

**Expansion Joint Guide Specifications**

Specifier Note: The purpose of this guide specification is to assist the specifier in correctly specifying expansion joint products and incorporating quality assurance measures to ensure a successful installation. The specifier needs to edit the guide specifications to fit the needs of specific projects.

Contact an MM Systems Expansion Joint Specialist to assist in appropriate product selections and specification development.

Email Contact: designassist@mm.systems or Phone: 706-824-7500

MM SYSTEMS

50 MM Way

Pendergrass GA 30567

Attn: National Product Specialist

Throughout the guide specification, there are Specifier notes to assist in editing of the file.



To view non-printing **Editor's Notes** that provide guidance for editing, toggle the “Paragraph” button to open and close.

The specifier needs to select project specific requirement where Brackets [ ]; “AND/OR”; and “OR” have been used to indicate when a selection is required.

SPECIFICATION

**Sections 07 90 00 & 07 95 00**

 **Expanding Impregnated Seismic Foam - EIS Series**

(Silicone Faced Waterproof Seismic Foam Seal Expansion Joint)

# PART 1 – GENERAL

* 1. WORK INCLUDED
1. The work shall consist of furnishing and installing preformed, pre-coated, pre-compressed, self-expanding, and tensionless seismic waterproof horizontal expansion joints in accordance with the details shown on the plans and the requirements of the specifications for concrete deck applications. The watertight seal shall incorporate a factory applied traffic-grade silicone face seal and a primary monolithic foam block impregnated with acrylic polymers that are UV stable, energy-efficient, flame resistant, and chemical resistant.
2. RELATED WORK
* Section 03 30 00 Cast-in-place Concrete
* Section 03 41 16 Precast Concrete Slabs
* Section 04 20 00 Unit Masonry
* Section 07 91 00 Preformed Joint Seals
* Section 07 92 00 Joint Sealants
1. REFERENCES
* ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
* ASTM D3575 - Standard Test Methods for Flexible Cellular Materials Made From Olefin Polymers.
* ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers Tension
* ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter
* NSF/ANSI Standard 51 – Food Equipment Materials.
* NSF/ANSI Standard 61 - Drinking water system components.
* MIL-A-46146 - Military Specification: Adhesives-Sealants, Silicone, RTV, Noncorrosive (For Use With Sensitive Metals and Equipment).
	1. DEFINITIONS (specifier please add actual joint gap values in A through H below)
1. Nominal Joint Width – the width of the linear opening based on an average mean temperature of 60 degrees Fahrenheit (15 degrees Celsius).
2. Maximum Thermal Joint Width – widest linear structural joint opening expected for normal thermal contraction of the structure.
3. Maximum Seismic Joint Width – widest linear structural joint opening expected during a seismic event.
4. Minimum Thermal Joint Width – narrowest linear opening expected for normal thermal expansion of the structure.
5. Minimum Seismic Joint Width – narrowest linear opening expected during a seismic event without damaging the structure.
6. Total Movement Capability – value obtained from the difference between the widest and narrowest joint opening expressed in inches (or millimeters).
7. Lateral Shear – Movement horizontally and parallel to the expansion joint.
8. Vertical Displacement – Movement vertically and parallel to the expansion joint.
	1. ACTION SUBMITTALS
9. Placement drawings – include line diagrams showing plans, elevations, sections details, splices, joint opening requirements, entire run of each joint system and attachment to respective substrates.
10. product data – include product details, maintenance and cleaning instructions, Safety Data Sheets, and LEED documentation.
11. Samples – submit virtual three-dimensional samples demonstrating expansion joint movement and its functioning components thereby fostering an eco-friendly alternative that supports with US Green Building Council initiatives. (Three-Dimensional Virtual Expansion Joint Samples reduce the carbon footprint compared to physical product samples that often end up in a landfill)
12. ISO-9001 CERTIFIED – certify that product is manufactured in an ISO-9001 facility with a formal quality management system, processes, manufacturing and customer service.
13. Independent Third-party Analysis – submit independent analysis from a licensed professional engineer in State of [list state] confirming compliance with the following:
14. Multi-directional seismic movement capability of +/-50% of nominal joint size.
15. Composition free of any wax or filler compounds using FTIR and DSC testing.
16. Solid foam block without vertical laminations (professional engineer should be licensed in the state where the project is located)

## Quality AssurancE

1. Pre-construction Meeting – the General Contractor, Engineer/Architect, Concrete Subcontractor, Manufacturer’s Representative and Certified Contractor, will conduct a pre-construction meeting to discuss blockout construction, joint gap settings, concrete elevations, flatness (critical) and construction phasing. This meeting shall be held prior to any con­crete placement at expansion joint blockouts and may be held in conjunction with the concrete pre-pour meeting.
2. Joint Opening Adjustment – the concrete contractor shall contact the Engineer of Record to confirm the nominal joint opening adjustment requirements on each day of concrete placement.

