



Building with conscience.

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Sto Guide Specification L100X - EPD StoTherm® ci XPS Lotusan®

Section 07 24 00

This specification is intended for use by the design/construction professional and any user of Sto products to assist in developing project specifications and to provide guidance on the application of StoTherm ci XPS Lotusan to vertical above grade exterior wall construction. StoTherm ci XPS Lotusan is a water-drainage exterior insulation and finish system (EIFS) that includes an air and moisture barrier beneath it. The full system consists of six components: air and moisture barrier, adhesive, continuous XPS insulation, reinforcing mesh, base coat, and finish coat.

StoGuard® is the air and moisture barrier component in StoTherm ci XPS Lotusan. It is installed over wood-based sheathing, glass mat gypsum sheathing, cementitious sheathing, concrete, or concrete masonry substrates. StoGuard provides protection against moisture damage during the construction process and in the event of a breach in the EIFS while in service. It is not intended to correct faulty workmanship such as the absence or improper integration of flashing in the wall assembly, 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 in the wall assembly 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 moisture in the air to a cold surface in the wall assembly. A complete air barrier system consists of individual air barrier materials and the connections between them. The air barrier materials must be continuously connected with all six sides of the building envelope to perform as an effective air barrier system. The design/construction professional must take material compatibility and construction sequencing into account when designing an "air tight" 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, or appropriate, 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 dew point analysis and/or dynamic hygrothermal modeling should be performed to determine whether a vapor retarder is appropriate.

Notes in BLUE 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. This specification should be modified where necessary to accommodate individual project conditions.

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PART 1 GENERAL

1.1 SUMMARY

- A. Provide air and moisture barrier, and compatible EIFS for vertical above grade exterior walls
- B. Related Sections (*add/delete, depending on specific project requirements*)
 - 1. Section 06 16 00: Sheathing
 - 2. Section 07 26 00: Vapor Retarders
 - 3. Section 07 27 00: Air Barriers
 - 4. Section 07 50 00: Membrane Roofing
 - 5. Section 07 62 00: Sheet Metal Flashing and Trim
 - 6. Section 07 90 00: Joint Protection
 - 7. Section 08 10 00: Doors and Frames
 - 8. Section 08 40 00: Entrances, Storefronts, and Curtain Walls
 - 9. Section 08 50 00: Windows

1.2 SUBMITTALS

- A. Manufacturer's specifications, details, installation instructions and product data
- B. Manufacturer's code compliance report or test summary
- C. Manufacturer's standard warranty
- D. Applicator's industry training credentials
- E. Samples for approval as directed by architect or owner
- F. XPS board manufacturer's ICC ES Evaluation Report or UL Listing
- G. Sealant manufacturer's certificate of compliance with ASTM C 1382
- H. Prepare and submit project-specific details (when required by contract documents)

1.3 REFERENCES

- A. ASTM Standards:
 - B 117 Test Method for Salt Spray (Fog) Testing
 - C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
 - C 578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
 - C 1177 Specification for Glass Mat Gypsum for Use as Sheathing
 - C 1382 Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
 - D 968 Test Method for Abrasion Resistance of Organic Coatings by Falling Abrasive
 - D 1784 Specification for Rigid Poly (Vinyl Chloride) (PVC) and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
 - D 2247 Practice for Testing Water Resistance of Coatings in 100% Relative Humidity

- D 3273 Test for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- E 72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
- E 84 Test Method for Surface Burning Characteristics of Building Materials
- E 96 Test Methods for Water Vapor Transmission of Materials
- E 119 Method for Fire Tests of Building Construction and Materials
- E 330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 331 Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E 1233 Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Cyclic Static Air Pressure Difference
- E 2098 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
- E 2134 Test Method for Evaluating the Tensile-Adhesion Performance of an Exterior Insulation and Finish System (EIFS)
- E 2178 Test Method for Air Permeance of Building Materials
- E 2273 Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
- E 2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- E 2485 Standard Test Method for Freeze/Thaw Resistance of Exterior Insulation and Finish Systems (EIFS) and Water Resistive Barrier Coatings
- E 2486 Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
- E 2568 Standard Specification for PB Exterior Insulation and Finish Systems
- E 2570 Test Method for Water-Resistive (WRB) Coatings used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage
- G 153 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials
- G 154 Recommended Practice for Operating Light-and Water-Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of Nonmetallic Materials

- B. Building Code Standards
 - AC 235 Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (November 2009)

- C. National Fire Protection Association (NFPA) Standards
 - NFPA 268 Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
 - 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

- D. Other Referenced Documents
 1. American Association of Textile Chemists and Colorists AATCC-127 Water Resistance: Hydrostatic Pressure Test
 2. APA Engineered Wood Association E 30, Engineered Wood Construction Guide

3. ICC-ES ESR-1233, StoGuard with Gold Coat, StoGuard Water-Resistive Barriers and StoEnergy Guard
4. ICC-ES ESR-1748, StoTherm® ci

