

[Insert Project Name Here]07 42 63.50-1

[Insert Project Number Here] StoPanel 3DP- Powered by Branch Technology

StoPanel® 3DP – Powered by Branch Technology

Digitally Fabricated Wall Panel Assemblies

Section 07 4263.50

Abstract:

PART 1 - The StoPanel 3DP – Powered by Branch Technology is a prefabricated drainable exterior wall panel system with integral air and moisture barrier and 3D printed Branch Composite Core. The Branch Composite Core provides R-7 insulation and is robotically milled to the architecturally specified contour and is finished by hand.

StoGuard®, the air and moisture barrier in the StoPanel 3DP – Powered by Branch Technology system, consists of two components—joint treatment and waterproof coating. StoGuard functions as an air and moisture barrier over glass mat faced gypsum sheathing.

StoGuard provides secondary protection to wall panels against moisture damage during the construction process and in the event of a breach in the wall cladding while in service. It is not intended to correct faulty workmanship such as the absence or improper integration of flashing in the construction, nor is it intended to correct other defective components of construction such as windows that leak into the wall assembly. Flashing should always be integrated with the cladding to direct water to the exterior, not into the wall assembly, particularly at potential leak sources such as windows.

As a component of an air barrier system StoGuard minimizes the risk of condensation within the building envelope by resisting mass transfer of warm moisture laden air through the wall assembly where it can condense on a cold surface. A complete air barrier system consists of individual air barrier components and the connections between them. The air barrier components must be continuous to become an effective air barrier system. The design/construction professional must take material compatibility and construction sequencing into account when designing an "airtight" assembly to ensure continuity and long-term durability. The effects of air tightness on mechanical ventilation should also be included in the overall project evaluation.

An air barrier should not be confused with a vapor retarder which may also be used in the wall assembly to retard water vapor diffusion and reduce the risk of condensation. Generally, a vapor retarder is placed on the warm side of the insulation. Specifically, it is placed on the interior side in cold climates. A vapor retarder may not be necessary depending on the wall components and the range of temperature/humidity conditions inside and outside. A vapor retarder should not be used on the inside of walls in warm humid climates. A dewpoint analysis should be performed to determine whether a vapor barrier should be installed.

[Insert Project Name Here]07 42 63.50-2

[Insert Project Number Here] StoPanel 3DP- Powered by Branch Technology

StoPanel 3DP – Powered by Branch Technology wall panels are produced and installed by StoPanel Technology Affiliates and are generally available with insulating values that conform to applicable energy codes, and a variety of finish coats.

StoPanel Technology’s exclusive limited warranty can only be obtained through StoPanel Technology Affiliates for projects fabricated and installed by a StoPanel Technology Affiliate.

Text between ** ** requires editing. Delete ** after editing.

SECTION 07 42 63.50 –StoPanel 3DP – Powered by Branch Technology

PART 2 - GENERAL

2.1 SUMMARY

- A. StoPanel Technology Affiliate shall provide finished, digitally prefabricated, 3D printed core, drainable, structural, exterior wall panels with integral StoGuard air and moisture barrier and robotically milled ci (continuous insulation) for exterior above grade walls.

Add/delete depending on project requirements

Edit “xx xxxxx” to appropriate section numbers.

- B. Related Requirements:
1. Section xx xxxxx: Cold Formed Metal Framing (used for other work)
 2. Section xx xxxxx: Sheathing (used for other work)
 3. Section xx xxxxx: Insulation (used for other work)
 4. Section xx xxxxx: Sheet Metal Flashing and Trim
 5. Section xx xxxxx: Sealants and Caulking
 6. Section xx xxxxx: Exterior Entrance Doors
 7. Section xx xxxxx: Exterior Windows

Retain the following article, REFERENCED STANDARDS, at the Specifier’s option.

2.2 REFERENCED STANDARDS

- A. American Society for Testing and Materials (ASTM) Standards
1. A36-12 Specification for Carbon Structural Steel.

2. A108-2013 Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
3. A283-13 Specification for Low and Intermediate Tensile Strength Carbon Steel Plates, Shapes and Bars.
4. A496-07 Specification for Steel Wire, Deformed, For Concrete Reinforcement.
5. A500-13 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
6. A572-13a Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
7. A780-09 Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
8. A1003-13b Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members.
9. B117-11 Test Method for Salt Spray (Fog) Testing.
10. C150-12 Specification for Portland Cement.
11. C1029-20 Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation
12. C920-11 Specification for Elastomeric Joint Sealants.
13. C954-11 Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 In. (0.84 Mm) to 0.112 In. (2.84 Mm) in Thickness.
14. C1177-13 Specification for Glass Mat Gypsum for Use as Sheathing.
15. C1382-11 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints.
16. D968-05(2010) Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive.
17. D2247-11 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
18. D3273-12 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
19. E84-2013a Test Method for Surface Burning Characteristics of Building Materials.
20. E119-12a Method for Fire Tests of Building Construction and Materials.
21. E283-04(2012) Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences across the Specimen.
22. E330-02(2010) Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
23. E331-00(2009) Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

