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Sto Guide Specification A5000E

StoEnergy Guard® for Concrete, Concrete Masonry (CMU) and Frame Wall Assemblies

Section 07 27 26

Fluid-Applied Membrane Air Barriers

This specification is intended for use by the design/construction professional and user of Sto products to assist in developing project specifications for the application of StoEnergy Guard – StoGuard (Sto EmeraldCoat Vapor Permeable Air and Moisture Barrier), Dow STYROFOAM™ XPS continuous insulation, and Sto DrainScreen™ cavity wall component, to vertical above grade concrete, concrete masonry, and sheathed wall construction. StoEnergy Guard is designed for use beneath claddings such as brick veneer with a cavity, vinyl, wood, and fiber cement siding. It can also be used behind portland cement stucco with code compliant metal lath and WRB (Water-Resistive Barrier), typically code approved building paper or felt. For this application see StoPowerwall ci specifications. For EIFS cladding see StoTherm® ci and StoTherm ci XPS specifications. For other claddings refer to the applicable building code, cladding manufacturer's attachment requirements, and/or available industry information.

StoGuard functions as an air barrier component and secondary water-resistive barrier (WRB) in wall assemblies. The secondary moisture protection provided by StoGuard protects walls against moisture damage from rain 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 wall assembly, nor is it intended to correct defective components of construction such as windows that leak into the wall assembly. Flashing must always be integrated with the WRB in the wall assembly to direct water to the exterior of the cladding, not into the wall assembly, particularly at potential leak sources such as windows.

An air barrier system minimizes the risk of condensation within the building envelope by eliminating mass transfer of warm moisture laden air into the wall assembly to a cold surface where it can condense. 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 assembly. 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.

The function of an air barrier should not be confused with that of a vapor retarder. A vapor retarder is placed in the wall to resist differential vapor pressures, whereas the air barrier is designed to resist the structural live loads induced by air pressure difference. Generally a vapor retarder is placed on the warm side of the wall. Specifically, it is placed on the interior side of the insulation in cold climates and on the exterior side of the insulation in warm humid climates to minimize condensation within the wall assembly. A vapor retarder may not be necessary depending on the wall components, the range of temperature/humidity conditions inside and outside, and the mechanical ventilation of the building. A vapor retarder should not be used on the interior side of walls in warm humid climates. If a vapor impermeable air barrier is desired refer to information on StoGuard VaporSeal.

Notes in italics, such as this one, are explanatory and intended to guide the design/construction professional and user in the proper selection and use of materials. This specification should be modified where necessary to accommodate individual project conditions. Verify that section titles in this specification are correct for the Project Specifications. Verify that table headers and spacing are aligned after final edit, including table header repeated at top of table, at any new pages.



Table of Contents

PART 1 GENERAL	3
1.1 RELATED DOCUMENTS.....	3
1.2 SUMMARY.....	3
1.3 DEFINITIONS.....	3
1.4 PRE-INSTALLATION MEETINGS.....	4
1.5 REFERENCES.....	4
1.6 COORDINATION/SCHEDULING.....	5
1.7 SUBMITTALS.....	6
1.8 QUALITY ASSURANCE.....	6
1.9 PRE-CONSTRUCTION TESTING	7
1.10 DELIVERY, STORAGE AND HANDLING.....	7
1.11 PROJECT/SITE CONDITIONS.....	8
1.12 WARRANTY.....	8
PART 2 PRODUCTS	8
2.1 MANUFACTURERS.....	8
2.2 MATERIALS.....	8
2.3 PERFORMANCE REQUIREMENTS.....	10
2.4 DESIGN CRITERIA.....	10
PART 3 EXECUTION	11
3.1 EXAMINATION.....	11
3.2 SURFACE PREPARATION.....	12
3.3 AIR BARRIER INSTALLATION.....	13
3.3.1 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, concrete, and concrete masonry (CMU) wall construction.....	13
3.4 CI INSTALLATION	15
3.5 CAVITY WALL COMPONENT INSTALLATION	16
3.6 FIELD QUALITY CONTROL.....	17
3.7 PROTECTION AND CLEANING.....	17

PART 1 GENERAL

1.1 RELATED DOCUMENTS

Retain or delete this article in all sections of the Project Manual

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes materials and installation of vapor permeable fluid applied air and moisture barrier membrane, over vertical above grade concrete walls, concrete masonry walls, and wall sheathing.
- B. Related Requirements *(add/delete, depending on specific project requirements)*:
 - 1. Section 03 30 00: Cast-In-Place Concrete
 - 2. Section 04 22 00: Concrete Unit Masonry
 - 3. Section 06 16 00: Sheathing
 - 4. Section 07 25 00: Weather Barriers
 - 5. Section 07 26 00: Vapor Retarders
 - 6. Section 07 50 00: Membrane Roofing
 - 7. Section 07 60 00: Flashing and Sheet Metal
 - 8. Section 07 90 00: Joint Protection
 - 9. Section 08 50 00: Windows

