



Building with conscience.

Sto Corp.

3800 Camp Creek Parkway
Building 1400, Suite 120
Atlanta, GA 30331
Tel: 404-346-3666
Toll Free: 1-800-221-2397
Fax: 404-346-3119
www.stocorp.com

**Sto Guide Specification 5700
StoTherm® ci MVES**

Section 07 24 19

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 MVES to vertical above grade exterior wall construction. StoTherm ci MVES is a water-drainage exterior insulation and finish system (EIFS) with adhered masonry veneer (AMV). The full system consists of six components: air and water-resistive barrier, adhesive, continuous insulation, reinforcing mesh, base coat, and AMV finish (with grout). The system integrates seamlessly with StoTherm ci GPS (and StoTherm ci) and is ideal for use as an impact and abrasion resistant exterior wainscoting. 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.

Design Guidance

General Description

StoTherm ci MVES (Masonry Veneer Engineered System) is an exterior insulated wall cladding with adhered masonry veneer and is intended for use on vertical above grade exterior walls. It incorporates an air and water-resistive barrier (AWRB) and continuous exterior insulation attached with vertical ribbons of adhesive to the AWRB, which forms a drainage cavity. A glass fiber mesh reinforced base coat is installed over the continuous insulation, which serves as a base to attach thin brick, thin natural stone, ceramic tile, or manufactured stone with Sto high performance masonry veneer adhesive. The system combines seamlessly with other Sto decorative and protective architectural finishes on a single substrate to facilitate design and installation detailing.

Structural Considerations

StoTherm ci MVES is a non-structural exterior wall cladding. It is non-load bearing and does not provide racking resistance, nor is it to be used as a base for mechanical anchoring of attachments such as signage or light fixtures. The structural backup wall, typically concrete, concrete masonry, or a frame wall with sheathing, must be designed and built for these purposes in accordance with the applicable building code.

Wind Load Resistance: design deflection criteria for StoTherm ci MVES is L/360. StoTherm ci MVES transfers positive wind loads to the supporting wall construction and resists negative wind loads via adhesive attachment to a substrate.

Frame Wall Construction: the system requires minimum 2x4 wood studs or minimum 18 gage steel studs with maximum stud spacing of 16 inches (406mm) on center.

Generally, StoTherm ci MVES is not determine ultimate wind load capacity when installed on frame walls. The supporting frame wall construction, or sheathing attachment, typically dictates ultimate load capacity of the assembly. Consult ICC ESR-1748 for allowable wind loads (published values have a safety factor of 3 applied to ultimate loads). In some cases, such as painted wall substrates, where adhesion may not be possible, full mechanical attachment is necessary. Refer to ICC ESR-1030 for information on allowable wind loads of mechanically attached StoTherm ci systems.

Fire Protection

StoTherm ci MVES uses combustible foam plastic insulation as its insulating component. Use of foam plastics on exterior walls is covered in Chapter 26 of the IBC (International Building Code), which requires certain tests to allow use of foam plastics on noncombustible construction. Based on testing and evaluation of StoTherm ci MVES in accordance with NFPA 285 and NFPA 268 (and other fire tests and criteria listed in the code), the system complies with requirements for use on noncombustible construction (Types I, II, III, and IV). The system may also be used on combustible (Type V) construction.

Where a fire resistance rating is required, in general, StoTherm ci MVES does not add to nor detract from the rating of an hourly rated load bearing or non-load bearing concrete, concrete masonry, or steel frame base wall assembly, based on testing and evaluation in accordance with ASTM E119.

Refer to ICC ESR-1748 for more information on tested assemblies. Note that certain assemblies may be extended beyond the recognition provided in the ICC evaluation report through engineering judgments on file at Sto Corp., or by way of modeling or rational analysis applied to the particular product or assembly in question.

Moisture Protection and Problem Prevention

StoTherm ci MVES has redundant built-in moisture protection with StoGuard®, the air and water-resistive barrier component in the assembly. StoGuard is applied to the structural backup wall and protects against water damage from rain during construction when the building is “closed-in,” and in the event of a breach in the wall cladding while in service. StoGuard is available as a vapor permeable or vapor impermeable fluid-applied membrane.

The system also has built-in drainage capability. When properly combined with flashing, the system effectively drains water, based on testing in accordance with ASTM E2273.

StoGuard is not intended to correct faulty design or workmanship, such as the absence or improper integration of flashing, roofing, copings, and sealants in the construction, which shed water and prevent water entry into wall construction. StoGuard is not intended to correct defective components of construction such as windows that leak into the wall assembly. Basic principles that should be followed in the design, detailing, and construction of the wall are listed below.