24. E2098-13 Test Method for Determining Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for Use in Class PB Exterior Insulation and Finish System after Exposure to a Sodium Hydroxide Solution.
 25. E2134-14 Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS).
 26. E2273 -18 Drainage Efficiency of EIFS
 - 27.
 28. E2485-13 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings.
 29. E2486-13 Standard Test Method for Impact Resistance of Class PB and PI Exterior insulation and Finish Systems (EIFS).
 30. E2570-07(2019) Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) and EIFS with Drainage
 31. G153-13 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials.
 32. G154-12a Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials.
 33. C1029-20 Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation, substantial compliance with the exceptions of referenced standards ASTM D2842 and ASTM D6226.
- B. American Iron & Steel Institute (AISI)
1. AISI 1018, Steel, Cold Drawn, High Temperature, Stress Relieved, 16-22 mm (0.625-0.875 in) Round.
 2. AISI 1019, Steel, Cold Drawn.
 3. AISI 1020, Carbon Steel.
 4. AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members and AISI S100-12.
 5. AISI S200, North American Standard for Cold-Formed Steel Framing – General Provisions, 2012 Edition
 6. AISI S211, North American Standard for Cold-Formed Steel Framing - Wall Stud Design, 2007 Edition with Supplement 1 (Reaffirmed 2012).
- C. American Welding Society (AWS)
1. D1.1/D1.1M, Structural Welding Code – Steel.
 2. D1.3/1.3M, Structural Welding Code – Sheet Steel.
- D. Building Code Standards
1. ICC ES – AC 235, Acceptance Criteria for EIFS Clad Drainage Wall Assemblies
- E. National Fire Protection Association (NFPA) Standards
1. NFPA 268-2017, Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source

2. NFPA 285-2019, 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

F. Other Reference Documents

1. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., ASHRAE 90.1-2019, Energy Standard for Buildings except Low-Rise Residential Buildings.
2. ICC ESR- 1233, Evaluation Report for StoGuard and StoPanel Backup
3. Occupational Safety and Health Administration (OSHA), 29 CFR 1926.

2.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Allow time in the project schedule for coordination with related sections through the General Contractor.
- B. Pre-Installation Conference: Prior to mobilizing installation forces onto the jobsite, participate in a Pre-Installation Conference with the General Contractor to review the following:
 1. General Contractor and StoPanel Technology Affiliate Field Operations contact information.
 2. Safety Plans and Procedures
 - a. Potential jobsite hazards.
 3. Schedules
 - a. Time frames for Layout/Hardware Install, Erecting, and Final Tune-up.
 - b. Operating hours and constraints.
 4. Access requirements for materials, equipment, processes, and personnel.
 5. Equipment (Cranes, Trucks, Welding machines, etc.).
 6. Jobsite areas strictly reserved for panel storage, staging, and erecting operations.
 7. General Contractor and preceding trade work requirements
 - a. Complete and stable structure and panel attachment surfaces.
 - b. Benchmarks and Control Lines as required.
 - c. Site conditions compliant with all safety requirements.
 - d. Clear access to all areas of work.
 - e. Do not allow the storage of materials or installation of work of other trades in areas where the panel installation process (including welding and torch burning) may damage such materials or work or may present a fire or other hazard.
 8. Special or unique conditions or issues.

2.4 ACTION SUBMITTALS

- A. StoPanel Technology Affiliate shall submit the following:

1. Component manufacturer's product data.
2. Shop drawings for each panel and for project-specific details.
 - a. Detail configurations of panelized units.
 - b. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit.
 - c. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
 - d. Indicate details at building corners.
 - e. Indicate type, size, and length of welded connections by AWS standard symbols. Detail loose and in-panel hardware and connections.
 - f. Indicate locations and details of anchorage devices to be embedded in or attached to structure or other construction.
 - g. Include plans and elevations showing unit location and sequence of erection for special conditions.
 - h. Indicate location of each panelized unit by same identification mark placed on panel.
 - i. Indicate relationship of panelized units to adjacent materials.
3. Samples for approval:
 - a. Samples for initial selection:
 - 1) For each type of finish-coat color and texture indicated.
 - b. Samples for verification: ** 24-inch- (600-mm-) ** square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including ** custom trim, each profile, ** and ** an aesthetic reveal.

2.5 INFORMATIONAL SUBMITTALS

- A. StoPanel Technology Affiliate shall submit the following.
 1. Component manufacturer's code compliance report.
 2. Affiliate's StoPanel Technology affiliate certificate.
 3. SPF manufacturer's certificate of compliance with ASTM E84 and substantial compliance with ASTM C1029, with the exceptions of referenced standards ASTM D2842 and ASTM D6226. Insulation shall have a flame spread of 25 or less, and smoke developed of 250 or less.
 4. Calculations: Provide structural calculations prepared in compliance with these specifications. Where these specifications and code differ, more severe requirements shall govern. Test reports are not an acceptable substitute for calculations. Calculations shall include the following information:
 - a. Analysis for all applicable loads on framing members and attachment hardware.
 - b. Seal and signature on calculations of professional structural engineer currently registered in State in which the project is located.