1.4 DESIGN REQUIREMENTS

NOTE: Coordinate this section with other material specification sections and detail drawings as applicable)

- A. Wind Load
 1. Design for maximum allowable system deflection, normal to the plane of the wall, of L/240.
 2. Design for wind load in conformance with code requirements.
 3. Maximum wind load resistance: ± 175 psf (8.37 kPa), provided structural supports and sheathing/sheathing attachment are adequate to resist these pressures.
- B. Moisture Control
 1. Prevent the accumulation of water behind the EIFS or into the wall assembly, either by condensation or leakage through the wall construction, in the design and detailing of the wall assembly:
 - a. Provide flashing to direct water to the exterior where it is likely to penetrate components in the wall assembly, including, above window and door heads, beneath window and door sills, at roof/wall intersections, decks, abutments of lower walls with higher walls, above projecting features, at floor lines, and at the base of the wall.
 - b. Air Leakage Prevention - provide continuity of the air barrier system at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components to minimize condensation and leakage caused by air movement.
 - c. Vapor Diffusion and Condensation - perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture in the wall assembly by diffusion. Adjust insulation thickness and/or other wall assembly components accordingly to minimize risk. Avoid the use of vapor retarders on the interior side of the wall in warm, humid climates.
- C. Impact Resistance
 1. Provide ultra-high impact resistance of the EIFS to a minimum height of 6'-0" (1.8 m) above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Indicate the areas with impact resistance other than "Standard" on contract drawings.
- D. Color Selection
 1. Select finish coat with a light reflectance value of 20 or greater. (The use of dark colors is not recommended over extruded polystyrene [XPS]. XPS has a service temperature limitation of approximately 165° F [74°C]).
- E. Joints

1. Provide minimum 3/4 inch (19 mm) wide joints in the EIFS where they exist in the substrate or supporting construction, where the cladding adjoins dissimilar construction or materials, at changes in building height, at expansion, control, and cold joints in construction, and at floor lines in multi-level wood frame construction. Size joints to correspond with anticipated movement. Align terminating edges of EIFS with joint edges of through wall expansion joints and similar joints in construction. Refer to Sto Details.
2. Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through the EIFS (windows, doors, mechanical, electrical, and plumbing penetrations, etc.).
3. Specify compatible backer rod and sealant that has been evaluated in accordance with ASTM C 1382, and that meets minimum 50% elongation after conditioning.
4. Provide joints so that air barrier continuity is maintained across the joint, and drain joints to the exterior, or provide other means to prevent or control water infiltration at joints.

F. Grade Condition

1. Do not specify the EIFS below grade (unless designed for use below grade and permitted by code) or for use on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Provide minimum 6 inch (152 mm) clearance above grade or as required by code.

G. Trim, Projecting Architectural Features and Reveals

1. All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All reveals must have minimum 3/4 inch (19 mm) insulation thickness at the bottom of the reveal. All 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 (51 mm) from the face of the EIFS wall plane, protect the top surface with waterproof base coat. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS finish on weather exposed sloped surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate and minimize maintenance. Refer to Sto Details.
2. Do not use the EIFS 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 Details 53s.60A and 53s.61.

H. Insulation Thickness

1. Minimum XPS insulation thickness is 1 inch (25 mm).
2. Maximum XPS insulation thickness is 6 inches (152 mm), except as noted below for fire-resistance rated wall assemblies.

I. Fire Protection

1. Do not use XPS foam plastic in excess of 6 inches (152 mm) thick on types I, II, III, or IV construction unless approved by the code official.
2. Where a fire-resistance rating is required by code use the EIFS over a rated concrete or concrete masonry assembly. Limit use over rated frame assemblies to non-load bearing assemblies (the EIFS is considered not to add or detract from the fire-resistance of the rated assembly). Maximum allowable XPS thickness: 2.75 inches (70 mm).
3. Refer to manufacturer's testing or applicable code compliance report for other limitations that may apply.

1.5 PERFORMANCE REQUIREMENTS

A. Comply with ASTM E 2568, ASTM E 2570, and the following:

Table 1 Air/Moisture Barrier Performance

TEST	METHOD	CRITERIA	RESULT
1. Weathering	AATCC 127 (Water Column)	No cracking, bond failure or water penetration after 210 hours UV exposure, 25 wet/dry cycles, and 21.6 in (55 cm) water column	Pass
2. Durability	ASTM E 1233 / ASTM E 72 / ASTM E 331	No water at exterior plane of sheathing after 10 cycles @ 80% design load and 75 minutes water spray at 6.24 psf (299 Pa) differential	No water penetration
3. Water Resistance	ASTM D 2247	Absence of deleterious effects after 14 day exposure	No deleterious effects
4. Water Vapor Transmission	ASTM E 96 Method B (Water Method)	Measure	Sto Gold Coat: > 10 perms [574 ng/(Pa·s·m ²)] Sto AirSeal: > 12 perms [689 ng/(Pa·s·m ²)]
5. Air Leakage (material)	ASTM E 2178	≤ 0.004 cfm/ft ² at 1.57 psf (0.02 L/s·m ² at 75 Pa)	Pass
6. Air Leakage (assembly)	ASTM E 2357	≤ 0.04 cfm/ft ² (0.2 L/s·m ²)	Pass ¹
7. Freeze-Thaw	ASTM E 2485	No delamination or surface changes after 10 cycles when viewed under 5X magnification	No delamination or surface changes
8. Surface Burning	ASTM E 84	Flame Spread less than or equal to 25, - Smoke developed less than or equal to 450	Flame Spread: <25 Smoke Density: <450
9. Tensile Bond	ASTM C 297	Greater than 15 psi (103 kPa)	Pass over Plywood, OSB, Glass Mat Faced Gypsum sheathings, CMU