- Flashing: 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.
- Air Leakage Prevention: provide continuity of the air barrier assembly at foundation, roof, windows, doors, and other penetrations through the wall with connecting and compatible air barrier components, to minimize condensation caused by air movement. In most cases StoGuard Detail Components will facilitate detailing at these transitions. Take into account construction sequencing when designing an airtight assembly and the effects of airtightness on mechanical ventilation in the overall project design.
- Water Vapor Diffusion: perform a dew point analysis and/or dynamic hygrothermal modeling of the wall assembly to determine the potential for accumulation of moisture by diffusion of water vapor. Adjust insulation thickness and/or other wall assembly components accordingly to eliminate or minimize the risk of a dew point in the wall assembly. Avoid the use of vapor retarders on the interior side of the wall in hot, humid climates.
- Terminations and Sealants: Provide minimum 1/2 inch (13 mm) wide perimeter sealant joints at all penetrations through StoTherm ci MVES (windows, doors, scuppers, mechanical, electrical, and plumbing penetrations, etc.).
 - Size joints at terminations based on anticipated movement and specify sealant and backer rod that is compatible with StoTherm ci MVES, supported by the sealant manufacturer's certificate of compatibility. Typically, sealant is adhered to the StoTherm ci MVES reinforced base coat or primed base coat, or to the masonry veneer unit.
 - Conduct field adhesion testing to verify adhesion compatibility and obtain the sealant manufacturer's adhesion data to the sealant substrate(s).
 - Maintain air barrier continuity across joints. Drain joints to the exterior or provide other means to prevent or control water infiltration at joints.
- Grade Condition: Provide minimum 6-inch (152mm) clearance above grade or as required by code. Do not specify StoTherm ci MVES for use below grade.
- Mock-ups and Testing: construct a mock-up and conduct testing of the opaque wall-to-window assembly and other critical construction details to verify performance – air leakage resistance (ASTM E283), resistance to wind-driven rain (ASTM E331), and wind load resistance (ASTM E330).

Do not use StoTherm ci MVES on surfaces subject to continuous or intermittent water immersion or hydrostatic pressure. Prevent the accumulation of water behind StoTherm ci MVES, either by condensation or water leakage into the wall construction, in the design and detailing of the wall assembly, and with proper sequencing and protective measures during construction.

For further information see Sto Tech Hotline No. 0403-BSc, *Critical Detail Checklist for Wall Assemblies*, Sto Tech Hotline No. 0603-BSc, *Moisture Control Principles for Design and Construction of Wall Assemblies*, and Sto Tech Hotline No. 1001-BSc, *Effects of Temporary Heating on Construction Materials in Cold Weather*.

Impact Resistance

The adhered masonry veneer provides resistance to impacts from blunt and sharp objects and is often specified for use at ground floors, areas with high pedestrian traffic, and other areas that are susceptible to damage from impacts. It is ideal for use as an impact and abrasion resistant exterior wainscoting.

StoTherm ci MVES meets FBC (Florida Building Code) and Miami-Dade County test protocols for large and small missile impact

resistance.

Acoustics

Acoustical controls are achieved primarily in the base wall assembly, for example, in frame wall construction by using batt insulation in the stud wall cavity, gypsum sheathing, and wood or metal stud spacing and configuration. Refer to the *Gypsum Association Fire Resistance and Sound Control Design Manual* for technical data on performance of base wall assemblies.

Aesthetics

A wide variety of aesthetic choices exist with thin brick, thin natural stone, ceramic tile, and manufactured stone that integrate seamlessly with Sto architectural finishes. Dark colored veneer units [LRV (Light Reflectance Value) less than 20] are not recommended unless reviewed by the design professional with regard to service temperature limitations of the foam plastic insulation [(limited to a maximum service temperature of 165°F (74.8°C)] and anticipated in-service temperatures on the facade.

Do not use StoTherm ci MVES on top of parapets or on large weather exposed projecting ledges, sills, or other projecting features unless supported by framing or other structural support and protected with metal coping or flashing.

Adhered masonry veneer units are limited in thickness, size and weight by the IBC and IRC (International Residential Code). For example, maximum allowable weight is 15 lb/ft² (73.2 kg/m²). Maximum size is not to exceed 24 inches (610mm) in any face dimension and total area of the face dimension is not to exceed 3 ft² (0.28m²). Refer to Sto Tech Hotline No. 0821-M, *Quick Reference Guide on Adhered Masonry Veneers in Exterior Wall Construction*, for additional information.

Joints

Joints are required at:

- Joints in the supporting wall construction such as expansion joints, control joints, and cold joints
- Perimeters of windows, doors, scuppers, fixture attachments, and similar objects in the wall construction
- Changes in substrate or support construction (e.g., masonry to frame wall) or other junctures with dissimilar construction
- Floor lines in multi-story wood frame wall construction
- Floor line deflection joints
- Changes in building height and other areas of stress concentration
- Areas of not greater than 144 ft² (13.4m²) with length or height not exceeding 12 ft (3.6m) for ceramic tile, and not more than 18 ft (5.5m) for brick or stone, and with length/height or height/length ratio not greater than 2-1/2 to 1. Note: dark colored veneer units may require closer spacing due to increased thermal movement.

Do not bridge expansion joints, control joints, or cold joints in wall construction with StoTherm ci MVES.

Mortar Joints in adhered masonry veneer: must be grouted / pointed with grouting mortar in compliance with ANSI 118.7, except where open joints are permitted for manufactured stone. Refer to Sto Tech Hotline No. 0821-M, *Quick Reference Guide on Adhered Masonry Veneers in Exterior Wall Construction*. Note: grout is furnished by others.

Regulatory Compliance

The StoTherm ci MVES System complies with the weather resistance requirements of the 2021 and 2018 IBC Chapter 14, the requirements of Chapter 26 for use on noncombustible construction (Types I, II, and IV), and Chapter 7 for use in fire-resistance rated wall construction. Refer to ICC ESR-1748. The system also complies with ASHRAE 90.1-2019 Section 5, Building Envelope, air barrier and continuous insulation requirements.

StoGuard complies with 2021 and 2018 IBC, IRC, and IECC (International Energy Conservation Code) requirements as an air barrier material and water-resistive barrier (WRB). It meets requirements as an air barrier material based on testing in accordance with ASTM E2178 and as an air barrier assembly based on testing in accordance with ASTM E2357. Refer to ICC ESR-1233.