1.3 DEFINITIONS

- A. Air Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air Barrier Auxiliary Material: A transitional component that provides air barrier continuity furnished by a source other than the primary air barrier manufacturer.
- D. Air Barrier Assembly: The collection of air barrier materials, accessory and auxiliary materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.
- E. Continuous Insulation (CI): insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. For purposes of this guide specification it is installed on the exterior of the building envelope.
- F. Cavity Wall Component: component material added to wall assembly to create a cavity beneath cladding for enhanced drainage and drying potential.

1.4 PRE-INSTALLATION MEETINGS

- A. Pre-installation Conference
 - 1. Review air barrier, CI, and cavity wall component installation requirements and installation details, mock-ups, testing requirements, protection, and sequencing of work.

1.5 REFERENCES

- A. Building Code and Material Evaluation Service Standards
 - ICC ES AC 212 February, 2015, ICC Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing
 - 2012, 2015 IBC International Building Code
 - 2012, 2015 IRC International Residential Code
 - 2012, 2015 IECC International Energy Conservation Code
- B. ASTM Standards
 - C 297-94 Test Method for Tensile Strength of Flat Sandwich Constructions in Flat wise Plane
 - C 578-01 Specification for Pre-formed Cellular Polystyrene Insulation Board
 - C 1177-08 Specification for Glass Mat Gypsum Substrate for Use as Sheathing
 - D 226-09 Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
 - D 522-93a Test Methods for Mandrel Bend Test of Attached Organic Coatings
 - D 1970-00 Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D 3273-00 Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 - D 4541-09 Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
 - E 84-98 Test Method for Surface Burning Characteristics of Building Materials
 - E 96-00 Test Method for Water Vapor Transmission of Materials
 - E 119-98 Standard Test Methods for Fire Tests of Building Construction and Materials
 - E 330-10 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 - E 331-09 Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
 - E 779-10 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
 - E 783-02 Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
 - E 1186-03 (2009) Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems
 - E 1827-96 (2007) Standard Test Methods for Determining Air Tightness of Buildings Using an Orifice Blower Door
 - E 2178-03 Test Method for Air Permeance of Building Materials

- E 2357-05 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
- C. APA – The Engineered Wood Association
E30U-2007 Engineered Wood Construction Guide
- D. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)
2005 ASHRAE Handbook Fundamentals
ASHRAE 90.1 2010, Energy Standard for Buildings Except Low-Rise Residential Buildings
ASHRAE 189.1 2009, Standard for the Design of High Performance Green Buildings Except Low-Rise Residential Buildings
- E. ICC ES (International Code Council Evaluation Service)
AC 212 Acceptance Criteria for Water-resistive Coatings used as Water-resistive Barriers over Exterior Sheathing
ICC ESR 1233 StoGuard with Gold Coat, StoGuard with EmeraldCoat, and StoGuard VaporSeal Water-resistive Barriers and StoEnergy Guard
ICC ESR 2142 Styrofoam Brand Insulation Boards and Dow Fan-Fold Products
- F. National Fire Protection Association (NFPA)
NFPA 285 Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components
- G. Proprietary
Sto Corp. Tech Hotline No. 0211-BSc Air Barrier Connections and StoGuard
- H. South Coast Air Quality Management District (SCAQMD)
Rule 1113 (2007) Architectural Coatings

1.6 COORDINATION/SCHEDULING

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

- A. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuous air barrier.
- B. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall.
- C. Provide sill flashing to direct water to the exterior before windows and doors are installed.
- D. Install window and door head flashing immediately after windows and doors are installed.
- E. Install diverter flashings wherever water can enter the assembly to direct water to the exterior.
- F. Install parapet cap flashing and similar flashing at copings and sills to prevent water entry into the wall assembly.
- G. Install CI or cladding within 180 days of air and moisture barrier installation.

- H. Install cavity wall component within 60 days of CI installation.
- I. Install cladding within 30 days of cavity wall component installation.