¹ Based on testing of air barrier joint treatment material at sheathing joints and no top coat

Table 2 EIFS Weather Resistance and Durability Performance*

TEST	METHOD	CRITERIA	RESULTS
1. Accelerated Weathering	ASTM G 153 (Formerly ASTM G 23)	No deleterious effects** at 2000 hours when viewed under 5x magnification	Pass*
2. Accelerated Weathering	ASTM G 154 (Formerly ASTM G 53)	No deleterious effects** at 2000 hours	Pass*
3. Freeze/Thaw Resistance	ASTM E 2485	No deleterious effects** at 10 cycles when viewed under 5x magnification	Pass*
4. Water Penetration	ASTM E 331 (modified per ICC-ES AC 235)	No water penetration beyond the plane of the base coat/insulation board interface after 15 minutes at 6.24 psf (299 Pa)	Pass*
5. Drainage Efficiency	ASTM E 2273	90% minimum	> 90%

TEST	METHOD	CRITERIA	RESULTS
6. Tensile Adhesion	ASTM E 2134	Minimum 15 psi (103kPa) tensile strength	Pass*
7. Water Resistance	ASTM D 2247	No deleterious effects**at 14 day exposure	Pass* @ 28 days
8. Salt Spray	ASTM B 117	No deleterious effects** at 300 hours	Pass* @ 300 hrs
9. Abrasion Resistance	ASTM D 968	No cracking or loss of film integrity at 528 quarts (500 L) of sand	Pass* @ 528 quarts (1000 L)
10. Mildew Resistance	ASTM D 3273	No growth supported during 28 day exposure period	Pass* @ 28 days
11. Impact Resistance	ASTM E 2486	Standard: 25-49 in-lbs (2.83-5.54J) Medium: 50-89 in-lbs (5.65-10.1J) High: 90-150 in-lbs (10.2-17J) Ultra High: >150 in-lbs (>17J)	Pass with one layer Sto Mesh Pass with one layer Sto Mesh And Dow Panel Core 20 Pass* with one layer Sto Intermediate Mesh Pass* with one layer Sto Armor Mat and one layer Sto Mesh

* Based on results over similarly installed and tested EPS

** No deleterious effects: no cracking, checking, crazing, erosion, rusting, blistering, peeling or delamination

Table 3 Air/Moisture Barrier and EIFS Fire Performance

TEST	METHOD	CRITERIA	RESULT
1. Fire Endurance	ASTM E 119	Maintain fire resistance of existing rated assembly	Pass* (2 inch [51 mm] maximum allowable insulation thickness)
2. Intermediate Scale Multi-Story Fire Test	NFPA 285 (formerly UBC Standard 26-9)	1. Resistance to vertical spread of flame within the core of the panel from one story to the next 2. Resistance to flame propagation over the exterior surface 3. Resistance to vertical spread of flame over the interior surface from one story to the next 4. Resistance to significant lateral spread of flame from the compartment of fire origin to adjacent spaces	Pass with 6 inches (152 mm) insulation
3. Radiant Heat Ignition	NFPA 268	No ignition @ 20 minutes	Pass with 1 and 6 inches (25 and 152 mm) insulation
4. Surface Burning (individual components)	ASTM E 84	Individual components shall each have a flame spread of 25 or less, and smoke developed of 450 or less	Flame Spread: < 25 Smoke Developed: < 450

* Results based on extrapolation of data from ASTM E119 testing performed on assembly with 4 inch (305 mm) thick EPS; results extrapolated to 2.75 inch (70 mm) Foamular CI-C and Dow Panel Core 20 insulation.

Table 4 EIFS Component Performance

TEST	METHOD	CRITERIA	RESULT
1. Alkali Resistance of Reinforcing Mesh	ASTM E 2098	Greater than 120 pli (21 dN/cm) retained tensile strength	Pass
2. Requirements for Rigid PVC Accessories	ASTM D 1784	Meets cell classification 13244C	Pass

1.6 QUALITY ASSURANCE

A. Manufacturer Requirements

1. Member in good standing of the EIFS Industry Members Association (EIMA)
2. Air/moisture barrier and EIFS manufacturer for a minimum of thirty (30) years
3. Manufacturing facilities ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System

B. Contractor Requirements

1. Engaged in application of similar systems 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 air/moisture barrier and EIFS 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. Insulation Board Manufacturer Requirements

1. XPS board listed by an approved agency

D. Mock-up Testing

1. Construct full-scale mock-up of typical air/moisture barrier and EIFS/window wall assembly with specified tools and materials and test air and water infiltration and structural performance in accordance with ASTM E 283, ASTM E 331 and ASTM E 330, 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.

