attributes. Refer to Product Bulletins for additional information.*

1. Sto BTS Xtra - lightweight one component polymer modified cement-based extra high build base coat material
2. Sto BTS Plus - one component polymer modified cement-based high build base coat material
3. Sto Primer/Adhesive-B - one component polymer modified cement-based base coat material
4. Sto Primer/Adhesive – two component acrylic based base coat material field mixed with portland cement
5. Sto RFP – ready mixed non-cementitious fiber reinforced base coat material
6. StoArmat Classic Plus – ready mixed non-cementitious fiber reinforced high build base coat material
7. Sto Flexyl – two component fiber reinforced acrylic-based waterproof base coat material field mixed with portland cement (for use as a waterproof base coat to waterproof foundations, parapets, splash areas, trim and other projecting architectural features).

### B. Reinforcing Mesh

1. Sto Mesh - nominal 4.5 oz./yd<sup>2</sup> (153 g/m<sup>2</sup>), symmetrical, interlaced open-weave glass fiber mesh made with alkaline resistant coating for compatibility with Sto materials.

## 2.14 PRIMER

*Optional component. Select one based on desired attribute. Refer to Product Bulletins for additional information.*

- A. StoPrime Hot - acrylic-based primer/sealer for freshly placed (minimum 4 day old) and high pH stucco surfaces.
- B. StoPrime Sand - acrylic-based tinted, sanded primer for fully cured (minimum 28 day old or pH less than 10) stucco surfaces.
- C. StoPrime - acrylic-based tinted primer for fully cured (minimum 28 day old or pH less than 10) stucco surfaces.

*Note: priming is recommended to provide uniform substrate absorption and finish color, to improve adhesion and water resistance, and to retard efflorescence. StoPrime Hot may be applied 48 hours after moist curing the brown coat. Other Sto primers require 28 days curing of brown coat or pH less than 10 before application.*

## 2.15 FINISH

*Select one or more as dictated by project design requirements*



- A. Stolit Lotusan Finish - integrally colored, factory blended textured Lotus-Effect Technology wall finish with graded marble aggregate
- B. Stolit HDP™ Finish - integrally colored, factory blended textured hydrophobic wall finish with graded marble aggregate
- C. Sto Powerflex Silco Finish - integrally colored, factory blended, silicone enhanced elastomeric textured wall finish with graded marble aggregate
- D. Sto Powerflex Finish - integrally colored, factory blended, elastomeric textured wall finish with graded marble aggregate
- E. StoPowerwall Finish - integrally colored, factory blended, flexible acrylic textured wall finish with graded marble aggregate.
- F. Stolit Finish - integrally colored, factory blended, acrylic textured wall finish with graded marble aggregate
- G. Sto Essence DPR Finish - integrally colored, factory blended, acrylic textured wall finish with graded marble aggregate
- H. StoSignature Finishes – Stolit acrylic-based textured wall finish applied with specialized techniques to achieve unique textures, impressions or effects. Refer to [www.stocorp.com](http://www.stocorp.com) for StoSignature Finishes Brochure and Installation Guides.
- I. Sto Specialty Finishes – acrylic based textured wall finishes with colored aggregates that create unique aesthetic effects.
- J. StoCast Finishes – Sto pre-formed decorative and protective veneer units (with adhesive and top coat as applicable)
  - 1. StoCast Wood
  - 2. Sto Cast Brick

## **2.16 MIXING**

- A. Mix all materials as directed by manufacturer in written instructions on product literature or packaging
- B. Do not add anti-freeze or other foreign ingredients unless instructed to do so in writing by the manufacturer
- C. When mixing stucco batches, only mix as much material as can readily be used

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Refer to manufacturers written instructions for installation of StoPowerwall ci (see Appendix)

### **3.02 PROTECTION**

- A. Provide protection of installed materials from water infiltration into or behind them.
- B. Provide protection of installed stucco from dust, dirt, precipitation, and freezing.