1.7 SUBMITTALS

- A. Manufacturer's specifications, details and product data for air barrier, WRB, CI, and cavity wall component
- B. Manufacturer's standard warranty
- C. Manufacturer's ICC evaluation report confirming compliance with the IBC, IRC, and IECC as an air barrier and water-resistive barrier
- D. Manufacturer's ICC evaluation report confirming code compliance with IBC, IRC, and IECC of continuous insulation component
- E. Samples for approval as directed by architect or owner
- F. Shop drawings: substrate joints, cracks, flashing transitions, penetrations, corners, terminations, and tie-ins with adjoining construction, and interfaces with separate materials that form part of the air barrier assembly

1.8 QUALITY ASSURANCE

- A. Manufacturer requirements
 - 1. Manufacturer of exterior wall air and moisture barrier materials for a minimum of 30 years in North America.
 - 2. ISO 9001:2008 Certified Quality System and ISO 14001:2004 Certified Environmental Management System.
 - 3. CI component listed through independent third party listing agency
- B. Contractor requirements
 - 1. Knowledgeable in the proper use and handling of Sto materials.
 - 2. Employ skilled mechanics who are experienced and knowledgeable in waterproofing and air barrier application, and familiar with the requirements of the specified work.
 - 3. Provide the proper equipment, manpower and supervision on the job-site to install the air barrier assembly in compliance with the project plans & specifications, shop drawings, and Sto's published specifications and details.
- C. Regulatory Compliance
 - 1. Primary air barrier and joint treatment reinforcement materials:
 - a. Listed by IBC and recognized for use on all types of construction. Refer to ICC ESR 1233 for limitations.
 - b. Comply with VOC requirements of SCAQMD Rule 1113.
 - c. Comply with air barrier material requirements of ASHRAE 90.1 – 2010, 2013
 - d. Comply with air barrier material requirements of ASHRAE 189.1 - 2009
 - e. Comply with 2012 and 2015 IRC requirement for a continuous air barrier

- f. Comply with air barrier material requirements of 2012 and 2015 IBC and IECC
- g. Evaluated and Listed by ABAA as an air barrier material.
- 2. CI component listed by ICC ES and recognized for use on all types of construction.
- D. Mock-ups
 - 1. Build stand-alone site mock up or sample wall area on as-built construction to incorporate back-up wall construction, typical details covering substrate joints, cracks, flashing transitions, penetrations, corners, terminations, tie-ins with adjoining construction, and interfaces with separate materials that form part of the air barrier, CI, and cavity wall component assembly.

1.9 PRE-CONSTRUCTION TESTING

- A. Conduct testing by qualified test agency or building envelope consultant.
 - 1. Conduct assembly air leakage testing in accordance with ASTM E 783.
 - 2. Conduct adhesion testing to substrates in accordance with ASTM D 4541.
 - 3. Conduct wet sealant compatibility testing in accordance with sealant manufacturer's field quality control test procedure.
 - 4. Notify design professional minimum 7 days prior to testing.

1.10 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 temperatures and temperatures in excess of 90 degrees F (32 degrees C). Store away from direct sunlight.
- C. Protect spray foam adhesive from freezing and direct sunlight and avoid contact with water. Store in a clean dry room at temperatures ranging from 50-75 degrees F (10-24 degrees C). Keep away from sources of heat, sparks, flame, ignition and physical abuse. Avoid temperatures above 110 degrees F (43 degrees C). Use only with adequate ventilation.
- D. Protect Portland cement based materials (bag products) from moisture and humidity. Store under cover off the ground in a dry location.
- E. Protect insulation materials from prolonged UV exposure, keep away from sources of heat, sparks, flame, flammable or volatile materials. Store on a clean, flat surface, off the ground in a dry area.
- F. Store cavity wall component in a dry area and protect from direct sunlight.
- G. Protect and store accessory and auxiliary products in accordance with manufacturer's written instructions.
- H. Handle all products as directed on labeling.

1.11 PROJECT/SITE CONDITIONS

- A. Maintain ambient and surface temperatures above 40 degrees F (4 degrees C) during application and drying period, minimum 24 hours after application of waterproof air barrier materials, CI adhesive, and spray foam material.
- B. Provide supplementary heat for installation in temperatures less than 40 degrees F (4 degrees C) or if surface temperature is likely to fall below 40 degrees F (4 degrees C).
- C. Do not use spray foam material when surface or ambient temperatures are at 110 degrees F (43 degrees C) or above during application or curing period.
- D. Provide protection of surrounding areas and adjacent surfaces from application of materials.

1.12 WARRANTY

- A. Provide manufacturer's standard warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Sto Corp. – air barrier and cavity wall component
- B. Dow Chemical Company – CI component
- C. Obtain primary air barrier and accessory air barrier materials, and cavity wall component from single source.