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

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in their original sealed containers bearing manufacturer's name and identification of product
- B. Protect coatings (pail products) from freezing and temperatures in excess of 90°F (32° C). Store away from direct sunlight.
- C. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.

1.8 PROJECT/SITE CONDITIONS

NOTE: Weather conditions affect application and drying time of most products. Hot or dry conditions limit working time and accelerate drying and may require adjustments in the scheduling of work 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.

- A. Maintain ambient and surface temperatures above 40°F (4°C) during application and drying period, minimum 24 hours after application of Air/Moisture barrier and EIFS products
- B. Provide supplementary heat for installation in temperatures less than 40°F (4°C)
- C. Provide protection of surrounding areas and adjacent surfaces from application of products

1.9 COORDINATION/SCHEDULING

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

- A. Provide site grading such that the EIFS terminates above grade a minimum of 6 inches (150 mm) or as required by code
- B. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and moisture barrier
- C. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall
- D. Install window and door head flashing immediately after windows and doors are installed
- E. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior
- F. Install splices or tie-ins from air/moisture barrier over back leg of flashings, starter tracks, and similar details to form a shingle lap that directs incidental water to the exterior
- G. Install copings and sealant immediately after installation of the EIFS when coatings are dry, and such that, where sealant is applied against the EIFS surface, it is applied against the base coat or primed base coat surface
- H. Schedule work such that air/moisture barrier is exposed to weather no longer than 90 days if Sto Gold Coat is used.

- I. Attach penetrations through the EIFS to structural support and provide water tight seal at penetrations

1.10 WARRANTY

- A. Provide manufacturer's standard warranty

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide Air/Moisture Barrier and EIFS coatings and accessories from single source manufacturer or approved supplier
- B. The following are acceptable manufacturers:
 1. Sto Corp. - Air/Moisture Barrier, EIFS
 2. Owens Corning – Insulation Board
 3. Dow (The Dow Chemical Company) - Insulation Board

2.2 AIR/MOISTURE BARRIER

(Select any of the listed joint treatment/rough opening protection/detail component options and top coat with one of the listed air barrier coatings)

- A. StoGuard®
 1. Joint Treatment, Rough Opening Protection, and Detail Components:
 - a. Sto Gold Coat® - ready mixed coating applied by brush, roller or spray for rough opening protection of frame walls and joint treatment of sheathing when used with StoGuard Fabric. Also used as a detail component with StoGuard Fabric to splice over back flange of starter track, flashing, and similar ship lap details
 - b. Sto RapidGuard® - one component STPE rapid drying gun-applied treatment for sheathing joints, rough openings, seams, cracks, penetrations and other transitions in above grade wall construction.
 2. Waterproof Coating:
 - a. Sto Gold Coat® - ready mixed waterproof coating for concrete, concrete masonry, wood-based sheathing, and glass mat gypsum sheathing
 3. Transition Detail Components:
 - a. StoGuard Transition Membrane - flexible air barrier membrane for continuity at static transitions such as sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, and shingle lap transitions to flashing. Also used for floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction
 - b. 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 transitions to flashing, wall to balcony floor slab or ceilings, and through wall penetrations – pipes, electrical boxes, and scupper penetrations.

2.3 ADHESIVE

- A. Sto TurboStick™ - one component polyurethane spray foam adhesive

2.4 INSULATION BOARD *(select one)*

- A. Foamular® CI-C – Type X extruded polystyrene (XPS) rigid foam plastic insulation board.
- B. Dow STYROFOAM™ Panel Core 20 Insulation - Type X extruded polystyrene (XPS) rigid foam plastic insulation board

NOTE: *Dow STYROFOAM™ Panel Core 20 insulation board is typically furnished in 2 x 8 foot [0.6 x 2.4 m] size and must be pre-cut or cut on site by the installer to 2 x 4 foot [0.6 x 1.2 m].*

2.5 BASE COAT

- A. Sto BTS® Plus - one component polymer modified cement based base coat for insulation board.