- C. Provide protection of installed primer and finish from dust, dirt, precipitation, freezing and continuous high humidity until fully dry.
- D. Provide sealant and backer material at stucco terminations and at fixture penetrations through the stucco to protect against air, water and insect infiltration. Provide weeps at floor lines, window and door heads, and other areas to conduct water to the exterior.

### **3.03 CLEANING, REPAIR AND MAINTENANCE**

- A. Clean and maintain the stucco finish for a fresh appearance and to prevent water entry into and behind the stucco. Repair cracks, impact damage, spalls or delamination promptly.
- B. Maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the wall assembly.
- C. Refer to Sto reStore Repair and Maintenance Guide ([reStore Program](#)) for detailed information on stucco restoration - cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding.

## **APPENDIX**

### **STOPOWERWALL CI (INBOUND) INSTALLATION**

#### **INSTALLER QUALIFICATIONS**

Applicators pre-qualify under Quality Assurance requirements of the specification (see section 1.07B of specification).

#### **CONTINUOUS INSULATION INSTALLATION**

1. Attach insulation boards to open framing with corrosion resistant bugle head metal screws and 1-1/4 inch (32mm) metal lath locks or other corrosion resistant cap fastener. Align vertical board joints with framing. Use only enough fasteners, minimum 3 per board mid-span) to temporarily hold the board in place (sheathing attachment is intended to permanently hold it in place).
2. Attach in courses with vertical joints staggered.
3. Cut insulation board in an "L" shape around openings. Tightly abut insulation board joints and interlock inside and outside corners. Trim or rasp board flush for square corners.
4. Seal gaps or open joints with Sto TurboStick spray foam and rasp or shave flush with surface.

#### **SHEATHING INSTALLATION**

1. Install sheathing in courses over the continuous insulation to permanently hold the insulation boards in place. Install immediately following or in tandem with the continuous insulation.
2. Abut gypsum sheathing joints. Gap wood sheathing 1/8 inch (3mm) at joints.
3. Install in compliance with applicable code and sheathing manufacturer's instructions, except: offset sheathing joints from continuous insulation board joints by a minimum of 6 inches (152mm). Support all vertical joints with studs, and use minimum #8 corrosion resistant screw fasteners with minimum three thread penetration into metal studs, minimum 1 inch (25 mm) penetration into wood studs. Space fasteners no greater than 8 inches (203 mm) on center along framing members for gypsum sheathing and in accordance with code

requirements for wood-based sheathing. Ensure fasteners are of sufficient length as identified in the specification for proper attachment to framing members.

4. Verify attachment and installation conforms with requirements for design wind pressures.

*IMPORTANT: sheathing must return into openings to cover exposed edges of continuous insulation. Rough openings must therefore be oversized in both directions by 2 times the thickness of the sheathing to accommodate the window or other object intended to go into the opening. Refer to Sto guide details.*

## **SUBSTRATES**

1. Inspect sheathing surfaces for damage and deterioration. Record any areas of moisture damage. Inspect sheathing application for compliance with applicable requirement:

- Glass Mat Faced Gypsum Sheathing in compliance with ASTM C1177—refer to manufacturer's instructions and/or ICC evaluation report
- Exterior Grade and Exposure 1 wood based sheathing—APA Engineered Wood Association E 30.

*Note: sheathing attachment is often the determinant of ultimate wind load resistance. Verify attachment is sufficient to meet design wind pressure requirements. Wood-based sheathing must be gapped 1/8-inch (3mm) at edge and end joints to prevent cracking in the stucco.*

2. Report deviations from the requirements of project specifications or other conditions that might adversely affect the air and water-resistive barrier, ci, or stucco installation to the General Contractor. Do not proceed with air and water-resistive barrier, ci, or stucco installation until deviations are corrected.

## **SURFACE PREPARATION**

1. Sheathing

- Remove surface contaminants and replace damaged sheathing.
- All sheathing must be handled and installed in compliance with applicable building code and manufacturer requirements. Installed sheathing must be clean, dry and free from damage, frost, and all bond-inhibiting materials. At gypsum sheathing joints. Gap wood sheathing 1/8-inch (3mm) at joints. Should gaps exceed 1/8-inch (3 mm) up to 1/2-inch (13 mm) wide, use Sto RapidGuard to fill joints, or apply low expanding urethane foam into joints and rasp or shave flush with sheathing surface in preparation for installation of StoGuard joint treatment.
- Spot surface defects in sheathing with joint treatment (Sto Gold Fill or Sto RapidGuard).

