TREMCO®
Commercial Sealants & Waterproofing

Tremco® PUMA Expansion Joint System (EJS)

Monolithic, Liquid, Polyurethane-Methacrylate (PUMA) Expansion Joint System

APPLICATION INSTRUCTIONS

1. Purpose

1.1 The purpose of this document is to establish and outline uniform procedures recommended for installing the Tremco® PUMA Expansion Joint System in horizontal, vertical and buried applications. These instructions describe the installation in concrete. The system is recommended for use on concrete and/or metal substrates. The techniques involved may require modifications to adjust to job-site conditions. If you have any questions regarding your application, contact your local Tremco Field Sales Representative for specific design requirements. This document will provide instructions and troubleshooting for the application of Tremco PUMA EJS to qualify for the manufacturer's warranty.

2. Substrate Preparation

Note: The Tremco PUMA EJS must be applied to a sound, properly prepared substrate in accordance with Tremco Technical Service Instructions. For more information please contact Tremco Technical Service.

2.1 Existing Expansion Joint

Any concrete defects including dusting, spalls, delaminations, bug holes, cracks or other concrete defects will be repaired as specified by the engineer of record.

The location and elevation of any buried objects, such as reinforcing steel or post-tension cables, must be determined prior to any concrete removal as determined by the engineer of record.

Any existing joint system must be removed prior to installation and to achieve the substrate conditions called out in section 3.

Using a vacuum, remove all abraded residue. All anchors, mechanical fasteners, steel channels and flexible materials must be removed as determined by the engineer of record or 3rd party consultant.

2.2 Substrate Repair Materials

Reconstruction should be done with Tremco approved concrete patching materials or high quality, commercial cementitious products developed for patching exterior concrete. They should exhibit a minimum 5,000 psi compressive strength by or before 28 days. All concrete repairs should be fully cured prior to the installation of the Tremco PUMA EJS per manufacturer's written installation instructions. Magnesium Phosphate Concrete Patching Materials should not be used.

3. Conditions for Concrete or Metal Surfaces

Note: Substrate temperature must be 85°F (30°C) or less with a UV index of 7 or less. Structural design and deck conditions must allow for movement — movement must be known or calculated by the engineer of record or 3rd party consultant.

Concrete Surfaces:

3.1 Concrete shall be water-cured and attain a 4000 PSI minimum compressive strength. Moisture content in the concrete must be lower than 6% as measured using a Tramex CME 4 Moisture Meter prior to boxing the joint out. An additional reading of the shelf should be taken once the joint profile has been cut and prior to installing the joint system. Excess moisture in the concrete can prevent the joint and coating materials from performing as intended. Depending on the concrete construction and job site location, additional concrete testing may be required. Please contact your local Tremco Sales or Technical Representative.

3.2 To detect the presence of excess moisture, several tests may be employed:

- ASTM D4263- Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
- ASTM F2170-02 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs
- Calcium Chloride Test

4. Jobsite Materials

4.1 Recommended materials and their use are as follows:

Dymonic 100: A one-part, moisture curing, gun grade polyurethane sealant for use in precast, masonry, expansion joints, control joints and for use in forming cants.

Tremco PUMA Primer: A two-part, chemical-curing MMA primer for porous and non-porous surfaces.

Tremco PUMA EJ Basic: A two-part, chemical curing, PUMA modified membrane used as an elastomeric joint compound material.

Tremco PUMA TC: A two-part, chemical curing MMA used as the top coat providing a chemical- and UV- resistant, color-stable, weatherproof wearing surface.

Tremco PUMA EJS Polyethylene Fibers: Polyethylene fibers used to thicken Tremco PUMA EJ Basic for slope applications.

Tremco PUMA EJS Butyl Tape: A tape used to cover joint openings of 2" or less.

Metal Plate: A 20-gauge metal plate to cover joint openings >2".

Tremco PUMA EJS Heat-Resistant Tape: A secondary tape used as a bond-breaker, to ensure two-sided adhesion of the Tremco PUMA EJS, allowing the system to properly handle cyclic joint movement. It can also withstand the heat produced by the exothermic reaction occurring in the joint compound material, Tremco PUMA EJ Basic.