2.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Manufacturer's recommendations for cleaning and repairing damage to system.
- B. Component manufacturer's standard warranty.

2.7 QUALITY ASSURANCE

- A. Fabricator and Installer Qualifications
 - 1. StoPanel fabricator/installer shall be an Affiliate in good standing with StoPanel Technology.
 - 2. StoPanel Technology Affiliate shall fabricate StoPanel 3DP and install the Branch Composite Core panels in accordance with StoPanel Technology Fabrication and Installation Quality Standards.
- B. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with StoPanel Technology Affiliates Quality Control Manual.
- C. Inspections
 - 1. StoPanel Affiliate shall provide access and coordination for independent third-party inspection of completed StoPanel 3DP panel installation, where required by code or contract documents.
 - 2. Inspections shall be conducted in accordance with code requirements and Contract Documents.
- D. Mock-up Testing (when required by contract)
 - 1. StoPanel Affiliate shall construct full-scale mock-up of typical panel assembly with specified tools and materials incorporating windows, doors and other penetrations, as depicted in Contract Documents.
 - 2. Testing of air and water infiltration and structural performance in accordance with ASTM E283, E331 and E330, respectively, shall be performed by an independent laboratory at the expense of the owner or as agreed in the Contract Documents.
 - 3. Mock-up shall comply with Design Team requirements.
 - 4. Acceptable mock-up may remain as part of project.

2.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver panels to site reserved and secured trailer staging area in sequence of erection and according to scheduled dates.
- B. If panels are stored on site, provide protection of panels from weather and damage.

2.9 FIELD/SITE CONDITIONS

- A. General Contractor shall provide restricted, level and stabilized staging and truck/crane operating area for the exclusive use of the panel installation operation, in accordance with OSHA standards for Steel Erection. (See 29 CFR 1926, Subpart R—Steel Erection, Section 1926.752©).
- B. All project general conditions safety measures (perimeter fall protection, stairs, hole covers, rebar capping, site grading, etc.) shall be coordinated by the General Contractor and installed and maintained by others prior to the panel installation forces mobilizing on site. All such measures shall allow for the required access of panel installation forces and processes and shall be configured such that panel installation can be completed without the modification or removal of such measures. All such measures shall be removed and/or modified by others at the direction of the General Contractor after the completion of panel installation and the General Contractor has determined that they are no longer needed.
- C. General Contractor shall provide all project general conditions items and services (water, power, general lighting, sanitary facilities, dumpster, restricted jobsite, etc.).

2.10 WARRANTY

- A. StoPanel Technology Affiliate shall provide standard warranty from fabricator. Warranty shall begin on date of substantial Completion.
- B. StoPanel Technology Affiliate's warranty shall not cover leakage due to infiltration of water or air through windows, doors or other penetrating elements installed by others.
- C. StoPanel Technology Affiliate's warranty shall not cover leakage of water or air due to failure of joint sealants or joint materials not installed as part of the work of this section.
- D. Provide StoPanel Technology limited warranty. Warranty shall begin on date of substantial Completion.

PART 3 - PRODUCTS

3.1 PANEL MANUFACTURERS

- A. Finished wall panel system shall be fabricated by a StoPanel Technology Affiliate.
- B. Air/moisture barrier and ci components shall be manufactured or recognized for use in the wall panel assembly by Sto Corp.
- C. Acceptable Fabricators: Subject to compliance with requirements of StoPanel Technology. For a list of acceptable fabricators visit www.stocorp.com.

3.2 PERFORMANCE REQUIREMENTS

- A. StoPanel Technology Affiliate shall fabricate the StoPanel® 3DP panels using materials shown to meet or exceed the following performance requirements.
- B. Air Barrier and WRB
1. Meets or exceeds durability and performance requirements of ASTM E2570.
 2. Air leakage less than 0.004 cfm/ft² (0.02 L/s·m²) at 1.57 psf (75 Pa) when measured in accordance with ASTM D2178
 3. Assembly air leakage less than 0.04 cfm/ft² (0.2 L/s·m²) after conditioning protocol when measured in accordance with ASTM E2357
 4. Water vapor permeance greater than 10 perms when measured in accordance with ASTM E96, Method B
 5. No water penetration when subjected to sequential water spray of 2.86 psf (137 Pa), 6.24 psf (299 Pa), and 12.00 psf (574 Pa) for 15 minutes at each pressure interval, when measured in accordance with ASTM E331
 6. No water penetration at nail puncture after 72 hours at 40°F (4°C) when measured in accordance with ASTM D1970
 7. No mold growth at 70 days when measured in accordance with ASTM D3273
- C. StoPanel 3DP – Powered by Branch Technology
1. Lamina (reinforced base coat and finish) meets or exceeds durability requirements of ASTM E2568 based on testing over foam plastic insulations
 2. No mold growth of finish coating at 90 days when measured in accordance with ASTM D3273
 3. Meets acceptance criteria of NFPA 285 for use on noncombustible construction
 4. No ignition when exposed to radiant heat in accordance with NFPA 268
 5. Maintains hourly fire resistance rating of known, rated wall assembly when tested in accordance with ASTM E119
- D. Energy Standards Compliance: Wall panel system capable of complying with the material requirements of ASHRAE 90.1 -2019 as dictated by local code requirements
1. Section 5: Building Envelope Continuous Insulation (ci) over Metal Frame Walls - All Climate Zones (with sufficient ci thickness)
 2. Section 5: Continuous Air Barrier