2.2 MATERIALS

- A. Primary Air Barrier Material: StoGuard with Sto EmeraldCoat - ready-mixed flexible spray or roller applied air and moisture barrier material.
- B. Accessory Materials
 - 1. Sheathing Joint Treatments (*select one*)
 - a. StoGuard RapidFill™: one component rapid drying gun-applied joint treatment for sheathing joints.
 - b. Sto Gold Fill® with StoGuard Mesh: ready mixed coating applied by trowel or knife over nominal 4.2 oz/yd² (142 g/m²) self-adhesive, flexible, symmetrical, interlaced glass fiber mesh.
 - c. Sto EmeraldCoat® with StoGuard Fabric: flexible air and moisture barrier membrane material for embedding non-woven integrally reinforced cloth reinforcement.
 - 2. Rough Opening Treatments (*select one*)
 - a. StoGuard RapidSeal: one component rapid drying gun-applied rough opening protection for frame and CMU walls. Also used as a detail component for shingle lap transition at flashing.
 - b. Sto EmeraldCoat with StoGuard Fabric and StoGuard Redicorner™: flexible air and moisture barrier membrane material with non-woven integrally reinforced cloth



- reinforcements. Also used as a detail component for shingle lap transition at flashing.
 - c. Sto Gold Fill with StoGuard Mesh: ready mixed coating applied by trowel or knife with nominal 4.2 oz/yd² (142 g/m²) self-adhesive, flexible, symmetrical, interlaced glass fiber mesh. Also used as a detail component for shingle lap transition at flashing.
 - d. StoGuard Tape: self-adhered rubberized asphalt tape for frame walls with polyester fabric facing.
3. Transition Membrane
- a. StoGuard Transition Membrane: flexible air barrier membrane for continuity at transitions: sheathing to foundation, dissimilar materials (CMU to frame wall), wall to balcony floor slab or ceiling, flashing shingle lap transitions, floor line deflection joints, masonry control joints, and through wall joints in masonry or frame construction.
 - b. StoGuard RapidFill: one component gun-applied air and moisture barrier membrane material for continuity at static transitions such as: flashing shingle laps, wall to balcony floor slab or ceiling, and through wall penetrations such as pipes, electrical boxes, and scupper penetrations.
4. Sealant
- a. StoGuard RapidSeal – one component rapid drying air and moisture barrier membrane material for sealing fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials
 - b. StoGuard RapidFill - one component rapid drying waterproof air and moisture barrier membrane material for sealing fish mouths, wrinkles, seams, gaps, holes, or other voids in StoGuard air barrier materials
5. Primers
- a. StoGuard Primer: rubber resin emulsion primer for use with StoGuard Tape to enhance adhesion.
- C. Auxiliary Materials (*by others*)
- 1. Wet sealant: Dow Corning 758, 790, 791, and 795 sealants
 - 2. Pre-cured sealant tape: Dow 123
 - 3. Spray adhesive: 3M Super 77 Spray Adhesive
 - 4. Spray foam: Dow Great Stuff for Gaps and Cracks
- D. Patch and Leveling Material for Concrete and Masonry
- 1. Sto Leveler: polymer modified cementitious patch and leveling material for prepared concrete and masonry surfaces for leveling up to 1/4 inch (6 mm).
 - 2. Sto BTS-Xtra: polymer modified lightweight cementitious patch and leveling material for prepared concrete and masonry surfaces for leveling up to 1/8 inch (3 mm).
- E. CI Adhesive (*select one*)
- 1. Sto TurboStick: single component polyurethane spray foam adhesive
 - 2. Sto ExtraSeal: single component polymer modified portland cement-based adhesive

F. Continuous Insulation (CI)

1. Dow STYROFOAM: Type IV extruded polystyrene (XPS) rigid insulation board scored longitudinally at 16 and 24 inches (406 and 610 mm) on center.

2.3 PERFORMANCE REQUIREMENTS

A. Air Barrier

1. Durability, resistance to aging, water and water penetration resistance, structural loading joint treatment and primary air barrier material, comply with ICC ES AC 212
2. Flexibility: ASTM D 522, primary air barrier material, no cracking or delamination before and after aging using 1/8 inch (3 mm) mandrel at 14° F (10° C)
3. Nail sealability: ASTM D 1970, 7.9.1, primary air barrier passes
4. Resistance to mold: ASTM D 3273, no mold growth after 28 day exposure
5. Adhesion: joint treatment and primary air barrier material, ASTM C 297 or D 4541, ≥ 30 psi (207 kPa), or exceeds strength of glass mat facing on glass mat gypsum substrates
6. Surface burning: ASTM E 84, joint treatment and primary air barrier material flame spread ≤ 25 , smoke developed ≤ 450 , Class A building material
7. Water vapor permeance: ASTM E 96 Method B, > 10 perms (570 ng/Pa·s·m²)
8. Field adhesion testing: ASTM D 4541, ≥ 30 psi (207 kPa) or exceeds strength of glass mat facing on glass mat gypsum substrates
9. Fire resistance: ASTM E 119, capable of maintaining a 1 hour fire-resistance rating with maximum 3 inch (76 mm) Dow STYROFOAM Type IV XPS insulation board and minimum 3/4 inch (22 mm) ASTM C 926 compliant stucco in a non-load bearing assembly (refer to Sto for assembly details and ICC-ESR 1233).
10. Building envelope air leakage: ASTM E 779 or 1827, ≤ 0.4 cfm/ft² (2 L/s·m²)
11. Material air leakage: ASTM E 2178, primary air barrier and joint treatment < 0.004 cfm/ft² at 1.57 psf (0.02 L/s·m² at 75 Pa)
12. Assembly air leakage: ASTM E 2357, ≤ 0.04 cfm/ft² (0.2 L/s·m²) air leakage after conditioning protocol
13. Fire propagation: NFPA 285, meets requirements for use on all Types of construction. Refer to ICC-ESR 1233.
14. Volatile Organic Compounds: SCAQMD Rule 1113, joint treatment and primary air barrier material ≤ 100 g/L
15. Water-resistive barrier: ICC ES 212, joint treatment and primary air barrier comply and are listed in a valid ICC ESR.