## **AIR AND WATER-RESISTIVE BARRIER INSTALLATION**

*Important Note: the air and water-resistive barrier installation described below is one component of the air barrier assembly for the building envelope and the moisture protection of the wall construction. Installation of the air and water-resistive barrier must be integrated with other air and water-resistive barrier components in the construction. This requires coordination with other trades to ensure proper sequencing of work, to achieve air barrier continuity, and to direct rain water to the exterior, not into the wall assembly. Always protect rough openings in wall construction BEFORE installing windows, doors, louvers, etc. Where water is likely to penetrate the wall assembly, such as windows, flashing must be installed to direct water to the exterior at the leak source. Refer to Sto Guide Details as needed*

1. The following instructions are applicable to:

- Exterior or Exposure I Plywood in compliance with PS-1
- OSB (Oriented Strand Board) in compliance with PS-1 or PS-2
- Glass Mat Faced Gypsum Sheathing in compliance with ASTM C1177

2. Transition Detailing: Detail transition areas with Sto RapidGuard (static joints and seams) or StoGuard Conformable Membrane (static and dynamic joints and seams) to achieve air barrier continuity. For illustrations of installation, refer to *StoPowerwall ci Design Guide and Detail Booklet*, *Sto RapidGuard Installation Guide*, and *StoGuard Conformable Membrane Installation Guide* ([www.stocop.com](http://www.stocop.com))

### 3. Rough Opening Protection

*Select one of the options below for frame construction; for rough openings with wood bucks and similar openings with complex 3-dimensional geometry, select Sto RapidGuard*

- Sto Gold Fill with StoGuard Mesh: apply 9-inch (229mm) wide StoGuard Mesh at rough openings. Immediately apply Sto Gold Fill by spray or trowel over the mesh and spread smooth with a trowel to completely cover the mesh (refer to *StoPowerwall ci Design Guide and Detail Booklet*).
- Sto Gold Coat, Sto AirSeal, or StoGuard VaporSeal with StoGuard Fabric: apply coating liberally by spray or roller to corners of openings, immediately place StoGuard RediCorners in the wet coating, and apply additional coating over the RediCorners to completely embed them. After all corners have been completed apply coating liberally to the entire rough opening, immediately place StoGuard Fabric in the wet coating, smooth any wrinkles with a brush or roller, and apply additional coating over the fabric to completely embed it. Overlap all seams minimum 2-inches (51mm). Once completed topcoat with additional coating as needed to completely seal the surface. Allow to dry and inspect for pinholes or voids. If pinholes or voids are present, seal with additional coating or Sto RapidGuard.
- Sto RapidGuard: apply a fillet bead of material with a caulking gun at interior corners inside the opening to seal jamb/sill and jamb/head seams. Then apply material in a zig-zag pattern along sill, jambs, and head to form a generous bead of material along the surface to be covered. Use a 6-inch (152 mm) wide plastic drywall knife or handheld spreader to spread the material to a uniform thickness of 12-20 mils (0.3-0.5 mm) before the material skins. Treat the entire rough opening surface in this manner and overlap onto the face of the sheathing 2-inches (51 mm) minimum all the way around.
- StoGuard Conformable Membrane: install the membrane in conformance with manufacturer's written installation instructions (refer to *StoGuard Conformable Membrane Installation Guide*)

### 4. Sheathing Joint Treatment

*Note: sheathing joint treatment is typically not required when working with StoShield SA (Self-Adhered) membranes. Select one of the options below*