Sto GPS Board and Sto EPS insulation board conform with ASTM C 578 Type I requirements. Sto GPS Board is made without fluorocarbon blowing agents (HFC, HCFC, or CFC) and has zero global warming potential and zero ozone depletion potential.

The adhered masonry veneer mortar component of the system complies with the shear bond strength requirements of IBC Section 1404.10 (as explained in Section 12.3 of TMS 402, The Masonry Society, *Building Code Requirements and Specifications for Masonry Structures*).

All Sto architectural coatings, textured and specialty finishes, adhesives, primers, sealers, waterproofers, underlayments, and AWRB detail components and coatings comply with South Coast Air Quality Management District (South Coast AQMD) volatile organic compound (VOC) requirements.

Masonry veneer units are supplied by others and must be in compliance with applicable regulatory requirements (ASTM C1088 for thin brick, ICC AC 51 for manufactured stone, ASTM C1242 for natural stone, and ANSI 137.1 for ceramic tile), while being certified for exterior use by the manufacturer and for the climate zone in which they are intended to be used. Refer to Sto Tech Hotline No. 0821-M, *Quick Reference Guide on Adhered Masonry Veneers in Exterior Wall Construction*, for more information.

Thermal Insulation

StoTherm ci MVES uses graphite enhanced polystyrene (graphite polystyrene) or expanded polystyrene (EPS) insulation board as the thermal insulating component. The insulation board is applied adhesively to StoGuard on a supporting substrate to create a continuous exterior insulating thermal barrier. Thickness is limited based on structural considerations and fire testing.

Two types of insulation board can be used:

1. Sto GPS Board conforms with ASTM E2430 and ASTM C578 Type I requirements. R-value is R-4.7 F-ft²-h/Btu per inch thickness at 75°F (RSI-0.83 K·m²/W per 25mm at 24°C). Minimum allowable thickness is 1-¹/₁₆-inch (27mm) and maximum allowable thickness is 4-inches (102mm).
2. Sto EPS Insulation Board conforms with ASTM E2430 and ASTM C578 Type I requirements. R-value is 3.6 F-ft²-h/Btu per inch thickness at 75°F (RSI-0.634 K·m²/W per 25mm at 24°C). Minimum allowable thickness is 1-inch (25mm) and maximum allowable thickness is 4-inches (102mm).

Insulation material is flammable and must be kept away from flame, ignition sources, high heat and temperatures in excess of 165°F [74.8° C]).

Sustainability

StoTherm ci MVES has high potential for LEED and other sustainability program credits based on efficient and effective use of a continuous air barrier, continuous exterior insulation, and the resulting energy savings and reductions in greenhouse gas emissions. The system also has positive impacts on life cycle energy use based on reduced dead load, which permits the use of lighter gage metal studs, and supporting structural members and foundation footings, when compared to full thickness/weight masonry veneer units. The use of light gage metal framing with recycled content and StoPanel prefabricated wall construction offers additional means to obtain credits. Refer to StoPanel Technology information and ICC ESR-4500. Sto GPS Board and Sto EPS Insulation Board do not use fluorocarbon blowing agents (HFC, HCFC, or CFC) in manufacturing. They are recyclable and have excellent long term thermal stability, low global warming potential and zero ozone depletion potential.

Additional Information

Refer to Sto product bulletins, guide specifications and guide details, technical hotlines, ICC Evaluation Reports, and other sources of information available at www.stocorp.com for more details on specific Sto products, features, benefits, and limitations that apply to StoTherm ci MVES wall systems and components.

References

1. American Society of Testing and Materials International (ASTM), *Standard Specification for Rigid Cellular Polystyrene Thermal Insulation*, ASTM C578.
2. American Society of Testing and Materials International (ASTM), *Standard Specification for Thin Brick Veneer Units Made from Clay or Shale*, ASTM C1088.
3. American Society of Testing and Materials International (ASTM), *Standard Guide for Selection, Design, and Installation of Dimension Stone Attachment Systems*, ASTM C1242.
4. American Society of Testing and Materials International (ASTM), *Standard Test Methods for Fire Tests of Building Construction and Materials*, ASTM E119.
5. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen*, ASTM E283.