Reinforcing Bar: Steel rods encased in plastic slip-joint sleeves. Used to mitigate compression-induced deflection of the Tremco PUMA EJ Basic under certain service conditions.

Tremco PUMA Cleaner: A one-part PUMA cleaner for all tools such as mixing paddles, squeegees, spiked rollers and spatulas. Always use this cleaner for TREMproof PUMA materials. Never use any kind of solvent to clean any of your tools as this will cause contamination and inhibit cure.

Tremco PUMA Initiator: A benzoyl peroxide-based initiator used to react to all components of Tremco PUMA EJS.

Aggregate: 30-40 mesh (0.6-0.7mm diameter) silica sand, which imparts a textured finish.

5. Joint Design

The joint profile must be designed according to Tremco's patent- pending Beveled Anchor Profile, as shown in published literature. The two major considerations of the Beveled Anchor Profile are the width of the joint throat and the total anticipated movement (compression and expansion) of the joint. These factors must be provided by the engineer of record and reviewed with the manufacturer before installing the PUMA joint system.

Refer to Table 4 for proper boxout dimensions for all joint throat conditions.

6. Preparation of the Joint Boxout

6.1 Set the boxout depth to ¾" for all joint conditions.

6.2 Cut the boxout with a concrete saw. The two shelves must be parallel and equal in plane to each other and within a ±1/16" (1.5 mm) height of each other. Slight differences can be corrected with an angle grinder. The concrete box out can be prepared manually or with a concrete saw.

6.3 Remove debris and tape edges.

6.4 Manually bevel boxout edges to a 45° angle to complete Tremco's patent-pending Beveled Anchor Profile.

6.5 For anchor cuts, refer to Table 4 to determine dimensions. Once dimensions have been determined, place anchor cuts with a concrete saw.

7. Priming the Surface

NOTE: Closed-cell backer rod or other Tremco-approved backing material must be installed in the throat opening prior to installation of PUMA Primer.

7.1 Mix Tremco PUMA Primer for 1 to 2 min prior to the addition of Tremco PUMA Initiator.

7.2 Mix Tremco PUMA Primer thoroughly together with Tremco PUMA Initiator in accordance with Table 3 for 2 to 3 min.

7.3 Apply Tremco PUMA Primer at a minimum of 90 ft²/gal to yield 17 wet mils to the entire joint profile. The recommended method of application is with a chip brush. Application below 17 wet mils will result in the primer not curing.

7.4 Allow Tremco PUMA Primer a minimum of 30 min to fully cure.

8. Joint Compound Material Application

Note: Do not apply Tremco PUMA EJS to a frosty, damp or wet surface or when substrate temperature is below 20˚ F (-6.7˚ C) or the surface temperature is above 110˚ F (43˚ C).

Reinforcing bars may be required prior to the application of Tremco PUMA EJ Basic. This typically occurs between the months of November-February when the throat is between its median and maximum opening. Please contact Tremco Technical Services to confirm the need to use reinforcing bars.

Horizontal or Buried Expansion Joints

8.1**a. If the joint throat opening is 2" (50.8 mm) or less**

1. Install the aluminum butyl-backed tape centered over the joint throat and overlapping ½" (12.2 mm) on both sides of the shelf. Make sure to roll or push the tape down as firmly as possible so that fishmouths are eliminated and the tape is firmly adhered to the concrete.

2. Install the aluminum heat-resistant tape over the previously installed aluminum butyl-backed tape. It should be centered over the joint throat and extending ½" (12.2 mm) past the edges of the previously installed aluminum butyl-backed tape. Make sure to roll or push the tape down as firmly as possible so that fishmouths are eliminated and the tape is firmly adhered to the previous tape and the concrete.

8.1b. If the joint throat opening is greater than 2" (50.8mm)

1. A 20-gauge metal plate must be installed centered over the joint throat and overlapping ½" (12.2 mm) on both sides of the shelf.