(Best practice is to incorporate a temperature adjustment table on the contract drawings. This will assist the concrete subcontractor to properly set the structural joint opening at time of concrete pour. Joint openings should be calculated and dsiplayed in five [5ºF] degree increments based on a temperature range of -20ºF to 120ºF [adjust for project].

1. EXPANSION JOINT OPENING – vibrate all formwork then float and trowel concrete adjacent to the joint opening before final cure to remove all air pockets, voids and spalls. Sidewalls of the joint opening must be parallel, straight, plumb and equidistant from each other. Check for sufficient depth to receive seal being installed plus an additional 1/4” to recess the seal. Any concrete substrate deficiencies shall be repaired with a structural repair material approved for use with expansion joints by the repair material manufacturer in writing. Submit to the engineer of record for approval. (95% of all new construction concrete joint openings require remediation which is why this is a key to long term performance)Non-complaint structural joint openings shall be considered major defects.
2. CONCRETE WASH - elevations two feet out on each side of the expansion joint shall be elevated above the finished deck surface thereby creating a downward slope allowing water to flow away from the expansion joint. (best practice design incorporates an elevated concrete wash with a downward slope ensuring water drains away from the expansion joint and doubles as a speed bump thereby extending the service life).
3. Pre-installation Inspection – the General Contractor, Engineer, Architect, Manufacturer’s Representative and Certified Installer, will conduct a pre-installation project site inspection. The General Contractor shall provide a field report that summarizes the project conditions and any remedial action necessary to correct field conditions (substrate, joint size, non-parallel sidewalls, vertical offsets, etc.) that may affect expansion joint system performance.
4. Service Condition – Installation Contractor to ensure that anticipated service conditions (loads, type of traffic, movement, vertical deflection, etc) specified for this project are clearly defined and communicated to the manufacturer prior to start of product manufacturing.
5. PRODUCT HISTORY – submit product history consisting of successful performance of five (5) installations in place over the previous five (5) years under similar project loads, traffic frequency, footprints, and joint sizes. Installations shall have experienced at least moderate levels of traffic.
6. EXPERIENCE – a factory trained, and certified installation contractor shall install the specified expansion joint systems. The installation contractor shall provide proof of certification from manufacturer and proof of participation in manufacturer’s continuing education program.
7. Mockups – build one mockup for each expansion joint style as specified herein to demonstrate aesthetic standards and to set quality standards for materials and execution. Minimum 6.5-feet for each. Approval of mockups does not constitute acceptance of deviations. Subject to compliance items listed below, approved mockup may become part of completed work. (Mockups should remain in place until the end of the project to allow installers to reference proper substrate preparation, splicing, joint sizing, and acceptable tolerances)
8. Inspect representative areas of Work and discuss condition of substrate, and other preparatory work performed by other trades.
9. Review Contract Document requirements and approved submittals.
10. Review inspection and testing requirements.
11. Evaluate environmental conditions and procedures for managing unfavorable site conditions.
12. Resolve deviations or differences between existing site conditions, Contract Documents, and the Manufacturer's Specifications.
13. General Contractor to document deviations and remediation agreements and then prepare and issue a Quality Assurance Field Report to all parties.

(Communication is the key to the process of understanding minimum substrate standards for a proper expansion joint installation)

## COORDINATION

##  (Expansion joints are typically one of the last purchases on a construction project. However, proper joint opening construction is one of the first quality control items on a project. By selecting the expansion joint manufacturer at the beginning of the project the necessary quality assurance measures can be implemented in a timely manner.)