6. American Society of Testing and Materials International (ASTM), *Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Uniform Static Air Pressure Difference*, ASTM E330.
7. American Society of Testing and Materials International (ASTM), *Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference*, ASTM E331.
8. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining Rate of Air Leakage Rate and Calculation of Air Permeance of Building Materials*, ASTM E2178.
9. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies*, ASTM E2273.
10. American Society of Testing and Materials International (ASTM), *Standard Specification for Expanded Polystyrene ("EPS") Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems ("EIFS")*, ASTM E2430.
11. American Society of Testing and Materials International (ASTM), *Standard Test Method for Determining Air Leakage Rate of Air Barrier Assemblies*, ASTM E2357.
12. American Society of Refrigeration and Air Conditioning Engineers (ASHRAE), *Energy Efficiency Standard for Buildings Except Low-Rise Residential Buildings*, ANSI/ASHRAE/IES Standard 90.1-2019.
13. American National Standards Institute, *High Performance Cement Grouts for Tile Installation*, ANSI 118.7
14. American National Standards Institute, *Standard Specification for Ceramic Tile*, ANSI 137.1.
15. Gypsum Association, *Fire Resistance and Sound Control Design Manual*, GA-600-2021.
16. International Code Council Evaluation Service, *Acceptance Criteria for Adhered Manufactured Stone Masonry Veneer*, AC 51, 2018.
17. International Code Council Evaluation Service, *Sto Rainscreen and Sto Rainscreen II Class PB Exterior Insulation and Finish Systems with Drainage*, ICC ESR-1030.
18. International Code Council Evaluation Service, *StoGuard Air Barrier and Water-resistive Barrier System, and StoEnergy Guard (StoGuard with Continuous Insulation)*, ICC ESR-1233.
19. International Code Council Evaluation Service, *StoTherm ci, StoTherm ci MVES, and StoTherm ci with StoCast Finishes*, ICC ESR-1748.
20. International Code Council Evaluation Service, *StoPanel Classic ci, StoPanel Impact ci, StoPanel XPS, StoPanel, StoPanel Classic NExt ci, and StoPanel Backup*, ICC ESR-4500.
21. International Code Council, Inc., *2021, 2018 International Building Code (IBC)*.
22. *International Code Council, Inc., 2021, 2018 International Energy Conservation Code (IECC)*.
23. *International Code Council, Inc., 2021, 2018 International Residential Code (IRC)*.
24. The Masonry Society, *Building Code Requirements and Specification for Masonry Structures*, TMS 402/602-16, 2016.
25. National Fire Protection Association (NFPA), *Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source*, NFPA 268.
26. National Fire Protection Association (NFPA), *Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components*, NFPA 285.
27. Sto Corp., *Critical Detail Checklist for Wall Assemblies*, Sto Tech Hotline No. 0403-BSc
28. Sto Corp., *Effects of Temporary Heating on Construction Materials in Cold Weather*, Sto Tech Hotline No. 1001-BSc.
29. Sto Corp., *Moisture Control Principles for Design and Construction of Wall Assemblies*, Sto Tech Hotline No. 0403-BSc.

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PART 1 GENERAL

1.1 SUMMARY

- A. Provide air and water-resistive barrier, and compatible EIFS with adhered masonry veneer for vertical above grade exterior walls
- B. Related Sections *(add/delete, depending on specific project requirements)*
 - 1. Section 03 00 00: Concrete
 - 2. Section 04 00 00: Unit Masonry
 - 3. Section 04 42 00: Exterior Stone Cladding
 - 4. Section 04 71 00: Manufactured Brick Masonry
 - 5. Section 04 72 00: Cast Stone Masonry
 - 6. Section 05 10 00: Structural Metal Framing
 - 7. Section 06 10 00: Rough Carpentry
 - 8. Section 06 16 00: Sheathing
 - 9. Section 07 26 00: Vapor Retarders
 - 10. Section 07 27 00: Air Barriers
 - 11. Section 07 50 00: Membrane Roofing
 - 12. Section 07 62 00: Sheet Metal Flashing and Trim
 - 13. Section 07 90 00: Joint Protection
 - 14. Section 08 10 00: Doors and Frames
 - 15. Section 08 40 00: Entrances, Storefronts, and Curtain Walls
 - 16. Section 08 50 00: Windows
 - 17. Section 09 30 00: Tiling

1.2 SUBMITTALS

- A. Manufacturer's specifications, design guide and details, installation instructions, and product data
- B. Manufacturer's code compliance report
- C. Manufacturer's standard warranty
- D. Applicator's industry training credentials
- E. Samples for approval as directed by architect or owner
- F. Sealant manufacturer's certificate of compatibility
- G. Prepare and submit project-specific details (when required by contract documents)

1.3 REFERENCES

- A. ANSI Standards

1. 118.15, Improved Modified Dry-Set Cement Mortar
 2. 118.7, High Performance Cement Grouts for Tile Installation
- B. ASTM Standards
1. C150, Standard Specification for Portland Cement
 2. C482, Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement Paste
 3. C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
 4. C920, Standard Specification for Elastomeric Joint Sealants
 5. C1177, Specification for Glass Mat Gypsum for Use as Sheathing
 6. C1382, Standard Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems
 7. D1970, Standard Specification for Self-Adhered Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 8. E84, Test Method for Surface Burning Characteristics of Building Materials
 9. E96, Standard Test Methods for Water Vapor Transmission of Materials
 10. E119, Method for Fire Tests of Building Construction and Materials
 11. E283, Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under specified Pressure Differences Across the Specimen
 12. E330, Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 13. E331, Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 14. E2178, Test Method for Air Permeance of Building Materials
 15. E2273, Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish System (EIFS) Clad Wall Assemblies
 16. E2357, Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
 17. E2430, Standard Specification for Expanded Polystyrene (“EPS”) Thermal Insulation Boards for Use in Exterior Insulation and Finish Systems (“EIFS”)
 18. E2486, Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
 19. E2568, Standard Specification for PB Exterior Insulation and Finish Systems
- C. ICC-ES Acceptance Criteria, Building Codes
1. AC 235, Acceptance Criteria for EIFS Clad Drainage Wall Assemblies (July 2020)
 2. AC 212, Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing
 3. IBC- 2021, 2018, International Building Code
 4. IRC- 2021, 2018, International Residential Code
 5. IECC- 2021, 2018, International Energy Conservation Code
- D. National Fire Protection Association (NFPA) Standards