2.6 REINFORCING MESHES

NOTE: *Designate areas with impact resistance other than “Standard” or “Medium” on architectural drawings.*

- A. Standard Mesh
1. 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 *(achieves Standard Impact Classification when used with Foamular CI-C, Medium Impact Classification when used with Dow Panel Core 20)*
- B. High Impact Mesh
1. Sto Intermediate Mesh - nominal 11.2 oz./yd² (380 g/m²), high impact, interwoven, open weave glass fiber fabric with alkaline resistant coating for compatibility with Sto materials *(achieves High Impact Classification)*
- C. Ultra-High Impact Mesh
1. 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 *(recommended to a minimum height of 6'-0" [1.8m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact. Achieves Ultra-High Impact Classification when applied beneath Sto Mesh)*
- D. Specialty Meshes
1. 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 *(used for standard back wrapping, aesthetic detailing, and reinforcement of sheathing joints and protection of rough openings with trowel applied air/moisture barrier)*

2.8 FINISH COAT

- A. Stolit Lotusan - acrylic based textured wall finish with graded marble aggregate and self-cleaning properties

Stolit Lotusan 1.0, Stolit Lotusan 1.0 Dark Colors, Stolit Lotusan 1.5, Stolit Lotusan 1.5 Dark Colors, Stolit Lotusan FreeForm, Stolit Lotusan FreeForm Dark Colors

2.9 JOB MIXED INGREDIENTS

- A. Water - clean and potable
- B. Portland cement - Type I, Type II, or Type I-II in conformance with ASTM C 150

2.10 ACCESSORIES

- A. Sto-Mesh Corner Bead Standard – one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh for outside corner reinforcement.
- B. Sto Drip Edge Profile - one component PVC (polyvinyl chloride) accessory with integral reinforcing mesh that creates a drip edge and plaster return

2.11 MIXING

- A. Sto Gold Coat - mix with a clean, rust-free high speed mixer to a uniform consistency
- B. Sto BTS Plus – mix ratio with water: 5-6.5 quarts (4.7-6.2 L) of water per 47-pound (21.3 kg) bag of Sto BTS Plus. Pour water into a clean mixing pail. Add Sto BTS Plus, mix to a uniform consistency and allow to set for approximately 5 minutes. Adjust mix if necessary with additional Sto BTS Plus or water and remix to a uniform trowel consistency. Avoid retempering. Keep mix ratio consistent. Do not exceed maximum water amount in mix ratio.
- C. Stolit Lotusan - mix with a clean, rust-free high speed mixer to a uniform consistency. A small amount of water may be added to adjust workability. Limit addition of water to amount needed to achieve the finish texture.
- D. Mix only as much material as can readily be used
- E. Do not use anti-freeze compounds or other additives

PART 3 EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. Prequalify under Quality Assurance requirements of this specification (section 1.06 B)

3.2 EXAMINATION

- A. Inspect concrete and masonry substrates prior to start of application for:
1. Contamination—algae, chalkiness, dirt, dust, efflorescence, form oil, fungus, grease, laitance, mildew or other foreign substances
 2. Surface absorption and chalkiness
 3. Cracks—measure crack width and record location of cracks

4. Damage and deterioration such as voids, honeycombs and spalls
 5. Moisture content and moisture damage—use a moisture meter to determine if the surface is dry enough to receive the products and record any areas of moisture damage
 6. Compliance with specification tolerances—record areas that are out of tolerance (greater than ¼ inch in 8-0 feet [6mm in 2438 mm] deviation in plane)
- B. Inspect sheathing application for compliance with applicable requirement and installation in conformance with specification and manufacturer requirements:
1. Glass Mat Faced gypsum sheathing compliant with ASTM C 1177
 2. Exterior Grade and Exposure I wood based sheathing - APA Engineered Wood Association E 30
 3. Cementitious sheathing - consult manufacturer
 4. Attachment into structural supports with adjoining sheets abutted (gapped if wood-based sheathing) and fasteners at required spacing to resist design wind pressures as determined by design professional
 5. Fasteners seated flush with sheathing surface and not over-driven
- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the Air/Moisture Barrier and the EIFS installation to the General Contractor. Do not start work until deviations are corrected.

3.3 SURFACE PREPARATION

- A. Remove surface contaminants on concrete, concrete masonry, gypsum sheathing, or coated gypsum sheathing surfaces
- B. Repair cracks, spalls or damage in concrete and concrete masonry surfaces and level concrete and masonry surfaces to comply with required tolerances
- C. Apply conditioner (consult Sto) by spray or roller to chalking or excessively absorptive surfaces or pressure wash to remove surface chalkiness
- D. Remove fasteners that are not anchored into supporting construction and seal holes with air barrier material
- E. Seal over-driven fasteners with air barrier material and install additional fasteners as needed to comply with fastener spacing requirement
- F. Fill large gaps between sheathing or voids around pipe, conduit, scupper, and similar penetrations with spray foam and shave flush with surface (refer to Sto Details)
- G. Replace weather-damaged sheathing and repair or replace damaged or cracked sheathing

3.4 INSTALLATION

NOTE: *The air/moisture barrier described below is one set of materials in the air barrier system and the moisture protection for the structure. Installation of the air/moisture barrier must be integrated with flashing and other air and moisture barrier materials to ensure that where water is likely to penetrate the wall assembly, it will be drained to the exterior at the source of the leak. Proper air barrier connections and integration of the air/moisture barrier through proper sequencing of*

work and coordination of trades is necessary for a complete air barrier system and complete moisture protection.