1. General Contractor shall award expansion joint contract prior to concrete substrate placement to allow quality control coordination as described in section 1.04.
2. Schedule for work in this section shall be planned to allow sufficient time for submittals to be approved and timely production and delivery by manufacturer.
3. General Contractor to coordinate installation of products and systems with interfacing and adjoining construction to provide a suitable and quality installation.
4. Installation Contractor working with the General Contractor shall ensure project as-built field measurements and color selections are communicated to the expansion joint manufacturer prior to production. (Ideal storage temperature is 70 ºF / 21 ºC)

## PRODUCT Delivery, Storage, and Handling

* 1. Deliver products to site in manufacturer’s original, unopened, labeled containers and store under cover in a dry off the ground in a clean and dry location at temperatures above 60ºF (16 ºC). until installed.
	2. Inspect materials upon arrival. Notify manufacturer within two business days of any damage caused during delivery and handling.
	3. Handle and protect products as necessary to prevent damage during storage and during construction.
	4. General Contractor to provide protective covering over all installed finished surfaces. Protection is required to guard against damage during construction.

## WARRANTY

1. The Manufacturer and Certified Installer jointly warrant to the Owner that the expansion joint system shall be free from manufacturing, material, and installation defects for a period of one (1) year from the date of installation, based on specified movements and vertical design conditions and when installed in accordance with manufacturer’s guidelines and recommendations. The General Contractor assumes responsibility for deficiencies due to construction and substrate defects. (Longer duration warranties are available on a project by project basis – contact MM Systems)

## PART 2 – PRODUCT

* 1. MANUFACTURER
1. Furnish and install expansion joints as noted herein and as indicated on the contract drawings as manufactured by MM Systems, 50 MM Way, Pendergrass, GA, 30567 Phone: 706.824.7500 / www.designassist@mm.systems / Web: [www.mm.systems](http://www.mm.systems)
2. Basis of Design (Product Standard) – the contract documents are based on project specific designs by MM Systems as specified to establish a standard of quality. Other manufacturers offering products having equivalent characteristics may be considered for future projects but will not be considered for this project due to insufficient product evaluation time.
3. Single Source Limitations – obtain all expansion joints from single manufacturer. (Single source responsibility provides essential coordination of sizing, waterproofing and life safety fireproofing requirements)
	1. Components and Materials
4. Silicone Bellows Surface Seal – provideEIS Series consisting of a flexible, factory preformed traffic-grade silicone rubber exhibiting the physical properties listed below.

### PHYSICAL PROPERTIES OF CURED TRAFFIC-GRADE SILICONE FACE SEAL

 (after 7 days at 77°F (25°C) and 50% relative humidity)

 Property Value Test Method

Hardness, Shore 00 (21 day) 60 points ASTM C661

Elongation (%) 1400 ASTM D412

 Resilience (%) 95 ASTM D5329

 Stress (@150%) 22 psi ASTM C794

 Cyclical Movement +100% / -50% ASTM C719

Ozone / UV Resistance Pass Weatherometer

VOC Content (g/L) 50 ASTM D3960

1. Self-expanding Impregnated Foam Seal - shall be a micro-cell polyurethane foam impregnated with a hydrophobic acrylic waterproofing polymer that is UV stable, flame resistant, chemical resistant, and meets the test standards below.

### PHYSICAL PROPERTIES OF EXPANDING IMPREGNATED FOAM

 Property Requirement Test Method

Density Average 6-7 lbs./cu.ft. (90-110kg/m3) ASTM D3574

Resistance – thermal 3.3-3.5 hr. oF-ft2/BTU ASTM C518

 Conductivity – thermal 0.28-0.30 BTU-in/hr oF-ft2 ASTM C518 Temperature Stability Range -39 oF to 186 oF

Shear Strength 8 N/cm2 minimum

Tensile Strength - minimum 21 psi (145 kPa) ASTM D3574

Compression Set Resistance 2.5% maximum ASTM D3574

Air Leakage (at 75 Pa) < 0.01 cfm/ft2 ASTM E283

Bleeding (212°F at 20% compress) No Bleeding DIN 18542

Water Penetration (at 5000 Pa) Zero / Pass E331 & E547

Wind Load (+/-9708 Pa / 203 psf) < 0.03 mm (0.01”) ASTM E330

Staining None DIN 18542

STC Rating 54dB in 56dB wall ASTM E90-09

OITC Rating 47dB in 49dB wall ASTM E90-09

Flammability Self Extinguishing UL94VO

Flame Spread Zero ASTM E84

Flash Point 590 oF (310 oC)