3.3 DESIGN CRITERIA

- A. StoPanel Technology Affiliate shall engage a qualified professional structural engineer, licensed in the state in which the project is located, to provide structural calculations:
1. Acknowledging the applicable Code design parameter values.
 2. Acknowledging the loading applied to the panels (including transferred window loads, etc.).

3. Substantiating the detailed panel framing and connection hardware.
 4. Providing the loads transferred to the supporting building structure, for submission to the Design Team and the Project Engineer of Record.
- B. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100, AISI S200 and AISI S211.
- C. Incorporate provisions within the structural calculations for the StoPanel 3DP wall panel system to provide for expected movement of structural members, as determined by structural engineer of record, without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects. Incorporate provisions for panels to allow for movement of adjacent framing members outside the insulated building envelope, when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
- D. Wind Load
1. Incorporate provisions within the structural calculations for the StoPanel 3DP – Powered by Branch wall panels for maximum allowable system deflection, normal to the plane of the wall, of L/240. Adjust allowable deflection requirement for more stringent deflection requirements where required by code or specific finish requirements.
 2. Provide for wind load resistance in conformance with code requirements and as agreed to with the Project Design Team.
- E. Moisture Control:
1. Fabricate panels to restrict air leakage of the panel assembly to limits required by applicable ASHRAE 90.1 standard and to restrict water leakage as required by ICC ES AC 235.
 2. Fabricate panels with Sto Wedge drainage feature at bottom in accordance with applicable StoPanel 3DP details.
- F. Impact resistance: Provide panels with impact resistance as determined by the Design Team and as indicated on design drawings.
1. Standard impact resistance: One layer of nominal 4.5 oz/yd² (153 gm/m²) reinforcing mesh
 2. Medium impact resistance:
 - a. One layer of nominal 11.0 oz/yd² (373gm/m²) reinforcing mesh (where indicated), or
 - b. Two layers of nominal 4.5 oz/yd² (153 gm/m²) reinforcing mesh
 3. Ultra-high impact resistance: One layer of nominal 4.5 oz/yd² (153 gm/m²) reinforcing mesh and one layer of nominal 15 oz/yd² (509 gm/m²) reinforcing mesh (where indicated).
- G. Branch Composite Core Joints:

1. Provide Branch Composite Cores (“BCCs”) with ends and edges of BCCs bonded with parallel ribbons of Sto TurboStick Adhesive
 2. Stagger BCC joints minimum 6 inches (152 mm) from gypsum sheathing joints in a running bond pattern.
 3. As BCCs are placed apply Sto TurboStick to the back of BCCs at 6 inches (152 mm) on center and not more than 1 inch (25 mm) from edges so that ribbons run vertically when the BCCs are in their final installed position.
 4. Apply Sto TurboStick to ends and edges of BCCs in ribbons parallel to the plane of the sheathing at nominal 3 inches (75 mm) on center and with the outermost ribbon following the contour of the BCC.
 5. Place BCCs in their final position with joints tightly butted and edges and ends bonded.
 6. When adhesive is firm rasp or shave joints as needed to achieve surface contour continuity at BCC butt joints.
 7. Fill any gaps at BCC joints with Sto TurboStick and cut flush with the contour of the BCCs.
- H. StoPanel 3DP Joints
1. Provide panels with allowance for minimum 3/4 inch (19 mm) wide joints between panels and adjacent to other work.
 2. Provide panels with allowance for minimum 3/4 inch (19 mm) wide perimeter sealant joints at penetrations through the prefabricated panel assembly (windows, doors, etc.).
 3. Panel Joint Filler (Provided by others): Unless otherwise noted by design team, provide joint design including sealants and backer rods specified in Joint Sealants section that comply with the following requirements:
 - a. One-part low modulus silicone sealant conforming to ASTM C920
 - b. Maintain air barrier continuity across the joint.
 - c. Use double seals or other approved redundant joint sealant configuration.
 - d. Use sealant/primer combinations compatible with the materials on both sides of the sealant joints.
 - e. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C1382, and that meets minimum 50% elongation after conditioning.
- B. Grade Condition: Panels shall not be installed below grade or where panel surfaces are subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 6-inch (152 mm) clearance above finished grade or as required by code. Keep finish components a minimum of 2 inches (51 mm) above paved surfaces. Keep finish components a minimum of 8 inches (203 mm) or greater (as required or recommended by roofing manufacturer) above roofing surfaces.
- C. Projecting Architectural Features and Reveals

1. Projecting architectural features shall have a minimum 1:2 [27°] slope along their top surface. Horizontal reveals shall 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 (51 mm) from the face of the panel wall plane, protect the top surface with Sto Flexyl waterproof base coat. For surfaces with lower slope provide specialized details taking into account climate and exposure conditions
2. Where panel finish system occurs on weather exposed projecting ledges, sills, and other projecting features, support by framing or other structural support and protect with metal coping or flashing.