1. NFPA 268, Standard Test Method for Determining Ignitability of Exterior Wall Assemblies Using a Radiant Heat Energy Source
 2. NFPA 285, Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components
- E. South Coast AQMD (Air Quality Management District) Standards
1. Rule 1113, Architectural Coatings
- F. UL Solutions
1. UL ER16529-01, Atlas Molded Products, A Division of Atlas Roofing Corporation
- G. Other Referenced Documents
1. APA Engineered Wood Association E30, Engineered Wood Construction Guide
 2. ICC ESR-1233, StoGuard Air Barrier and Water-Resistive Barrier System, StoEnergy Guard (StoGuard with Continuous Insulation), and StoPanel Backup
 3. ICC ESR-1748, StoTherm ci, StoTherm ci MVES, and StoTherm ci with StoCast Finishes
 4. ICC ESR-4500, StoPanel Classic ci, StoPanel Impact ci, StoPanel XPS, and StoPanel Classic NExT ci and StoPanel Backup
 5. StoTherm EIFS: Installation Guide
 6. Sto RapidGuard®: Installation Guide
 7. StoGuard® Conformable Membrane: Installation Guide
 8. StoTherm ci MVES Design Guide and Detail Booklet
 9. Sto Tech Hotline No. 0821-M, Quick Reference Guide on Adhered Masonry Veneers in Exterior Wall Construction

1.4 DESIGN REQUIREMENTS

Consult StoTherm ci MVES Design Guide and Detail Booklet, and the Design Guidance section in the front of this specification, for limits of system and guidance on design and design details. Coordinate this section with other material specification sections and detail drawings as applicable.

1.5 PERFORMANCE REQUIREMENTS

- A. Air and Water-resistive Barrier
1. Air leakage less than 0.004 cfm/ft² (0.02 L/s·m²) at 1.57 psf (75 Pa) when measured in accordance with ASTM E2178
 2. Assembly air leakage less than 0.04 cfm/ft² (0.2 L/s·m²) after conditioning protocol when measured in accordance with ASTM E2357
 3. Vapor Permeable, Water vapor permeance greater than 10 perms when measured in accordance with ASTM E96, Method B
 4. Vapor Impermeable, Water vapor permeance less than 0.1 perms when measured in accordance with ASTM E96, Method A
 5. No water penetration when subjected to sequential water spray of 2.86 psf (137 Pa), then 6.24 psf (299 Pa), for 15 minutes at each pressure interval, when measured in accordance with ASTM E331

6. No water penetration at nail puncture after 72 hours at 40°F (4°C) when measured in accordance with ASTM D1970
- B. EIFS with Adhered Masonry Veneer (AMV)
1. Meets or exceeds durability requirements of ASTM E2568 (modified for AMV)
 2. Drainage efficiency greater than 95% when measured in accordance with ASTM E2273
 3. No water penetration when subjected to 75 minutes of water spray at 6.24 psf (299 Pa) and measured in accordance with ASTM E331
 4. Flame spread and smoke development of lamina (base coat, reinforcing mesh, and finish) less than 25 and 450, respectively, when tested in accordance with ASTM E84
 5. Meets acceptance criteria of NFPA 285 for use on non-combustible construction
 6. No ignition when exposed to radiant heat in accordance with NFPA 268
 7. Maintains hourly fire resistance rating of known, rated wall assembly when tested in accordance with ASTM E119
 8. Meets standard impact resistance with Sto Mesh, when measured in accordance with ASTM E2486
 9. Ultimate wind load capacity of plus 220 psf, minus 166 psf (plus 10.5 kPa, minus 7.95 kPa) with thin brick, plus 160 psf, minus 107 psf (plus 7.66 kPa, minus 5.12 kPa) with manufactured stone, when measured in accordance with ASTM E330, and support wall construction achieves equal or greater ultimate load capacity

1.6 COMPLIANCE

- A. Air and Water-resistive Barrier
1. Meets or exceeds maximum allowable material air leakage requirements of the 2021 and 2018 IECC based on independent laboratory testing in accordance with ASTM E2178
 2. Meets or exceeds maximum allowable assembly air leakage requirements of the 2021 and 2018 IECC based on independent laboratory testing in accordance with ASTM E2357
 3. Meets requirements of ICC AC 212 for coatings used as WRBs over sheathing
 4. Listed as compliant with 2021 and 2018 IBC, IRC, and IECC in a current ICC-ES Evaluation Report
 5. Meets VOC standard of South Coast AQMD Rule 1113 for Building Envelope Coatings
- B. EIFS with AMV Cladding
1. Meets ASHRAE 90.1-2019, Section 5, Building Envelope, continuous insulation requirements
 2. Meets performance and weather resistance requirements of 2021 and 2018 IBC Chapter 14, complies with requirements of Chapter 26 for use on noncombustible construction (Types I, II, and IV) and Chin fire-resistance rated wall assemblies. Complies with requirements for use on combustible (Type V) construction.
 3. Meets performance and weather resistance requirements of 2021 and 2018 IRC Chapter 7
 4. Meets requirements of ICC AC 235 for EIFS clad drainage wall assembly
 5. Listed as compliant with 2021 and 2018 IBC and IRC in a current ICC-ES Evaluation Report
- C. Joint Sealant for Use with EIFS
1. Conforms with ASTM C920: Type S, Grade NS, Use NT, A, M, Class 100/50
 2. Tested in accordance with ASTM C1382