2.4 DESIGN CRITERIA

A. Structural (Wind and Axial Loads)

1. Design for maximum allowable deflection normal to the plane of the wall: L/240. Where cladding dictates stiffer deflection criteria use cladding design criteria for maximum allowable deflection.
2. Design for wind load in conformance with code requirements.

- B. Moisture Control
 - 1. Prevent the accumulation of water in the wall assembly and behind the exterior wall cladding:
 - a. Minimize condensation within the assembly.
 - b. Drain water directly to the exterior where it is likely to penetrate components in the wall assembly (windows and doors, for example).
 - c. Provide corrosion resistant flashing to direct water to the exterior in accordance with code requirements, including: above window and door heads, beneath window and door sills, at roof/wall intersections, floor lines, decks, intersections of lower walls with higher walls, and at the base of the wall.
- C. Air Barrier Continuity: provide continuous air barrier assembly of compatible air barrier components.
- D. Substrates
 - 1. Concrete Masonry Units: provide CMU surfaces in conformance with the applicable building code, and such that a void and pinhole free air barrier is achieved. Provide normal weight units with flush joints (struck flush with the surface) and allow for a minimum of 2 coats of the primary air barrier material applied by spray or roller. Alternatively, for “rough” CMU wall surfaces allow for a cementitious parge coat to fill and level irregular surfaces, prior to 1 coat of the primary air barrier material.
 - 2. Concrete: provide concrete in conformance with the applicable building code.
 - 3. Sheathing: provide gypsum sheathing in compliance with ASTM C 1177, provide APA Exterior or Exposure 1 wood-based sheathing, and provide sheathing that meets required design wind pressures.
- E. Fire Protection
 - 1. Provide 15 minute thermal barrier, typically minimum ½ inch thick interior gypsum wall board, to separate foam plastic insulation from interior.
 - 2. For noncombustible Type construction: provide wall assembly that has been tested or evaluated for compliance with NFPA 285 acceptance criteria. Limit foam plastic insulation thickness to that tested or evaluated per NFPA 285. Provide minimum 4 pcf semi-rigid mineral wool fire stops at floor lines where metal framing runs continuously past floor line.
 - 3. For construction that requires an hourly fire resistance rating: provide wall assembly that has been tested or evaluated for required rating in conformance with ASTM E 119.
- F. Mechanical Ventilation: maintain pressurization and indoor humidity levels in accordance with recommendations of ASHRAE (see 2005 ASHRAE Handbook—Fundamentals).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Inspect concrete and concrete masonry surfaces for:
 - 1. Contamination - algae, dirt, dust, efflorescence, form oil, fungus, grease, mildew or other foreign substances.
 - 2. Surface deficiencies - weak, friable, chalkiness, laitance, bugholes, and spalls.

3. Cracks - measure crack width and record location of cracks.
 4. Damage or deterioration.
 5. Moisture content and moisture damage — use a moisture meter to determine if the surface is dry enough to receive the waterproof air barrier and record any areas of moisture damage or excess moisture.
 6. Flush masonry mortar joints completely filled with mortar.
- B. Inspect sheathing application for compliance with applicable requirement:
1. Exterior Grade and Exposure I wood based sheathing: E30U-2007, Engineered Wood Construction Guide, and the requirements of the applicable building code.
 2. Glass mat faced gypsum sheathing in compliance with ASTM C 1177: consult manufacturer's published recommendations and ICC ES Report. Conform with project requirements for wind load resistance.
 3. Cementitious sheathing — Consult manufacturer's published recommendations and ICC ES Report. Conform with project requirements for wind load resistance.
- C. Report deviations from the requirements of project specifications or other conditions that might adversely affect the air and moisture barrier installation. Do not start work until deviations are corrected.