* 1. seismic expansion joint seal
1. Furnish MM Systems EIS Series Expansion Joint Seal capable of +/-50% (total 100%) movement with the following performance features:
2. Preformed [single side or dual sided] traffic-grade silicone rubber bellows surface seal shall be factory extruded on a monolithic foam support seal and cured prior to compression. When compressed to final specified width, a bellow(s) profile must be created in the silicone surface coating to accommodate specified movement while providing a watertight seal.
3. Primary foam support seal shall be self-expanding micro-cellular foam impregnated with a hydrophobic acrylic waterproofing polymer that is UV stable, flame resistant, and chemical resistant. Produce from a solid foam block (zero laminations) that is wider than the maximum joint opening expansion. Must be free of wax and filler compounds. (While less expensive, laminated designs often separate and delaminate during horizontal and vertical shear movement)
4. Use sidewall adhesive, splice adhesive and fillet bead edge sealant provided by manufacturer.
	1. Life Safety – Fire Barrier Systems (as required) (This section may be deleted if a sperate fire rated foam specification is used)
5. Furnish MM Systems PyroFlex EIS-FR Series. Refer to EIS-FR Series specification for detailed product and application information.
6. Fire ratings must be equal to or greater than the rating of adjacent construction when tested in accordance with ASTM E1966 and ASTM E119.
7. Provide specified [2 or 3 hour] rated fire rated expansion joint assembly as tested and listed by a nationally accredited independent testing laboratory in accordance with UL 2079, or ASTM E1966. Include hose stream test where applicable.
	1. Fabrication
8. Basis of Design: EIS Traffic-Grade Silicone Seal – supplied factory pre-compressed to less than the specified joint width, packaged in stick lengths of 6.56-feet (2-meter).(Fabricated from a solid foam bun which is prouduce to metric dimensions)
9. Supply solid foam blocks engineered and oversized at 2X (with cover plates) and 3X (without cover plates) the nominal structural joint opening width to prevent system from going into tension at maximum structural joint width.(EIS Plus is the model number used on smaller joint with additional traffic load support)
10. Requires a 1:1 nominal seal depth-to-width ratio to form a geometric cube that closes uniformly without upward buckling.
	1. Finishes
11. Silicone seal color available in pavement grey or custom order black.

## PART 3 – EXECUTION

* 1. Installation - Preparation of the Work Area
1. Contractor shall provide a properly formed and prepared expansion joint openings constructed to the exact dimensions and elevations as shown on manufacturer’s standard system drawings or as shown on the contract drawings. Deviating from dimensions shown is not allowed without written consent of the engineer of record.
2. Contractor abrasive blast the joint opening to remove all contaminants immediately prior to installation of expansion joint system. Concrete form release agents, water repellents, laitance, surface dirt, rust, old sealants, surface treatments, and protective coatings must be removed from the joint opening sidewalls to obtain proper adhesion.

(Abrasive blasting with sand, glass bead, soda, or high-pressure water provides optimum clean results)

1. The self-expanding foam seal is wider than the joint opening. Release the wrap from around the seal and allow it to self-expand and fill the opening. Use shims as necessary to brace the seal until it fully expands, at which point shims can be removed.
2. Mask areas adjacent to the joint with tape to assure neat, clean joint lines. Remove tape prior to the curing process.
3. Apply factory supplied epoxy adhesive between the seal and joint opening sidewall interface. Remove any excess epoxy from contact with the silicone surface seal.
4. Recess the highest point of the silicone seal 1/4" [5mm] below the deck surface.
5. Apply a fillet bead of silicone sealant on each side of silicone bellows surface seal with manufacturer’s silicone. Fill any voids between the seal and the substrate and tool immediately to ensure firm contact and secure bond.
6. Adjoin segmental seal lengths together using manufacturer’s splice adhesive.
7. Refer to Manufacturers Installation Guide for detailed step-by-step instructions.

(contact MM for link to Install Videos and for date of the next Contractor Certification College where specifiers and installers are welcome to attend)

* 1. Clean and Protect
1. Protect the expansion joint system during construction by work from other trades.
2. Where required, install temporary protection over joints.
3. Do not remove protective coverings until work in adjacent areas is complete.
4. Prior to project closeout, clean exposed surfaces with a suitable cleaner that will not harm or discolor the finish of the concrete or the expansion joint system.

END OF SECTION