IMPORTANT: *Ensure the air/moisture barrier surface, insulation board surface, and reinforced base coat surface are free of surface contamination. Install XPS insulation board within 90 days of the application of Sto Gold Coat.*

Air/Moisture Barrier Installation over Exterior or Exposure I Wood-Based Sheathing (Plywood and OSB), Glass Mat Faced Gypsum Sheathing in Compliance with ASTM C 1177, and Concrete, or Concrete Masonry (CMU) Wall Construction

- A. Transition Detailing
1. Detail transition areas with Sto RapidGuard or StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, refer to Sto guide Details and Sto RapidGuard Installation Guide or StoGuard Transition Membrane Installation Guide (www.stocorp.com)
- B. Rough Opening Protection (*select 1, 2, for frame construction; for concrete or concrete masonry rough openings with wood bucks and similar openings with complex 3-dimensional geometry select 2*)
1. Sto Gold Coat 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 (51 mm). Once completed top coat 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 StoGuard RapidGuard.
 2. 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. 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 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.
- C. Sheathing Joint Treatment (*select one*)
1. Sto Gold Coat with StoGuard Fabric: apply coating liberally by spray or roller along sheathing joints and immediately place 4 inch (102 mm) wide fabric centered over the joints into the wet coating, and 6 inch (152 mm) 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 (51 mm).
 2. 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 [3 mm] 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 20-30 mils (0.5-0.6 mm)

before the material skins. Spread 1 inch (25mm) beyond the sheathing joint on each side. Follow the same procedure for inside and outside corners.

D. Air/Moisture Barrier Coating Installation

1. Plywood and Gypsum Sheathing: apply waterproof coating by spray or roller over sheathing surface, including the dry joint treatment, rough opening protection, and transition areas, to a uniform wet mil thickness of 10 mils in one coat (Sto Gold Coat) Use ½ inch (13 mm) nap roller for plywood. Use ¾ inch (19 mm) nap roller for glass mat faced gypsum sheathing. Protect from weather until dry.
2. OSB Sheathing: apply waterproof coating by spray or with a ¾ inch (19 mm) nap roller to sheathing surface to a uniform wet mil thickness in two coats of 10 wet mils each (Sto Cold Coat). Protect rough openings, joints, and parapets (Paragraph 3.04D), then apply a second coat of waterproof coating.
3. CMU Surfaces:
 - a. Repair static cracks up to 1/2 inch (13 mm) wide with Sto RapidGuard. Rake the crack with a sharp tool to remove loose or friable material and blow clean with oil-free compressed air. Apply the crack filler with a trowel or putty knife over the crack and tool the surface smooth. *(Note: For moving cracks or cracks larger than ½ inch [13mm]), consult with a structural engineer for repair method).* Protect repair from weather until dry.
 - b. Liberally apply coating to the surface with a ¾ inch nap roller or spray equipment to a minimum wet thickness of 10 – 30 mils (Sto Gold Coat) depending on surface condition. Apply to a uniform thickness. Additional coats may be necessary to provide a void and pinhole free surface. Protect from weather until dry.

IMPORTANT: *The Sto coating functions as an air and moisture barrier on normal weight concrete masonry wall construction with flush (struck flush with the surface of the CMU) or concave joints when minimum two liberal coats are applied. Additional coats may be necessary depending on the condition of the CMU wall surface, CMU porosity, joint profile, and other variables that may exist. For "rough" CMU wall surfaces, skim coat the entire surface with one of Sto's cementitious levelers (Sto BTS Plus) before application of coating. A VOID AND PINHOLE FREE SURFACE must be achieved for the coating to properly function as an air and moisture barrier on CMU wall surfaces.*

E. Air /Moisture Barrier Connections and Shingle Laps

1. Coordinate installation of connecting air barrier components with other trades to provide a continuous air tight membrane.
2. 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).
3. 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/moisture barrier such that water is directed to the exterior.

NOTE: *Windows and doors are typically installed immediately following installation of the air/moisture 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.

3.4.2 EIFS Installation

A. Backwrapping

1. Apply a strip of detail mesh to the dry air/moisture barrier at all system terminations (windows, doors, expansion joints, etc.). The mesh must be wide enough to adhere approximately 4 inches (100 mm) of mesh onto the wall, be able to wrap around the insulation board edge and cover a minimum of 2 ½ inches (64 mm) on the outside surface of the insulation board. Attach mesh strips to the air/moisture barrier and allow them to dangle until the backwrap procedure is completed (paragraph 3.04 G1). Alternatively, pre-wrap terminating edges of insulation board.