3. Meets Federal Specification TT-S-00230C Type II
4. Conforms with AAMA 808.3 (Type1) Exterior Perimeter Sealing

1.7 QUALITY ASSURANCE

- A. Manufacturer Requirements
 1. Member in good standing of the EIFS Industry Members Association (EIMA) for over thirty (30) years
 2. Air and water-resistive barrier and EIFS manufacturer for a minimum thirty (30) years
 3. Manufacturing facilities in compliance with ISO 9001 Certified Quality System and ISO 14001 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 and water-resistive barrier application, EIFS application, and ceramic tile, thin brick application, or stone thin-set method of application, and familiar with the requirements of the specified work
 4. Successful completion of minimum of three (3) projects of similar size and complexity compared 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. Insulation board listed by an approved agency and in compliance with the applicable building code
 2. GPS board manufactured under Sto agreement
 3. EPS board manufactured under Sto licensing agreement by EPS molder recognized by Sto as being capable of producing EPS insulation board to meet EIFS requirements
- D. AMV Manufacturer Requirements
 1. Provide AMV units in conformance with the IBC and IRC size, weight, and durability requirements.
 2. Provide AMV units that comply with minimum 50 lb/in² (0.345 N/mm²) shear bond strength when tested in accordance with ASTM C482.
- E. Mock-ups and Testing
 1. Construct full-scale mock-up of typical air and water-resistive barrier and EIFS/window wall assembly with specified tools and materials and test air leakage, water infiltration and structural performance in accordance with ASTM E283, ASTM E331 and ASTM E330, respectively, through independent laboratory. Mock-up shall comply with requirements of project specifications. Where mock-up is tested at job site maintain approved mock-up at site as reference standard. If tested off-site accurately record construction detailing and sequencing of approved mock-up for replication during construction.
 2. Conduct AWRB adhesion tests in accordance with ASTM D4541 to foundation waterproofing, roofing material, and any other unknown or untested AWRB substrate connections to verify adequacy of adhesion.
 3. Conduct shear bond strength tests of AMV unit in accordance with ASTM C482 to verify adequacy of adhesion.

- F. 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

1.8 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
- D. Store foam adhesive in a clean, dry area at room temperatures ranging from 50 to 75°F (10 to 24°C). Protect from freezing and direct sunlight. Avoid contact with water. Keep away from sources of heat, sparks, flame, ignition, and physical abuse
- E. Store gun-grade air barrier component at temperatures between 40 and 80°F (4 and 26°C), and protect from freezing, moisture, direct sunlight, and keep away from sources of ignition
- F. Keep products packaged in cartons off the ground in a cool dry environment
- G. Insulation material is combustible. Keep away from flame or ignition sources, direct sun exposure, high heat, and temperatures in excess of 165°F (73.8°C)
- H. Store and handle all products as directed on labeling

1.9 PROJECT/SITE CONDITIONS

Weather conditions affect application and drying time of 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 (Exception: gun-grade air barrier component dries faster in damp or high humidity conditions)

- A. Maintain ambient and surface temperatures above 40°F (4°C) during application and drying period, minimum 24 hours after application of air and water-resistive barrier and EIFS products
- B. Maintain ambient and surface temperatures between 45 and 85°F (7 and 29°C) during application and drying period of AMV adhesive – not less than 24 hours.
- C. Provide supplementary heat for installation in temperatures less than 40°F (4°C) for air and water-resistive barrier and EIFS products, and less than 45°F (7°C) for AMV adhesive.
- D. Provide protection of surrounding areas and adjacent surfaces from application of products

1.10 COORDINATION/SCHEDULING

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

- A. Provide site grading such that the EIFS with adhered masonry veneer terminates above grade a minimum of 6 inches (150 mm) or as required by code

- B. Provide roofing and protection at roof and floor levels to prevent excess water entry to the interior or into and behind the exterior wall during construction.
- C. Coordinate installation of foundation waterproofing, roofing membrane, windows, doors and other wall penetrations to provide a continuously connected air and water-resistive barrier
- D. Provide protection of rough openings before installing windows, doors, and other penetrations through the wall
- E. Install window and door head flashing immediately after windows and doors are installed
- F. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior
- G. Install splices or tie-ins from air and water-resistive barrier over back leg of flashings, and similar details, to form a shingle lap that directs water to the exterior
- H. Install copings and sealant immediately after installation of the EIFS/AMV assembly 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
- I. Schedule work such that the air and water-resistive barrier is exposed to weather no longer than 180 days, or 90 days when stated on manufacturer's product bulletin
- J. Attach penetrations through the EIFS to structural support and provide watertight seal at penetrations

1.11 WARRANTY

- A. Provide manufacturer's standard warranty

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide air and water-resistive barrier, EIFS materials, and AMV adhesive from single source
 - 1. Sto Corp., 3800 Camp Creek Parkway, Building 1400, Suite 120, Atlanta, GA 30331
Tel: 800 221 2397, www.stocorp.com
- B. Provide insulation board from Sto listed or licensed source
 - 1. GPS Insulation Board – Atlas Molded Products, A Division of Atlas Roofing Corporation
 - 2. EPS Insulation Board – Sto licensed EPS Board molder (*contact Sto Corp. for a list of licensed molders*)
- C. Material provided by others
 - 1. EIFS fasteners: Wind-lock, 1055 Leisz's Bridge Road, Leesport, PA 19533, Tel: 800 872 5625
 - 2. Adhered Masonry Veneer: ASTM C1088 compliant thin brick or ASTM C1670 (AC 51) compliant manufactured stone
 - 3. AMV Grout/Pointing Mortar: ANSI 118.7 compliant grout produced by manufacturer with current ISO 9001 compliant quality system

2.2 AIR AND WATER-RESISTIVE BARRIER

Refer to Sto Guide Details, Sto RapidGuard Installation Guide, and StoGuard Conformable Membrane Installation Guide to assist in selecting the proper detail components