3.2 SURFACE PREPARATION

A. Concrete Masonry

1. Surface must be structurally sound and free of weak or damaged surface conditions such as laitance or spalls. Surface must be clean, dry, frost-free, and free of any bond-inhibiting materials such as dust, dirt, oil, algae, mildew, salts, efflorescence, or any other surface contamination. Mortar joints must be struck flush with the surface.
2. Remove excess mortar from masonry ties, lintels and shelf angles.
3. Remove loose or damaged material by water-blasting, sandblasting or mechanical wire brushing. Remove surface contamination such as dirt or efflorescence by chemical or mechanical means. Repair surface defects such as spalls, voids and holes with Sto BTS Xtra (up to 1/8 inch [3 mm] thick) or Sto Leveler (up to 1/4 inch [6 mm] thick).
4. Repair non-structural cracks up to 1/8 inch (3 mm) wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint treatment material over crack, embed reinforcement (where applicable), and smooth joint treatment material with a trowel, drywall or putty knife to cover the reinforcement.

IMPORTANT: *For "rough" CMU wall surfaces skim coat the entire wall surface with the leveling material to fill and level the surface prior to applying the air and moisture barrier membrane and transition materials. When a skim coat of the leveling material is installed only one coat of the air and moisture barrier coating is typically required. Use the mock-up and site tests as the basis for the work.*

B. Concrete

1. Surface must be structurally sound and free of weak or damaged surface conditions such as laitance, bugholes, or spalls. Surface must be clean, dry, frost-free, and free of any

bond-inhibiting materials such as dust, dirt, oil, form release, algae, mildew, salts, efflorescence, or any other surface contamination.

2. Remove projecting fins, ridges, form ties, and high spots by mechanical means.
3. Remove loose or damaged material by water-blasting, sandblasting or mechanical wire brushing. Remove form release by chemical or mechanical means. Repair surface defects such as honeycombs, pitting, spalls, voids or holes with Sto BTS Xtra (up to 1/8 inch [3 mm] thick) or Sto Leveler (up to 1/4 inch [6 mm] thick).
4. Repair non-structural cracks up to 1/8 inch (3 mm) wide by raking with a sharp tool to remove loose, friable material and blow clean with oil-free compressed air. Apply joint treatment material over crack, embed reinforcement (where applicable), and smooth joint treatment material with a trowel, drywall or putty knife to cover the reinforcement.

C. Sheathing

1. Remove and replace damaged sheathing.
2. Spot surface defects such as over-driven fasteners, knot holes, or other voids in sheathing with knife grade joint treatment material.
3. Spot fasteners with knife grade or coating joint treatment material.

3.3 AIR BARRIER INSTALLATION

3.3.1 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, concrete, and concrete masonry (CMU) wall construction

- A. Coordinate work with other trades to ensure air barrier continuity with connections at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.
- B. Transition Membrane Detailing: detail transition areas with StoGuard Transition Membrane to achieve air barrier continuity. For illustrations of installation, including complex geometries such as inside and outside corners, refer to Sto Guide Details and StoGuard Transition Membrane Installation Guide (www.stocorp.com).
- C. Floor line deflection joints up to 1 inch (25 mm) wide, static joints and transitions – sheathing to foundation, dissimilar materials (CMU to frame wall), flashing shingle lap transitions, wall to balcony floor slab or ceiling:
 1. Apply air and moisture barrier coating (Sto EmeraldCoat) liberally to properly prepared surfaces with brush, roller, or spray.
 2. Place pre-cut lengths of StoGuard Transition Membrane centered over the transition in the wet coating. At changes in plane crease the membrane and similarly place the membrane material in the wet coating.
 3. Immediately top coat the membrane with additional coating and apply pressure with brush or roller to fully embed the membrane in the coating and achieve a smooth and wrinkle-free surface without gaps or voids.
 4. Apply coating liberally along all top horizontal edges on walls and along all edges on balcony floor slabs to fully seal the edges.