2. Fasten the plate down on one side only every 12" (30.5 cm) on center using Tremco-approved adhesive.

3. Install the aluminum heat-resistant tape over the previously installed metal plate centered over the joint throat and extending ½" (12.2 mm) past the edges. Make sure to roll or push the tape down as firmly as possible so that fishmouths are eliminated and the tape is firmly adhered to the metal plate and concrete.

8.2 Mix Tremco PUMA EJ Basic for 1 to 2 min prior to the addition of Tremco PUMA Initiator or Tremco PUMA EJS Polyethylene Fibers for sloping conditions.

8.3 For slopes up to a 3" x 12" slope, use 1% by weight of Tremco PUMA EJS Polyethylene Fibers.

8.4 Thoroughly mix the fibers in to the Tremco PUMA EJ Basic ensuring they are fully dispersed prior to any addition of initiator.

8.5 Mix Tremco PUMA EJ Basic thoroughly with the Tremco PUMA Initiator in accordance with Table 3 for 2 to 3 min. Amount of Tremco PUMA Initiator is dependent on the ambient temperature.

8.6 Apply Tremco PUMA EJ Basic by pouring it into the boxout. Overfill the boxout slightly so that a rounded edge of PUMA EJ Basic is proud above the taped shelf boxout on both sides. Ensure the joint compound material is distributed over the edge of the boxout for a seamless application.

8.7 Allow Tremco PUMA EJ Basic to fully cure a minimum 45 min.

Vertical Expansion Joints

8.8 Prepare boxout as referenced in steps 8.1a-8.1b.

8.9 Apply duct tape to an appropriately sized joint form created from plywood. The duct tape serves as a bond breaker to ensure the joint compound material does not adhere to the form.

8.10 Fasten the joint form to the substrate.

8.11 Mix Tremco PUMA EJ Basic for 1 to 2 min prior to the addition of Tremco PUMA Initiator.

8.10 Mix Tremco PUMA EJ Basic thoroughly together with the Tremco PUMA Initiator in accordance with Table 3 for 2 to 3 min. Amount of Tremco PUMA Initiator is dependent on the ambient temperature.

8.11 Pour Tremco PUMA EJ Basic into the form.

8.12 Allow Tremco PUMA EJ Basic to cure fully before removing the form.

9. Top Coat Application

9.1 Grind down surface approximately one hour after Tremco PUMA EJ Basic cures for a flush profile. Clear any excess dust and debris using a vacuum. Use duct tape to mask the concrete approximately 2" on both

sides beyond the installed Tremco PUMA EJ Basic.

9.2 Mix Tremco PUMA Primer for 1 to 2 min prior to the addition of Tremco PUMA Initiator.

9.3 Mix Tremco PUMA Primer thoroughly together with Tremco PUMA Initiator in accordance with Table 2 for 2 to 3 min.

Apply Tremco PUMA Primer at a minimum of 90 ft²/gal to yield 17 wet mils to the exposed concrete within the masked area. The cured ground Tremco PUMA EJ Basic does not require priming. The recommended method of application is with a chip brush or 2", medium- nap roller. Application below 17 wet mils will result in the primer not curing.

9.4 Allow Tremco PUMA Primer a minimum of 30 min to fully cure prior to proceeding.

9.5 Mix Tremco PUMA TC for 1 to 2 min prior to the addition of Tremco PUMA Initiator.

9.6 Mix Tremco PUMA TC thoroughly together with the Tremco PUMA Initiator in accordance with Table 2. Amount of Tremco PUMA Initiator is dependent on the ambient temperature.

9.7 Apply Tremco PUMA TC at 17 to 20 mils (90 to 80 ft²/gal). The recommended method of application is with a roller.

9.8 If silica aggregate is required for skid resistance, broadcast to refusal the first layer of top coat.

9.9 Apply the second layer of Tremco PUMA TC at 17 to 30 mils (90 to 53 ft²/gal).

9.10 Allow Tremco PUMA TC a minimum of 1 hr to cure before opening to vehicular traffic.

10. Clean Up

10.1 Clean all adjacent areas to remove any stains or spills with Tremco PUMA Cleaner.

10.2 Clean tools or equipment with Tremco PUMA Cleaner.

10.3 Clean hands by soaking in hot, soapy water then brush with a stiff bristle brush.

11. Material Usage Guidelines

The following is a guide to determine material usage:

Tremco PUMA Primer: When applied at 90 ft²/gal (2.21 M²/L) will yield a mil thickness of 17 wet mils.