A. StoGuard Detail Components

1. Sheathing Joint Treatment, Rough Opening (RO) Protection, Counterflashing, and Penetrations:

- a. Sto Gold Coat, Sto AirSeal, or StoGuard VaporSeal: brush, spray or roller applied air and water-resistive barrier coating used with StoGuard Fabric reinforcement
- b. Sto RapidGuard: single component rapid drying gun-applied STPE detail component
- c. Sto Gold Fill: trowel applied detail component used with StoGuard Mesh, glass fiber self-stick reinforcing mesh
- d. StoGuard Conformable Membrane – self-adhered membrane flashing for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, glass mat gypsum sheathing, and cementitious sheathing

2. Static Joints and Seams

- a. Sto RapidGuard: single component rapid drying gun-applied treatment for static joint transitions to dissimilar construction (i.e., masonry to frame wall), balcony floor slab-to-ceiling, and wall sheathing to foundation

3. Static and Dynamic Joints

- a. StoGuard Conformable Membrane: self-adhered membrane flashing for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, glass mat gypsum sheathing, and cementitious sheathing used to:
 - Seal joints and seams in wall sheathing
 - Seal static joints between dissimilar materials
 - Flash exterior wall openings and protect rough openings
 - Seal between window flange and wall sheathing
 - Connect to above grade foundation waterproofing
 - Connect to roof membrane
 - Seal around wall penetrations such as pipes, scuppers, vents
 - Back masonry wall ties
 - Seal dynamic joints in wall construction

Choose one coating and select application by Substrate (B1a, B2a, or B3), Medium Build (B1b, B2b, or B3), or High Build (B1c, B2c, or B3) as indicated

B. Air and Water-resistive Barrier Coating

1. Sto Gold Coat: ready mixed vapor permeable air and water-resistive barrier coating applied

- a. By substrate as follows:
 - Glass Mat Gypsum: apply one coat at minimum 10 mils WFT
 - Plywood: apply one coat at minimum 10 mils WFT
 - Cement Board: apply one coat at minimum 10 mils WFT
 - OSB: apply one or two coats at minimum 20 mils WFT. If applied by roller, apply two coats. Touch up any bare spots and raised OSB strands.
 - CMU: apply two or three coats at minimum 20-60 mils WFT.
 - Concrete: apply one coat at minimum 10 mils WFT
- b. To achieve Medium-Build apply in one or two coats at minimum 20 mils WFT. If applied by roller apply two coats to achieve minimum 20 mils WFT. For CMU substrates apply two or three coats to achieve 20-60 mils WFT.
- c. To achieve High-Build apply in two or three coats at minimum 40 mils WFT. If applied by roller apply three or more coats as needed. For CMU substrates apply multiple coats to achieve 40-60 mils WFT.

2. Sto AirSeal: ready mixed vapor permeable air and water-resistive barrier coating applied
 - a. By substrate as follows:
 - Glass Mat Gypsum: apply one coat at minimum 20 mils WFT
 - Plywood: apply one coat at minimum 20 mils WFT
 - Cement Board: apply one coat at minimum 20 mils WFT
 - OSB: apply one or two coats at minimum 20 mils WFT. If applied by roller, apply two coats. Touch up any bare spots and raised OSB strands.
 - CMU: apply two or three coats at minimum 20-65 mils WFT.
 - Concrete: apply one coat at minimum 20 mils WFT
 - b. To achieve Medium-Build apply in one or two coats at minimum 40 mils WFT. If applied by roller apply two coats to achieve minimum 40 mils WFT. For CMU substrates apply two or three coats to achieve 40-65 mils WFT.
 - c. To achieve High-Build apply in one, two or three coats at minimum 65 mils WFT. If applied by roller apply minimum three coats to achieve minimum 65 mils WFT.
3. StoGuard VaporSeal: Class 1 vapor retarder coating for use over prepared vertical above-grade concrete, concrete masonry, brick masonry, wood sheathing, cementitious sheathing, and glass mat gypsum sheathing, applied by airless spray in one or two coats to achieve minimum 80 mils total WFT

Refer to Tables in Appendix for product names and combinations of products based on compliance with the 2021 and 2018 IBC and 2021 and 2018 IRC and select one in each category: Insulation Adhesive, Insulation Board, Base Coat, Reinforcing Meshes, Primer, and Finish. Consult Sto for any additional guidance on product selection.

2.3 INSULATION ADHESIVE *(refer to Tables in Appendix for guidance on product selection)*

- A. Sto one component polyurethane foam adhesive
 1. Sto TurboStick®

2.4 INSULATION BOARD

Select one product based on the options presented below, regulatory requirements, R-value, and other applicable criteria.

- A. Graphite Enhanced Polystyrene Insulation Board
 1. Sto GPS Board: nominal 1.0 lb/ft³ (16 kg/m³) graphite enhanced polystyrene rigid foam plastic insulation board in compliance with ASTM E2430 and ASTM C578 Type I requirements, R-4.7 per inch (RSI – 0.83 per 25mm), listed, labelled, and furnished in accordance with Section 1.7C.
- B. Expanded Polystyrene Insulation Board
 1. Sto EPS Insulation Board: nominal 1.0 lb/ft³ (16 kg/m³) Expanded Polystyrene (EPS) rigid foam plastic insulation board in compliance with ASTM E2430 and ASTM C578 Type I requirements, R-3.6 per inch (RSI – 0.63 per 25mm), listed, and furnished in accordance with Section 1.7C.