D. Fire Protection:

1. Limit Branch Composite Core to 10.5 inches (267 mm) average thickness for Types I, II, III, and IV construction.
2. Limit Branch Composite Core to 10.5 inches (267 mm) maximum thickness in fire-resistance rated wall construction.
3. Field application of additional fire-resistant materials (such as interior gypsum wallboard) are typically required to be added to the installed panels (by others) to provide the finished fire-resistant and building code compliant assembly.

1.2 COLD-FORMED METAL FRAMING

- A. Manufacturer shall be a member in good standing with at least one of the following steel framing industry associations:
1. Certified Steel Stud Association (CSSA)
 2. Steel Framing Alliance (SFA)
 3. Steel Framing Industry Association (SFIA)
 4. Steel Stud Manufacturers Association (SSMA).
 - 5.
 6. (Retain CP 90 for members subjected to high humidity and/or salt laden air.)
- B. Stud Type: Channel type, roll-formed from steel complying with ASTM C955, Metallic Coated, ** CP 60. ** CP 90. **
1. Material: Metallic coated steel meeting ASTM A1003-13b, Coating Designation ** G60: ** G90: **
 2. Grade: As required by structural performance requirements.
 - 3.
 4. (Retain G90 if CP-90 specified in previous paragraph.)
- C. Studs and runners (track):
1. Stud sizes: As indicated on approved shop drawings.

2. Stud gauge: Minimum 0.0428 inch (1.09 mm), except where stud manufacturer's product data requires heavier gauge for heights and conditions of use and as indicated on approved shop drawings and structural calculations.
 3. Runners: 1-1/4 inches (32 mm) deep by widths to receive studs, and as indicated on approved shop drawings and structural calculations.
- D. Recycled Content of Steel Materials: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- 1.
 2. (Revise the following paragraph to suit Project. Add other materials as required.)
- E. Steel Connection Materials
1. Carbon-Steel Shapes and Plates: ASTM A36/A36M.
 2. Carbon-Steel-Headed Studs: ASTM A108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or Type B, with arc shields.
 3. Carbon-Steel Plate: ASTM A283/A283M, Grade C.
 4. High-Strength, Low-Alloy Structural Steel: ASTM A572/A572M.
 5. Carbon-Steel Structural Tubing: ASTM A500/A500M, Grade B or Grade C.
 6. Deformed-Steel Wire or Bar Anchors: ASTM A496/A496M or ASTM A706/A706M.
 7. Welding Electrodes: Comply with AWS standards.
- F. Red Oxide Primer: Red oxide primer meeting requirements of SSPC-Paint No. 15, Type I.
- G. Cold-Galvanizing Compound: Pre-mixed, zinc dust and organic binders formulated specifically for use on steel surfaces. Compounds shall have concentrations of zinc dust in the range of 65% to 69% or above 92% in the dried film in accordance with ASTM A780.

1.3 SHEATHING

- A. Acceptable products:
1. CertainTeed Corp., GlasRoc Sheathing.
 2. G-P Gypsum Products, DensGlass Sheathing.
 3. National Gypsum, Gold Bond eXP Extended Exposure Sheathing.
 4. Temple-Inland GreenGlass Fiberglass-Faced Gypsum Sheathing.
 5. USG, Securock Sheathing
- B. Material:
1. Composition: Conforming to ASTM C1177; noncombustible water-resistant core, essentially gypsum, surfaced with glass mat partially or completely embedded in the core.
 2. Mold resistance: Resistant to mold growth when tested in accordance with ASTM D3273.

3. ** Type: Minimum 5/8" thickness for stud spacing of up to 2'-0" o.c. Face size shall be 4'-0" wide by 8'-0", 9'-0", 10'-0", or custom length, square ends and edges. **
4. ** OR **
5. ** Type: Type X Grade fire-rated board, minimum 5/8" thickness. Face size shall be 4'-0" wide by 8'-0", 9'-0", 10'-0", or custom length, square ends and edges. **

- C. Sheathing Fasteners: Screws for application of fiberglass-faced gypsum sheathing to cold-formed metal framing shall be minimum 1-1/4 inch (31.8 mm) long, non-corrosive coated, self-drilling fasteners complying with ASTM C1002 and ASTM C954.
- D. StoPanel 3DP Fasteners: Screws for attachment of StoPanel 3DP through embedded C-Channel into cold-formed metal framing shall be minimum #14 x 2.5 inch (63.5 mm) hex head non-corrosive coated self-drilling fasteners complying with ASTM C1002 and ASTM C954, and of sufficient length to achieve minimum 3-thread penetration into metal framing).