Dymonic 100: For a 1" (25 mm) cant bead over a 1/4" (6 mm) backer rod, 1 case of sealant for every 48 lf (14.6 M) is required.

Tremco PUMA EJ Basic: To determine the coverage rates for the joint compound material, use the Tremco usage calculator. Usage will vary depending on throat size.

Tremco PUMA TC: When applied at 80 to 90 ft²/gal (1.96-2.21 M²/L) will yield a mil thickness of 17 to 20 wet mils.

Aggregate: Apply silica sand at a rate of 1 lb/ft² immediately after the first Tremco PUMA TC application.

12. Troubleshooting

12.1 This section describes common industry application issues when certain environmental conditions exist. Below are some commonly seen issues and remedies. If any of these should occur, it is always recommended you contact your local Tremco Sales Representative or Tremco's Technical Service.

12.2 When a deck contains too much moisture, the excess moisture may change into a vapor which then condenses at the concrete-membrane interface before the coating has cured, which will cause blisters or bubbles, which, in turn, will interfere with proper adhesion. If this should occur the blisters/bubbles can be cut out, allowing the moisture to escape. After moisture has escaped and the surface is dry, the area can be repaired.

12.3 If the coating is applied in very hot ambient temperatures, the air in the small spaces between the concrete particles increases in volume and forms blisters. Contact Tremco's Technical Service should this occur.

12.4 Tremco PUMA products should only be applied when the UV index is less than 7 and substrate temperatures below 115°F.

Table 1: Quick Reference Application Chart

Layer	Product	Wet Mils	Cure Time	Square Feet Per Gallon
Primer	Tremco PUMA Primer	17	15 min	90
Joint Compound Material	Tremco PUMA EJ Basic	n/a	45 min	n/a
Top Coat	Tremco PUMA TC	17-20	45 min	80-90
Top Coat	Tremco PUMA TC	17-30	1 hr for vehicular traffic	53-90

Table 2: Temperature Chart – Primer & Top Coat

Temperature °F	Temperature °C	Grams or ounces/gallon
68 to 95	20 to 35	75 g or 2.75 oz of initiator/gal resin
50 to 68	10 to 20	150 g or 5.5 oz of initiator/gal resin
32 to 50	0 to 10	300 g or 11 oz of initiator/gal resin
14 to 32*	-10 to 0*	450 g or 16 oz of initiator/gal resin

*Below 14ºF (-10ºC), please contact Tremco Technical Service for further details
Minimum 75g of initiator per gallon required.

Table 3: Temperature Chart – Joint Compound Material

Temperature °F	Temperature °C	Grams or ounces/gallon
68 to 95	20 to 35	150 g or 5.5 oz of initiator/gal resin
50 to 68	10 to 20	300 g or 11 oz of initiator/gal resin
32 to 50	0 to 10	450 g or 16 oz of initiator/gal resin
14 to 32*	-10 to 0*	600 g or 22 oz of initiator/gal resin

*Below 14ºF (-10ºC), please contact Tremco Technical Service for further details
Minimum 150g of initiator per gallon required.

Table 4: Quick Reference Dimensions Chart

Joint Conditions	Boxout	Depth	Anchor Cut	Aluminum Butyl-Backed Tape	Metal Plate	Aluminum Heat-resistant Tape
If maximum throat size is ≤2"	4" from edge of joint	¾"	¼" x ¼"	½" throat overlap	N/A	½" tape overlap
If maximum throat size is >2"	4" from edge of joint	¾"	½" x ¼"	N/A	1/2" throat overlap	½" metal plate overlap

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Please refer to our website at www.tremcosealants.com for the most up-to-date application instructions.

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