- Sto Gold Fill with StoGuard Mesh: place 4-inch (102 mm) wide mesh centered along sheathing joints and minimum 9-inch (229 mm) wide mesh centered and folded at inside and outside corners. Immediately apply Sto Gold Fill by spray or trowel and spread smooth with a trowel to completely cover the mesh.
- Sto AirSeal, Sto Gold Coat or StoGuard VaporSeal with StoGuard Fabric: apply coating liberally by spray or roller along sheathing joints and immediately place 4-inch (102mm) wide fabric centered over the joints into the wet coating, and 6-inch (152mm) wide fabric centered and folded at inside and outside corners into the wet coating. Smooth any wrinkles with a brush or roller and apply additional coating to completely embed the fabric. Overlap seams minimum 2-inches (51mm).
- Sto RapidGuard: apply to properly installed sheathing – joints butted for gypsum sheathing, and joints gapped for plywood and OSB sheathings (wood-based sheathing typically requires 1/8-inch [3mm] spacing at edge and end joints). Apply a thick bead of Sto RapidGuard with a caulking gun along sheathing joints, or apply in a zig-zag pattern across and down the joints. Spread to a uniform thickness of 20-30mils (0.5-0.6 mm) before the material skins. Spread minimum 1-inch (25mm) beyond the sheathing joint on each side. Follow the same procedure for inside and outside corners.
- StoGuard Conformable Membrane: install the membrane in conformance with manufacturer's written installation instructions (refer to *StoGuard Conformable Membrane Installation Guide*)

### 5. Primary Air and Water-Resistive Barrier Installation

- Coating: install the specified AWRB coating uniformly by spray or roller to the required wet film thickness. Refer to individual Product Bulletins for more detailed installation instructions.

- Self-Adhered Membrane: install the self-adhered membrane in shingle lap fashion following the manufacturer's written instructions

#### 6. Air and Water-Resistive Barrier Connections and Shingle Laps

- Coordinate installation of connecting air barrier components with other trades to provide a continuous airtight membrane.
- Coordinate installation of flashing and other moisture protection components with other trades to achieve complete moisture protection such that water is directed to the exterior, not into the wall assembly, and drained to the exterior at sources of leaks (windows, doors and similar penetrations through the wall assembly).
- Splice-in head flashings above windows, doors, floor lines, roof/sidewall step flashing, and similar locations with StoGuard detail component to achieve shingle lap of the air and water-resistive barrier such that water is directed to the exterior.

*Note: windows and doors are typically installed immediately following installation of the air and water-resistive barrier and work should be sequenced accordingly. Consult with window manufacturer for installation requirements to maintain air barrier continuity and for head, jamb, sill flashing and perimeter sealant requirements needed to prevent leaks into the wall assembly.*

*IMPORTANT: do not allow air and water-resistive barrier installation to remain exposed more than allowed by the manufacturer. refer to product literature for the specific air barrier selected. Protect with continuous insulation promptly after installation.*

### PAPER OR FELT WATER-RESISTIVE BARRIER INSTALLATION

1. Install in compliance with the applicable building code requirements for building paper. Lap paper over foundation weep screed attachment flange, floor line flashing, and window/door head flashings. Refer to Sto Guide Details at [www.stocorp.com](http://www.stocorp.com)

*Note: code requirements may vary. Always consult the applicable code and the manufacturer's code compliance report. Typically building paper in compliance with the code is lapped shingle style, upper courses over lower courses, by minimum 2-inches (51mm), with vertical laps of minimum 6-inches (150mm). Courses are staggered so that vertical joints do not align. Care must be taken to prevent tears in the paper and to limit penetrations to only those required for attachment. Flashing must be in place and properly integrated with the sheet WRB at sills, above windows and doors, at floor lines, decks and at roof/wall intersections such that water is directed to the exterior.*

### DRAINAGE MAT INSTALLATION

1. Place drainage mat against the wall surface and unroll horizontally with the fabric facing out. Hammer-tack or staple into continuous insulation with corrosion-resistant fasteners.
2. Use as few fasteners as needed to hold the mat in place, starting from the bottom of the wall at base flashing or weep screed and working up. Do not fasten through flashing.
3. Shingle lap fabric at horizontal courses. Shingle lap drainage mat over weep screeds, flashing at floor lines, decks, roof lines, window heads, and other areas where flashing is required, to direct water to the exterior.
4. Butt ends of rolls and vertical seams.
5. Trim around windows, doors, vents, or other penetrations through the wall. Do not install behind window nail flanges.