1.4 AIR AND MOISTURE BARRIER

- A. Acceptable Product: StoGuard®
 1. Joint Treatment (Pick one):
 - a. Sto Gold Fill® with StoGuard Mesh Nominal 4.2 oz. /yd² (143 g/m²).
 - b. Sto Gold Coat® with StoGuard Fabric.
 - c. Sto RapidGuard®
 2. Rough Opening Protection (Pick one):
 - a. Sto Gold Fill® with StoGuard Mesh Nominal 4.2 oz. /yd² (143 g/m²).
 - b. Sto Gold Coat® with StoGuard Fabric and StoGuard RediCorners
 - c. Sto RapidGuard®
 3. Air and Moisture Barrier Coating: Sto Gold Coat® - Ready mixed waterproof coating for wall sheathing.

1.5 ADHESIVE

- A. Acceptable Adhesive (select one):
 1. Sto TurboStick: Spray polyurethane foam adhesive for use as adhesive and infill between weeps.

1.6 WEEPS

- A. Medium Density Polyethylene:
 1. Minimum 1/4" (25 mm) Inside Diameter.
 2. Stainless Steel Bug Screen (optional)

1.7 POLYURETHANE FOAM INSULATION

- A. (Note: Minimum required thickness is 1 inch [25 mm] and maximum allowable thickness is 12 inches [305 mm]. Insert thickness and R-value required for project.)
- B. Nominal 2.5 lb/ft³ (40 kg/m³) Closed Cell Rigid Spray Polyurethane Foam (SPF) insulation in compliance with ASTM C1029-20, Type I requirements, and ASTM E84, Class A fire rating.
 - 1. Thickness: Not to exceed average of 10.5 inches (267 mm)
 - 2. R-value at 75 degrees F.: ** 6.45/in. **
 - 3. Robotically milled to digital geometry specifications.

1.8 3D PRINTED CORE

- A. 3D Printed Cellular Fabrication (C-Fab®) Matrix: Carbon fiber reinforced ABS polymer formulated for robotic structural freeform 3D printing
 - 1. Color: Black
 - 2. Branch Matrix density: Nominal 2" (51 mm) average cell size

1.9 BASE COAT

- A. (Select one of the following base coats)
- B. Cementitious Base Coats:
 - 1. Sto BTS Plus: polymer modified portland cement base coat mixed with potable water .
- C. Waterproof Base Coat: Sto Flexyl - two component fiber reinforced acrylic based waterproof base coat mixed with portland cement (for use as a waterproof base coat for foundations, parapets, splash areas, trim and other projecting architectural features).

1.10 REINFORCING MESHES

- A. Standard Mesh: Sto Mesh - Nominal 4.5 oz./yd² (153 g/m²), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials which shall achieve Standard Impact Classification.
- B. Intermediate Mesh: Sto Mesh - Nominal 11.0 oz./yd² (373gm/m²) symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials which shall achieve Intermediate Impact Classification.
- C. Ultra-High Impact Mesh: Sto Armor Mat - Nominal 15 oz./yd² (509 g/m²), ultra-high impact, double strand, interwoven, open-weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials installed to a height of 6'-0" above grade or

as indicated on drawings. Mesh shall achieve Ultra-High Impact Classification when applied beneath Sto Mesh.

- D. Specialty Meshes: Sto Detail Mesh - Nominal 4.2 oz/yd² (143 g/m²), flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating for compatibility with Sto materials. Use for standard back wrapping, edge wrapping and aesthetic detailing. It may also be used for reinforcement of sheathing joints and protection of rough openings with Sto Gold Fill as part of the StoGuard air and moisture barrier.

1.11 PRIMERS

A. Acceptable Products:

1. StoPrime Sand: Use for priming prepared concrete, EIFS base coat, or prior to application of Sto finishes and coatings.
2. StoPrime UV: Acrylic based tinted, sanded primer for use with specific Sto finishes.

1.12 FINISH COAT

A. (Select one finish coat.)

B. Acceptable Finish Coat

1. Stolit[®]: Acrylic based textured wall finish with graded marble aggregate.
2. Stolit[®] Lotusan[®]: Specialty textured wall finish with graded marble aggregate and self-cleaning properties.

C. Finish color: ** As selected by Architect from manufacturer's standard selection. ** Custom color as selected by Architect. ** Match color indicated on drawings. **

1.

D. (Select finish color with a light reflectance value of 20 or greater. The use of dark colors is not recommended with EIF Systems that incorporate spray polyurethane foam. SPF has an upper service temperature limitation of approximately 175° F [79.4°C]).

E. (Retain the following joint sealant article if joints between panels are to be sealed by panel installer)

1.13 JOINT SEALANTS

A. Acceptable products:

1. Sealant: Dow Chemical Company., Dowsil 790.
2. Primer: Dow Chemical Company, 1200 OS Primer or as recommended by Dow Chemical Company.

3. Sealant: Dow Chemical Company, Dowsil 795

B. Sealant:

1. Type: One-part, low modulus silicone rubber; meeting ASTM C920, Type S, Grade NS, Class 50, for use NT.
2. Colors: ** Custom ** Standard ** colors as selected by Architect.