5. Overlap minimum 2 inches (51 mm) at ends and adhere lap seams together with coating. Shingle lap vertical seams and vertical to horizontal intersections with minimum 2 inch (51 mm) overlap.
- D. Movement joints up to 1 inch (25 mm) wide and up to \pm 50% movement: masonry control joints, through wall joints in masonry or frame construction
1. Insert backer rod sized to friction fit in the joint (diameter 25% greater than joint width).
 2. Recess the backer rod $\frac{1}{2}$ " (13 mm).
 3. Apply the waterproof coating liberally to properly prepared surfaces with brush, roller, or spray along each side of the joint (not in the joint).
 4. Immediately place the membrane by looping it into the joint against the backer rod surface to provide slack.
 5. Embed the membrane in the wet coating along the sides of the joint by top coating with additional coating material and applying pressure with a brush or roller.
- E. After the membrane installation is complete and the air and moisture barrier coating is dry:
1. Apply a final liberal coat of the coating to all top horizontal edges on walls to ensure waterproofing integrity. Similarly apply coating at all edges on balcony floor slabs.
 2. Inspect the installed membrane for fish mouths, wrinkles, gaps, holes or other deficiencies. Correct fish mouths or wrinkles by cutting, then embedding the area with additional coating applied under and over the membrane.
 3. Seal gaps, holes, and complex geometries at three dimensional corners with StoGuardRapidSeal or StoGuard RapidFill.
- F. Rough opening protection (*select one*):
1. Install rough opening protection. Refer to Sto details 20.20M, 20.20F, 20.20FT, 20.20T, 20.20R, 21.20G, and 21.20R and applicable Sto product bulletins.
- G. Sheathing joints
1. Install joint treatment material with applicable reinforcement over sheathing joints. Refer to Sto detail 20.00a and applicable Sto product bulletins.
- H. Air and moisture barrier coating
1. Concrete – install one coat of Sto EmeraldCoat by spray or roller in a uniform, continuous wet film of 10 mils to the prepared concrete substrate. Do not install over working or moving joint sealants.
 2. Concrete Masonry - install one liberal coat of Sto EmeraldCoat by spray or roller in a uniform, continuous film to the prepared concrete masonry substrate. Backroll spray applications. Allow to dry. Install a second liberal coat in a uniform, continuous film, and backroll spray applications, to achieve a void and pinhole free surface. Depending on the condition of the surface a minimum of 10 wet mils up to a maximum of 30 wet mils per coat is required. Apply additional coats if needed to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.

IMPORTANT: *The number of coats and thickness is highly dependent on CMU composition, unit weight (lightweight or normal weight), porosity, joint profile, and other variables that may exist. For "rough" CMU wall surfaces skim coat the entire wall surface with the leveling material to*

fill and level the surface prior to applying the air barrier coating and transition materials. When a skim coat of the leveling material is installed only one coat of the air and moisture barrier coating is typically required. Use the mock-up and site tests as the basis for the work.

3. Sheathing
 - a. Glass mat faced gypsum sheathing: install one coat of Sto EmeraldCoat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared glass mat gypsum substrate to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.
 - b. Plywood sheathing: install one coat of Sto EmeraldCoat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared substrate to achieve a void and pinhole free surface. Do not install over working or moving joint sealants.
 - c. OSB sheathing: install one coat of Sto EmeraldCoat by spray or roller in a uniform, continuous film of 10 wet mils to the prepared substrate and to a void and pinhole free surface. Inspect surface and touch-up with a second coat at raised wood strands. Do not install over working or moving joint sealants.

3.4 CI INSTALLATION

(Select one method)

IMPORTANT: *Adhesive or mechanical attachment of Dow STYROFOAM Type IV XPS is temporary attachment intended to hold the insulation board in place prior to permanent attachment with cladding fasteners or clips. Maximum recommend board size for adhesive attachment is 2 x 8 ft (0.6 x 2.4 m).*

- A. General rules for installation of CI
 1. Cut boards at 16 or 24 inch (406 or 610 mm) score lines as needed to accommodate spacing of clips, ties, or furring in wall assembly.
 2. Install boards in a running bond pattern with vertical joints offset. Stagger joints minimum 6 inches (152 mm) from sheathing joints. Cut insulation in an
 3. “L” shape around openings in the wall to avoid alignment of joints with corners. Tightly abut insulation board joints and interlock boards at inside and outside corners.
 4. Trim or rasp boards for flush, square corners.
 5. Where brick ties or other elements penetrate the insulation pre-fit and cut the insulation, or install in a manner to avoid breakage and gaps in the insulation.
 6. Seal gaps and open joints in insulation with StoTurboStick spray foam. After adhesive sets, rasp or shave expanded foam flush with the surface if necessary for cladding attachment. Do not install CI over working or moving joints or joint sealants.
- B. Adhesive attachment methods with Sto ExtraSeal
 1. Notched Trowel Method (where drainage behind the insulation board is required):
 2. Apply a uniform coat of Sto ExtraSeal at approximately 3/8 inch (9 mm) thick by spray or trowel to the wall surface. Form vertical ribbons of adhesive with a 1/2 x 1/2 x 2 inch (13 x 13 x 51 mm) “U”- notched trowel. Alternatively, apply adhesive uniformly to the back of the insulation board and form vertical ribbons of adhesive with the notched trowel.