Immediately follow installation of drainage mat with stucco accessory and lath installation. Where stucco lath installation will not immediately follow installation of drainage mat, use corrosion-resistant cap nails, cap staples, or cap screws every 16-inches (406mm) on center along framing for more secure attachment. Cover drainage mat with metal lath within 30 days of installation.

### STUCCO INSTALLATION

General: after satisfactory inspection of surfaces and correction of any deviations from specification requirements commence the stucco installation. Apply the stucco in discrete panels without interruption to avoid cold joints and differences in appearance. Abut wet stucco

to set stucco at natural or architectural breaks in the wall such as expansion joints, pilasters, terminations, or changes in plane. Hot or dry conditions accelerate drying and moisture loss from stucco which can diminish strength and resistance to cracking. Under these conditions, adjustments in the application, scheduling and curing of stucco to prevent rapid loss of moisture are necessary to achieve a satisfactory stucco installation. Cold temperatures retard drying and strength gain and adjustments may have to be made in the application, scheduling and curing of stucco to prevent damage from frost and other trades. Do not install stucco during extremely hot, dry and/or windy conditions. Do not install stucco during freezing conditions or on frozen substrates. Do not install stucco onto grounds of accessories. Completely embed lath and flanges of accessories and completely cover fastener attachments with stucco. Moist cure stucco minimum 48 hours for optimum strength gain and resistance to cracking. Allow final stucco application to completely cure (minimum 28 days) before applying primer or finish or until pH of stucco surface is less than 10 (except in the case of StoPrime Hot which can be applied 48 hours after completing moist cure of stucco). The finished installation must be true, plumb and square. Should stucco get into control or expansion joints, remove the stucco from within the joint before the stucco sets. Refer to Sto Guide Details as needed.

Installation over StoGuard/Sto DrainScreen:

1. Weep Screed Installation: install foundation weep screed at the base of the wall securely to solid substrate or framing with the appropriate fastener. Locate foundation weep screed so that it overlaps the joint between the foundation and framing by a minimum of 1-inch (25mm). Locate the foundation weep screed nosing minimum 4-inches (100mm) above earth grade, 2-inches (51mm) above finished grade (paved surfaces, for example). Lap air and water-resistive barrier, sheet water-resistive barrier, and drainage mat over the weep screed attachment flange.

*Weep screed may also be installed in conjunction with flashing and air and water-resistive barrier installation to facilitate shingle lapping of components at base of wall*

2. Casing Bead and Two-Piece Expansion Joint Installation: install casing beads at stucco terminations—doors, windows and other through wall penetrations. Install two piece expansion joints (or back-to-back casing beads) at building expansion joints, thru-wall joints, where the stucco is to be installed over dissimilar construction or substrates, at changes in building height, at floor lines, columns, and cantilevered areas. Install full accessory pieces where possible and avoid small pieces. Seal adjoining pieces by embedding ends in sealant. Abut horizontal into vertical joint accessories (except where horizontal movement joints exist that prevent continuous vertical runs of accessories). Attach at no more than 7-inches (178mm) into solid substrate/framing with appropriate fasteners.

*Note: refer to architectural drawings for joint locations and accessory type. Air and water-resistive barrier must be continuous behind joints and accessories – refer to Sto Guide Details.*

3. Lath Installation; for welded wire lath refer to Structa Wire Corp. TwinTrac Installation Guide and IAPMO ER 2017

Diamond Mesh Metal Lath: conform to ASTM C1063

- General--install metal lath with the long dimension at right angles to structural framing (horizontally on solid substrates). Terminate lath at expansion joints. Do not install continuously at joints.
- Seams/Overlaps--overlap side seams minimum 1/2-inch (13mm) and end seams minimum 1-inch (25mm). Stagger end seams. Overlap casing beads and expansion joints minimum 1-inch (25 mm) over narrow wing accessories, minimum 2-inches (51mm) over expanded flange accessories. Do not install lath continuously beneath expansion joints.
- Attachment--fasten securely through sheathing into structural framing at 6-inches (152mm) on center maximum vertically and 16-inches (406mm) on center horizontally. Wire tie at no more than 9-inches (225mm) on center at: side laps, accessory overlaps, and where end laps occur between supports.
- Paper-backed lath--follow installation as for diamond mesh metal lath. Lap lath over lath, not paper to lath overlap. For horizontal overlaps the paper backing must lap shingle style behind the lath-to-lath overlap.