NOTE: *Backwrapping can be replaced by “pre-wrapping” terminating edges of insulation board with Sto Mesh or Sto Detail Mesh embedded in the Sto base coat. This method is often preferred to facilitate installation in the field. This method may also be used in conjunction with flashing at the base of the wall, roof/wall intersections, floor lines, and similar terminations to replace the starter track.*

B. Adhesive Application and Installation of Insulation Board

1. Ensure the air/moisture barrier surface (Sto Gold Coat) is free of surface contamination. Install the insulation board within 90 days of the application of the air/moisture barrier coating (Sto Gold Coat), or clean the surface and recoat with Sto Gold Coat.
2. Cut the insulation board squarely to a 2 x 4 foot (0.6 x 1.2 m) dimension (if not already furnished pre-cut).
3. Apply adhesive to the back of the insulation board with the dispensing pistol approximately ¾ inch (19 mm) from ends. Apply 6 additional ribbons spaced equally at no greater than 5-6 inches (127-152 mm) apart between the end ribbons for a total of 8 ribbons. Apply uniform ribbons of adhesive parallel with the SHORT dimension of the board so that when boards are placed on the wall the ribbons will be VERTICAL. Apply adhesive ribbons approximately ½ inch (51 mm) in diameter which will expand to ¾ - 1 inch (19 – 25 mm). Keep adhesive ½ inch (51 mm) short of board edges. Apply adhesive uniformly so ribbons of adhesive do not converge. Allow adhesive to “dwell” and become “tacky” before placing boards on wall. Adhesive will look smooth, not jagged, when ready to apply to wall surface. Place boards while adhesive is “tacky” and before adhesive “skins”.

IMPORTANT: *Adhesive tack time varies with temperature and humidity. High temperature or high humidity decreases tack time. Low temperature or low humidity increases tack time. Generally adhesive will remain tacky between 1-5 minutes. If adhesive “skins” remove it and apply fresh adhesive.*

4. Place insulation boards in a running bond pattern on the wall with the long dimension horizontal. Start by inserting the lower edge of the boards inside the starter track at the base of the wall until they contact the bottom of the track. Apply light pressure when placing the boards. After boards have been in place for 5-10 minutes use a straight edge to lightly press the boards inward and to keep board joints flush, as post expansion of the adhesive may force boards slightly outward.
5. Bridge sheathing joints by a minimum of 6 inches (152 mm). Interlock inside and outside corners.

6. Butt all board joints tightly together to eliminate any thermal breaks. Care must be taken to prevent any adhesive from getting between the joints of the boards.
7. Cut insulation board in an L-shaped pattern to fit around openings. Do not align board joints with corners of openings.
8. Check for satisfactory contact of the insulation board with the substrate. If any boards have loose areas use the dispensing pistol to create a hole through the board and inject adhesive to attach the loose area. Allow the adhesive to expand to the outer face of the board while withdrawing the pistol. Cut excess adhesive flush with the surface of the insulation. Do not use nails, screws, or any other type of non-thermal mechanical fastener.

C. Slivering and Rasping of Insulation Board Surface

1. Make sure insulation boards are fully adhered to the substrate before proceeding to steps 3.04 E2 and 3.04 E3 below.
2. Fill any open joints in the insulation board layer with slivers of insulation or the spray foam adhesive.
3. Rasp the insulation board surface to achieve a smooth, even surface and to remove any ultraviolet ray damage.

D. Trim, Reveals and Projecting Aesthetic Features

NOTE: Reveals/aesthetic grooves may be designed into the system to accommodate workability on multi-level buildings or lengthy wall sections)

1. Attach features and trim where designated on drawings with adhesive to a base layer of insulation board or to the coated sheathing surface. Fill any gaps between the trim and base layer of insulation with spray foam adhesive and rasp flush with the trim surface. Slope the top surface of all trim/features minimum 1:2 (27°) and the bottom of all horizontal reveals minimum 1:2 (27°).
2. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in locations indicated on drawings.
3. Offset reveals/aesthetic grooves minimum 3 inches (75 mm) from insulation board joints.
4. Do not locate reveals/aesthetic grooves at high stress areas.
5. Ensure minimum ¾ inch (19 mm) thickness of insulation board at the bottom of the reveals/aesthetic grooves.

E. Completion of Backwrapping

1. Complete the backwrapping procedure by applying base coat to exposed edges of insulation board and approximately 4 inches (100 mm) onto the face of the insulation board. Pull mesh tight around the board and embed it in the base coat with a stainless steel trowel. Use a corner trowel for clean, straight lines. Smooth any wrinkles or gaps in the mesh.

F. Accessory Installation

1. Corner Bead: cut the corner bead accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the outside corner area that will receive the accessory. Immediately place the accessory directly into the wet base coat material. Do not slide

into place. Press the accessory into place. A corner trowel is best for this purpose. Embed and completely cover the mesh and PVC by troweling from the corner to the edge of the mesh so that no mesh or PVC color is visible. Avoid excess build-up of base coat and feather along mesh edges. Adjoin separate pieces by abutting PVC to PVC and overlapping the mesh “tail” from one piece onto the next piece. Fully embed the accessory and mesh “tail” in base coat material. When installing field mesh reinforcement overlap accessory mesh minimum and PVC. Remove any excess base coat from the outside corner.