3. Dab Method: apply dabs of adhesive to the back of insulation boards with a minimum 4 inch (102 mm) drywall knife or trowel in 2 rows of minimum 7 dabs per row. Space adhesive dabs evenly across the length of the board at no more than 16 inches (406 mm) on center. Space dabs in rows of no more than 16 inches (406 mm) on center and no more than 3 inches (76 mm) from board ends and edges.
 4. Immediately place insulation boards against the wall surface before adhesive “skins”. If adhesive “skins” remove and apply fresh material. Install insulation with firm, even pressure applied along the full dimension of the boards in courses starting from the base of the wall in a running bond pattern.
- C. Adhesive attachment method with Sto TurboStick (where drainage behind the insulation board is required)
1. Apply uniformly spaced vertical ribbons of adhesive at no more than 7 inches (178 mm) on center and spaced approximately ¾ inch (19 mm) from board ends and ½ inch (13 mm) from board edges.
 2. Install boards with LIGHT even pressure across the face of the boards.
 3. Several minutes after the boards are placed it may be necessary to re-apply light even pressure with a straight edge to maintain the plane of the insulation boards, as the adhesive expands slightly while curing.
- D. Mechanical attachment method
1. Attach insulation boards to solid substrate or framing with corrosion resistant metal screws and 1-1/4 inch metal lath locks or other corrosion resistant cap fastener. Use only enough fasteners (typically 3 per board mid-span) to temporarily hold the board in place, as cladding attachment is intended to permanently hold it in place. If cladding installation is delayed, use additional fasteners to attach CI.

3.5 CAVITY WALL COMPONENT INSTALLATION

(Add or delete depending on wall assembly design)

Note: cavity wall component is intended for use with claddings that do NOT have a discrete cavity such as portland cement stucco, adhered masonry veneer, and siding (where approved by siding manufacturer). For claddings or veneers that incorporate a cavity such as brick veneer, siding installed over furring, and some metal panels, the cavity wall component may not be applicable.

- A. Install cavity wall component over continuous insulation
1. Place drainage mat against the wall surface and unroll horizontally with the fabric facing out, starting from the bottom of the wall at base flashing or weep screed and working up.
 2. Use “foam tacs” to temporarily hold the mat in place. Do not fasten through flashing.
 3. Shingle lap fabric at horizontal courses. Shingle lap drainage mat over flashing at floor lines, decks, roof lines, window heads, and other areas where flashing is required, to direct water to the exterior.
 4. Butt ends of rolls and vertical seams. Trim around windows, doors, vents, or other penetrations through the wall. Do not install behind window nail flanges.
 5. Immediately follow installation of drainage mat with cladding installation

3.6 FIELD QUALITY CONTROL

- A. Owner's qualified testing agency or building envelope consultant shall perform inspections and tests.
- B. Inspections: air barrier and CI materials are subject to inspection to verify compliance with requirements.
 - 1. Condition of substrates and substrate preparation.
 - 2. Installation of primary air barrier material, accessory materials, and compatible auxiliary materials over structurally sound substrates and in conformance with architectural design details, contractor's shop drawings, project mock-up, and manufacturer's written installation instructions.
 - 3. Air barrier continuity and connections without gaps and holes at foundation, floor lines, flashings, lintels and shelf angles, openings and penetrations such as pipes, vents, windows and doors, masonry anchors, rafters or beams, joints in construction, projections such as decks and balconies, and roof line.
 - 4. CI continuity and sealing without gaps or cracks at joints and penetrations.
- C. Tests: air barrier materials and assembly are subject to tests to verify compliance with performance requirements:
 - 1. Qualitative air leakage test: ASTM E 1186
 - 2. Quantitative air leakage test: ASTM E 779, E 783, and E 1827
 - 3. Adhesion test: ASTM D 4541
 - 4. Qualitative adhesion and compatibility testing: wet sealant manufacturer's field quality control adhesion test
- D. Repair non-conforming substrates, air barrier, CI, and cavity wall component installation to conform with project requirements.
- E. Take corrective action to repair and replace, reinstall, seal openings, gaps, or other sources of air leakage and CI gaps or discontinuities to conform with project performance requirements.

3.7 PROTECTION AND CLEANING

- A. Protect air barrier materials, CI, CI adhesives, and cavity wall component from damage during construction caused by wind, rain, freezing, continuous high humidity, or prolonged exposure to sun light.
- B. Protect air barrier materials, CI, CI adhesives, and cavity wall component from damage from trades, vandals, and water infiltration during construction.
- C. Repair damaged materials to meet project specification requirements.
- D. Clean spills, stains, soiling from finishes or other construction materials that will be exposed in the completed work with compatible cleaners.
- E. Remove all masking materials after work is completed.



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