*Note: the type fastener selected, its layout and pullout or withdrawal value from the supporting construction must be verified and approved by the project engineer/architect with respect to design wind load and local building code requirements. Exercise care when attaching metal lath and accessories through the air and water-resistive barrier so that fasteners go into [not between] framing supports. Do not use power, powder-actuated or other fastening tools/methods that can damage the air barrier, air and water-resistive barrier or substrate.*

#### 4. One Piece Expansion Joint Installation

- Install one piece expansion joints at through wall penetrations, for example, above and below doors and windows. Install one piece expansion joints at every 144 ft<sup>2</sup> (13 m<sup>2</sup>). Wire tie one piece expansion joints to lath at no more than 7-inches (178mm) on center. Seal adjoining pieces by embedding ends in sealant. Make certain lath is DISCONTINUOUS at or beneath joints.

5. Inside and Outside Corners: install corner lath at inside corners and corner bead at outside corners over lath. Attach through lath into solid substrate or framing at no more than 7-inches (178mm) on center with appropriate fasteners.

#### 6. Stucco Installation

- Scratch Coat: apply stucco with sufficient pressure to key into and embed the metal lath. Apply sufficient material,  $\frac{3}{8}$ -inch or  $\frac{1}{2}$ -inch (9mm or 12mm), to cover the metal lath and to permit scoring the surface. Score the stucco upon completion of each panel in preparation for a second coat. Score horizontally.
- Brown Coat: as soon as the first coat is firm enough to receive the second coat without damage, apply the second coat. Alternatively, moist cure the first coat up to 48 hours and dampen the scratched surface with water immediately before applying the second coat. Apply the second coat with sufficient pressure to ensure intimate contact with the first coat and as needed to bring the stucco to a uniform thickness that matches the grounds of the accessories. Use a rod or straight edge to bring the surface to a true, even plane. Fill depressions in plane with stucco. Final thickness of stucco shall be uniform throughout the wall area and shall be either  $\frac{3}{4}$ -inch or  $\frac{7}{8}$ -inch (19mm or 22mm) as dictated by final design requirements, and shall not exceed  $\frac{7}{8}$ -inch (22mm).
- After the stucco has become slightly firm float the surface lightly with a darby or wood float to densify the surface and to provide a smooth, even surface. The proper time to float is when the wood float no longer sticks to the surface of the stucco.
- Moist cure after the stucco has set by lightly fogging for at least 48 hours. Fog as frequently as required during the 48-hour period to prevent loss of moisture from the stucco. Avoid eroding the stucco surface with excess moisture. If relative humidity exceeds 75% the frequency of moist curing can be diminished.

#### 7. Foam Trim and Build-Outs

- Where foam trim or build-outs terminate at a dissimilar material such as a window, door or other non-stucco surface, backwrap the foam build-out by installing detail mesh onto the terminating edge of the stucco. Embed the mesh in the foam trim adhesive. Allow the mesh to dangle until the backwrapping procedure is completed.
- Install foam build-outs directly over hardened stucco with foam trim adhesive. Apply adhesive with the appropriate size notched trowel to the back of the insulation board and immediately place build-out in the proper location on the wall. Press firmly into place and trim or tool excess adhesive from ends and edges of foam trim for a smooth void-free connection to the stucco substrate.
- After the adhesive has cured sufficiently to hold the build-out firmly in place, rasp the entire foam surface smooth.
- Complete the backwrapping procedure by applying the base coat to the exposed edges of the foam build-out and minimum 2- $\frac{1}{2}$  - inches (64mm) onto the face. Pull the backwrap mesh around the foam build-out and fully embed it into the base coat. Use a corner trowel for neat straight corners.
- Apply the base coat to the foam build-out and approximately 3-inches (76mm) onto the adjacent stucco surfaces to an approximate thickness of  $\frac{1}{8}$ -inch (3mm). Immediately embed the reinforcing mesh in the wet base coat. Trowel from the center to the edges of the mesh to avoid wrinkles and remove excess base coat. Overlap mesh seams minimum 2- $\frac{1}{2}$ -inches (64mm). Overlap mesh onto adjacent stucco wall surfaces minimum 2- $\frac{1}{2}$ -inches (64 mm) at terminations of the foam build-out and feather onto the stucco wall surface. Alternatively, if Crack Defense is used apply Crack Defense with its reinforcing mesh continuously from the stucco wall surface over foam build-outs.