NOTE: *Install the corner bead accessory prior to the application of field mesh. If installing a multi-layer mesh system such as StoTherm ci high impact systems with Sto Armor Mat or Sto Armor Mat XX, install the corner bead accessory over the first layer of mesh and before the final layer of mesh is installed.*

For additional reinforcement at the corner the field mesh (paragraph 3.4.2 15 below) may be wrapped around the corner and extend a minimum of 6 inches (152 mm) in one or both directions.

2. Drip Edge: install the drip edge accessory prior to application of field mesh (paragraph 3.4.2 15 below). Install with arrow on mesh pointing UP. Cut the accessory to proper length as needed. Use full pieces wherever possible and avoid using short filler pieces. Offset accessory butt joints from substrate joints. Apply base coat with a stainless steel trowel to an approximate thickness of 1/8 inch (3 mm) to the area that will receive the accessory. Immediately place the accessory directly into the wet base coat material and press into place. Do not slide into place. Embed and completely cover the mesh and PVC by troweling from the drip edge screed rail to the edge of the mesh. Avoid excess build-up of base coat, feather along mesh edges, and remove any excess base coat from the drip edge nosing. Abut adjoining pieces and install as described above. When installing field mesh reinforcement overlap accessory mesh 4 inches (10 cm) on both vertical and horizontal faces so the PVC is overlapped, and remove any excess base coat from the drip edge nosing. On vertical and horizontal faces of the accessory install finish to the drip edge lines and remove any protruding finish from the drip edge nosing.

G. Base Coat and Reinforcing Mesh Application

1. Ensure the insulation board is firmly adhered and free of surface contamination or UV degradation, and is thoroughly rasped before commencing the base coat application.
2. Apply minimum 9x12 inch (225x300 mm) diagonal strips of detail mesh at corners of windows, doors, and all penetrations through the system. Embed the strips in wet base coat and trowel from the center to the edges of the mesh to avoid wrinkles.
3. Apply detail mesh at trim, reveals and projecting architectural features. Embed the mesh in the wet base coat. Trowel from the base of reveals to the edges of the mesh.
4. Ultra-High impact mesh application (recommended to a minimum height of 6'-0" [1.8 m] above finished grade at all areas accessible to pedestrian traffic and other areas exposed to abnormal stress or impact, and where indicated on contract drawings): apply base coat over the insulation board with a stainless steel trowel to a uniform thickness of approximately 1/8 inch (3 mm). Work horizontally or vertically in strips of 40 inches (1016 mm), and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt ultra-high impact mesh at seams. Allow the base coat to dry.
5. Standard mesh application: Apply base coat over the insulation board, including areas with Ultra-High impact mesh, with a stainless steel trowel to a uniform thickness of approximately 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 2-½ inches (64 mm) at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 6 inch (152 mm) overlap in each direction (optional if corner bead accessory is used – see NOTE to paragraph 3.4.2 H1 above). 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.

6. Sloped Surfaces: for trim, reveals, aesthetic bands, cornice profiles, sills or other architectural features that project beyond the vertical wall plane more than 2 inches (51 mm) apply waterproof base coat with a stainless steel trowel to the sloped surface and minimum four inches (100 mm) above and below it. Embed standard mesh or detail mesh in the waterproof base coat and overlap mesh seams a minimum of 2-½ inches (65 mm).
7. Allow base coat to thoroughly dry before applying finish.

NOTE: *All trim and projecting architectural features must have a minimum 1:2 [27°] slope along their top surface. All 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 (51 mm) from the face of the EIFS wall plane, protect the weather exposed sloped surface with waterproof base coat. Maximum insulation board thickness is 6 inches (152 mm), which includes trim and architectural features. Periodic inspections and increased maintenance may be required to maintain surface integrity of the EIFS on sloped, weather exposed surfaces. Limit projecting features to easily accessible areas and limit total area to facilitate maintenance and minimize maintenance burden. Refer to Sto Details.*

Do not use the EIFS 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.

Finish Coat Application

8. Ensure the base coat surface is free of surface contamination before commencing the finish application.
9. Apply finish directly over the base coat or primed base coat when dry. Apply finish by spray or stainless steel trowel, depending on the finish specified. Follow these general rules for application of finish:
 - a. Avoid application in direct sunlight.
 - b. Apply finish in a continuous application, and work to an architectural break in the wall.
 - c. 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.
 - d. Do not install separate batches of finish side-by-side.
 - e. Do not apply finish into or over sealant joints. Apply finish to outside face of wall only.

- f. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

3.5 PROTECTION

- A. Provide protection of installed materials from water infiltration into or behind them
- B. Provide protection of installed materials from dust, dirt, precipitation, freezing and continuous high humidity until they are fully dry

3.6 CLEANING, REPAIR AND MAINTENANCE

- A. Clean and maintain the EIFS for a fresh appearance and to prevent water entry into and behind the system. 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 or behind the EIFS and anywhere into the wall assembly
- C. Refer to Sto reStore Repair and Maintenance Guide ([reStore Program](#)) for detailed information on restoration - cleaning, repairs, recoating, resurfacing and refinishing, or re-cladding

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