1.14 MIXED INGREDIENTS

A. Water: Clean and potable.

B. Portland cement: Type I, Type II, or Type I-II in conformance with ASTM C150.

1.15 MIXING

A. For products requiring mixing, mix components in accordance with published instructions on the applicable Sto Product Bulletin.

1.16 FABRICATION

A. Fabricate all StoPanel® 3DP – Powered by Branch Technology panels and connection hardware in accordance with shop drawings and StoPanel Affiliate Quality Control Manual (QCM).

B. Fabricate StoPanel in accordance with StoPanel specifications and the StoPanel Affiliate QCM.

C. Install Branch Composite Cores (“BCCs”) over StoGuard air and moisture barrier on the prefabricated framed and sheathed StoPanel.

1. Install the BCC / Sto Wedge assembly along bottom edge of panel and at rough opening heads, where specified.
2. Apply Sto TurboStick ribbons to back side of BCCs at nominal 6 inches on-center, oriented such that ribbons will be vertical when the panel is in final position.
3. Position BCCs as quickly as practical and place on StoPanel substrate. (Shims are recommended to provide consistent separation between BCCs and substrate for drainage). Do not allow Sto TurboStick to skin-over. (Daily trials to determine Sto TurboStick open time in current ambient conditions are recommended.)
4. When adhesive is dry pre-drill pilot holes through face side of StoPanel 3DP at spacing as indicated on shop drawings to align with C-channel embedded in the BCC and with studs or other structural support elements as indicated on shop drawings.
5. Fasten BCC units at pilot holes through C-channels into studs, or other structural support elements as indicated on shop drawings to achieve minimum 3-thread penetration into supports.

6. Fill pilot holes with Sto TurboStick spray foam and cut foam flush with the panel surface.
 7. Install Sto base coat with Sto Mesh embedded, allow to dry, then install a second coat of base coat and allow to dry. Touch-up or install additional base coat material as needed to achieve the desired aesthetic. Finish with Sto textured finish in accordance with Sto published product instructions and to achieve the desired aesthetic.
- D. StoPanel Product Tolerances: Fabricate panelized units to shapes, lines, and dimensions indicated in accordance with StoPanel Affiliate QCM and the following dimensional tolerances:
1. Overall Height and Width of Units, measured at the Face Exposed to View:
 - a. 10 feet (3 m) or under, plus or minus 1/8 inch (3 mm).
 - b. 10 to 20 feet (3 to 6 m), plus 1/8 inch (3 mm), minus 3/16 inch (5 mm).
 - c. 20 to 40 feet (6 to 12 m), plus or minus 1/4 inch (6 mm).
 - d. Each additional 10 feet (3 m), plus or minus 1/16 inch (1.5 mm).
 2. Total Thickness at Perimeter: Plus 1/4 inch (6 mm), minus 1/8 inch (3 mm).
 3. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch/72 inches (3 mm/1830 mm) or 1/2 inch (13 mm) total, whichever is greater.
 4. Length and Width of Openings within One Unit: Plus or minus 1/4 inch (6 mm).
 5. Bowing: Plus or minus L/360, maximum 1 inch (25 mm).
 6. Local Smoothness: 1/4 inch/10 feet (6 mm/3 m).
 7. Warping: 1/16 inch/12 inches (1.5 mm/300 mm) of distance from nearest adjacent corner.
 8. Dimensions of In-Plane Architectural Features and Rustications: Plus or minus 1/8 inch (3 mm).
- E. StoPanel Position Tolerances: Fabricate panelized units to shapes, lines, and dimensions indicated in accordance with the following positional tolerances
1. Built-In Anchors: Plus or minus 1/2 inch (13 mm).
 2. Handling Devices: Plus or minus 3 inches (75 mm).
 3. Location of Aesthetic Joints: Plus or minus 1/8 inch (3 mm).
 4. Location of Opening within Panel: Plus or minus 1/4 inch (6 mm).
 5. Location of Finish Terminations on Panel: Plus or minus 1/4 inch (6 mm).
 6. Location of Misc. Openings (Electrical Outlets, Hose Bibs): Plus or minus 1/2 inch (13 mm).
 7. Location of Connection Plates: Plus or minus 1/4 inch (6 mm).

PART 2 - EXECUTION

2.1 EXAMINATION

- A. Upon mobilization onto the project site, examine building supporting structural frame elements and adjacent conditions for compliance with requirements for proper panel installation, in accordance with approved panel shop drawings. Check bearing and adjacent surface locations and other conditions affecting installation of the panels.
- B. Do not proceed with wall panel installation until General Contractor confirms that the structure is structurally ready to receive loads from panel units and preceding trades' work is complete and corrected.
- C. Proceed with panel installation only after all unsatisfactory conditions have been corrected.