*Note: do not install foam build-outs over joints in the stucco wall assembly. Terminate foam build-outs and backwrap in accordance with instructions above.*

#### 8. Crack Defense

*Crack Defense is optional. It provides additional crack resistance to the stucco wall surface.*



- Apply base coat over the moist cured stucco (and foam build-outs if not already reinforced with mesh) with appropriate spray equipment or a stainless steel trowel to a uniform thickness of approximately  $\frac{1}{8}$ -inch (3 mm).
- Work horizontally or vertically in strips of 40-inches (1016mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh.
- Overlap mesh not less than 2- $\frac{1}{2}$  -inches (64mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Avoid wrinkles in the mesh.
- The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry.
- Re-skim with additional base coat if mesh color is visible.
- Do not install base coat or mesh over joints or accessories in the stucco wall assembly.

## 9. Primer Installation

*Priming is optional. Priming is recommended to provide uniform substrate absorption and finish color, to improve adhesion and water resistance, and to retard efflorescence. StoPrime Hot may be applied 48 hours after moist curing the brown coat. Other Sto primers require 28 days curing of brown coat or pH less than 10 before application.*

- StoPrime Hot—Moist cure stucco for a minimum of 48 hours. Allow stucco to dry an additional 48 hours, then apply primer evenly with brush, roller or proper spray equipment over the clean, dry stucco and foam build-outs, and allow to dry. Final age of primed stucco application must be minimum 7 days before application of finish.
- StoPrime Sand—Moist cure stucco for a minimum of 48 hours. Wait until stucco is 28 days old or the pH level of the surface is below 10 before applying primer. Final age of primed stucco application must be minimum 28 days before application of finish or pH must be below 10.
- StoPrime— Moist cure stucco for a minimum of 48 hours. Wait until stucco is 28 days old or the pH level of the surface is below 10 before applying primer. Final age of primed stucco application must be minimum 28 days before application of finish or the pH must be below 10.

## 10. Finish Installation

Sto Textured Finish: apply finish to minimum 28-day old stucco or primed stucco and foam build-outs, or when pH of stucco surface is less than 10. If StoPrime Hot is used as the primer the primed stucco/foam build-out surfaces need only be minimum 7 days old. Apply finish by spraying or troweling with a stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:

- Avoid application in direct sunlight.
- Apply finish in a continuous application and work a wet edge towards the unfinished wall area. Work to an architectural break in the wall before stopping to avoid cold joints.
- Weather conditions affect application and drying time. Hot or dry conditions limit working time and accelerate drying. Adjustments in the scheduling of work may be required to achieve desired results. Cool or damp conditions extend working time and retard drying and may require added measures of protection against wind, dust, dirt, rain and freezing. Adjust work schedule and provide protection.
- Float "R" (rilled or swirl texture) finishes with a plastic float to achieve their rilled texture
- Do not install separate batches of finish side-by-side.
- Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.
- Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.
- Do not install finish over high pH ( $\geq 10$ ) stucco surfaces or surfaces that have not been fully cured.

StoSignature or Sto Specialty Finish Installation: refer to applicable Installation Guide or Product Bulletin for selected finish.

StoCast Finish Installation: refer to *StoCast Brick Application Guide* or *StoCast Wood Application Guide* for the selected finish.



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