2.5 BASE COAT

- A. Cementitious Base Coat
 1. Sto Primer/Adhesive – acrylic admixture for use with Type 1 portland cement

2.6 REINFORCING MESHES

Designate areas with impact resistance other than "Standard" on architectural drawings

- A. Standard Mesh
 - 1. Sto Mesh 6 oz – nominal 6 oz/yd² (203 g/m²), symmetrical, interlaced open-weave glass fiber fabric made with alkaline resistant coating for compatibility with Sto materials
- B. 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 of insulation boards)*

2.7 AMV ADHESIVE

- A. StoColl – polymer modified portland cement adhesive mortar for AMV in compliance with ANSI118.15

Grout / pointing mortar is furnished by others

2.8 AMV GROUT / POINTING MORTAR

- A. Polymer modified portland cement grout in conformance with ANSI 118.7

2.9 JOB MIXED INGREDIENTS

- A. Water – clean and potable
- B. Type I portland cement in compliance with ASTM C150

2.10 ACCESSORIES

Fasteners are furnished by others. Fasteners are not required on ground floors up to a maximum height of 10ft (3m)

- A. Fasteners – Wind-lock corrosion resistant fastener with 1-1/4 inch (32mm) diameter galvanized steel lath-plate (legless) washer. Fastener type and length must be sufficient for minimum 3 thread penetration into steel studs and minimum 1 inch (25mm) penetration into concrete or CMU construction
- B. StoSeal® STPE Sealant - high-movement, low modulus, non-sag one-component silyl-terminated polyether joint sealant in compliance with ASTM C920 and tested in accordance with ASTM C1382

2.11 MIXING

- A. Refer to manufacturer's applicable product bulletins for mixing of materials

PART 3 EXECUTION

3.1 ACCEPTABLE INSTALLERS

- A. Prequalify under Quality Assurance requirements of this specification (Section 1.7B)

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
 - 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 10 feet [6mm in 3 m] 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 – consult manufacturer
 - 2. Exterior Grade and Exposure I wood based sheathing – APA Engineered Wood Association E30
 - 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 and water-resistive barrier, EIFS, or AMV 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 and water-resistive barrier detail material
- E. Seal over-driven fasteners with Sto air and water-resistive barrier detail 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

- A. Install manufacturer’s air and water-resistive barrier in conformance with manufacturer’s written instructions *(refer to applicable Sto product bulletins and StoTherm ci MVES Design Guide and Detail Booklets)*
- B. Install manufacturer’s EIFS cladding in conformance with manufacturer’s written instructions *(refer to product bulletins, StoTherm EIFS: Installation Guide, and StoTherm ci MVES Design Guide and Detail Booklets)*
- C. Install AMV in conformance with AMV adhesive manufacturer’s written instructions *(refer to 81789 StoColl Adhesive Mortar Product Bulletin)*
- D. Install AMV grout/pointing mortar in conformance with grout manufacturer’s written instructions

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/AMV assembly 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/AMV assembly and anywhere into the wall assembly.

Appendix: StoTherm ci MVES Cladding Components

IMPORTANT: Listing of Sto GPS Board with ICC-ES is pending in ICC ESR-1748

Table 1. StoTherm ci MVES Cladding Components

Adhesive	Continuous Insulation ^{1,2,3,4}	Base Coats	Reinforcing Mesh	Finish
Sto TurboStick Sto TurboStick Mini	Sto GPS Board Sto EPS Insulation Board	Sto Primer/Adhesive	Sto Mesh 6oz	ASTM C1088 Thin Brick or ASTM C1670 (AC 51) Compliant Manufactured Stone adhered with StoColl Adhesive Mortar and grouted per Sto specification

1. Minimum insulation board thickness: 1 inch (25 mm). Maximum insulation board thickness: 4 inches (102mm), subject to restrictions based on fire tests (see below).
 2. Use on noncombustible construction (Types I, II, III, and IV): maximum 4-in (102mm) Sto GPS Board or Sto EPS Insulation Board

3. Use on fire-resistance-rated wall construction: can be installed on 1-hour load bearing or non-load bearing fire-resistance-rated wall construction over steel frame, concrete, and concrete masonry with maximum 4-in (102mm) insulation board.
4. Use on combustible construction (Type V): maximum thickness of 4-in (102mm).

NOTE: Certain assemblies may be extended beyond the listed products and/or limitations, through engineering judgments on file at Sto Corp., or by way of modeling or rational analysis applied to the particular assembly in question.

ATTENTION

Sto products are intended for use by qualified professional contractors, not consumers, as a component of a larger construction assembly as specified by a qualified design professional, general contractor or builder. They should be installed in accordance with those specifications and Sto's instructions. Sto Corp. disclaims all, and assumes no, liability for on-site inspections, for its products applied improperly, or by unqualified persons or entities, or as part of an improperly designed or constructed building, for the nonperformance of adjacent building components or assemblies, or for other construction activities beyond Sto's control. Improper use of Sto products or use as part of an improperly designed or constructed larger assembly or building may result in serious damage to Sto products, and to the structure of the building or its components. **STO CORP. DISCLAIMS ALL WARRANTIES EXPRESS OR IMPLIED EXCEPT FOR EXPLICIT LIMITED WRITTEN WARRANTIES ISSUED TO AND ACCEPTED BY BUILDING OWNERS IN ACCORDANCE WITH STO'S WARRANTY PROGRAMS WHICH ARE SUBJECT TO CHANGE FROM TIME TO TIME.** For the fullest, most current information on proper application, clean-up, mixing and other specifications and warranties, cautions and disclaimers, please refer to the Sto Corp. website, www.stocorp.com.