2.2 INSTALLATION

- A. Layout: Layout for installation of panels from control lines and benchmarks provided by General Contractor.
 - 1. Install sufficient layout markings to install panels as per approved shop drawings and StoPanel project requirements.
 - 2. Install clips, plates, and other accessories required for connecting wall panels to supporting structure.
 - 3. Re-check preceding trade work for compliance of proper and complete panel installation, as per approved shop drawings.
 - 4. Do not deviate from the approved panel shop drawing layout. Deviate only as directed by and agreed to with the General Contractor.
- B. Erection: Erect panels level, plumb, and square within specified allowable tolerances in accordance with approved shop drawings:
 - 1. Erect panels from trailers or staging stacks onto the building, in the agreed to sequence, to approximate line and grade as established in the layout phase.
 - 2. Maintain approximate horizontal and vertical joint alignment and approximate uniform joint width as erection proceeds.
 - 3. Install a sufficient number of permanent and/or temporary connections as required to maintain stability of the panels until panels are tuned-up and all permanent connections are completed.
 - 4. Install temporary shims and/or erecting aids as necessary as panels are being erected.
 - 5. Return reusable dunnage to fabrication plant on unloaded panel delivery trailers.
 - 6. Deposit trash and waste into dumpsters as provided by the General Contractor.
- C. Tune-up: Adjust and final connect wall panels in position by bolting, welding, or as otherwise indicated on shop drawings and in accordance with tolerances stated in 3.2.D of this specification.

1. Adjust panel locations as necessary to maintain final panel positions within tolerances.
 2. Install balance of permanent connections.
 3. Remove temporary shims and/or erecting aids after panel connections are completed.
 4. Notify General Contractor of completed panel tune-up progress and request a review of tuned-up panels and release for follow-up trade work.
- D. Tolerances: Install panels level, plumb, square, and in alignment without exceeding the following erection tolerances:
1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch (13 mm).
 2. Top Elevation from Nominal Top Elevation: As follows:
 - a. Exposed Individual Panel: Plus or minus 1/4 inch (6 mm).
 - b. Exposed Panel Relative to Adjacent Panel: 1/4 inch (6 mm).
 3. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet (30 m): 1 inch (25 mm).
 4. Plumb in Any 10 Feet (3 m) of Element Height: 1/4 inch (6 mm).
 5. Maximum Jog in Alignment of Matching Edges: 1/4 inch (6 mm).
 6. Joint Width (Governs over Joint Taper): Plus or minus 1/4 inch (6 mm).
 7. Maximum Joint Taper: 3/8 inch (10 mm).
 8. Joint Taper in 10 Feet (3 m): 1/4 inch (6 mm).
 9. Maximum Jog in Alignment of Matching Faces: 1/4 inch (6 mm).
 10. Differential Bowing or Camber, as Erected, between Adjacent Members of Same Design: 1/4 inch (6 mm).
 11. Opening Height between Spandrel Panels: Plus or minus 1/4 inch (6 mm).
- E. Welding: Comply with applicable requirements in AWS D1.1/D1.1M and AWS D1.3/D1.3M for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.

2.3 ACCEPTANCE CRITERIA

- A. All StoPanel® 3DP – Powered by Branch Technology panels shall be fabricated and installed in accordance with these specifications and StoPanel Technology Affiliate's Quality Control Manual.
- B. All functional damages or deficiencies shall be promptly corrected. The StoPanel Affiliate shall be reimbursed for all costs for repair of all damages to in-place panels not caused by the Affiliate.
- C. All aesthetic variations shall be evaluated in accordance with installation StoPanel tolerances in Section 3.2.D of this specification and the following:
 1. Aesthetic quality shall not be evaluated in conditions of "Critical Lighting." Critical Lighting is defined as a condition where the angle of the light from the illumination

source intersects with the plane of the finished surface at an angle of fifteen degrees or less. Critical Lighting from natural sunlight conditions is transient; care is advised when specifying artificial lighting that would create a Critical Lighting condition.

2. Aesthetic quality shall be evaluated by unaided, normal eyesight at a threshold distance of twenty feet or more. Aesthetic imperfections not viewable at that distance are deemed acceptable. By mutual agreement, the threshold distance may be reduced at entrances and aesthetic features normally viewable by the public at such closer distances and increased at locations not normally viewable by the public or otherwise obscured from view.
3. StoPanel® 3DP - Powered by Branch Technology finishes are generally hand-tool applied and by their nature have texturing variations within and among panels. The span of normal variations is not represented by small samples.
4. Aesthetic quality of repairs is limited by normal expectations of repairs performed in accordance with StoPanel Affiliate QCM.

2.4 PROTECTION

- A. General Contractor shall coordinate follow-up trades and follow-up work to proceed in such a way to protect installed panels from water infiltration into or behind panels.

2.5 MAINTENANCE

- A. Building Owner shall over time clean and maintain panels and sealants for a fresh appearance and to prevent water entry into and behind panel system. Repair cracks, impact damage, spalls or delamination promptly.
- B. Building Owner shall maintain adjacent components of construction such as sealants, windows, doors, and flashing, to prevent water entry into the building or wall panel assembly.

END OF SECTION **07 4263.50**