



Installation



Bridges

REV 08/20

Expansion Joint Systems

Matrix™ 502 Asphaltic Expansion Joint System

Introduction

These installation instructions detail requirements and procedures to be followed for proper installation of the Matrix™ 502 Asphaltic Expansion Joint System. Usage, binder grade selection, equipment, materials, preparation, cleaning and construction requirements are covered. Installation consists of constructing the joint cutout, preparing the joint surface, installing bridging plates, mixing the aggregate and binder, placing and compacting the mixture and applying surface dressing aggregate. With proper installation, long-lasting durable joints are achieved.

Usage

The Matrix™ 502 Asphaltic Expansion Joint System can be used for both expansion and fixed end joints at abutments or piers in many bridge types including concrete slab, concrete beam, prestressed concrete and steel beam, either simple or multi-span and in either new construction or rehabilitation. The Matrix™ 502 Joint can be installed on joints with up to a 30 degree skew. Maximum joint movement should not exceed $\pm 3/4"$ (± 19 mm), and maximum expansion gap width should not exceed 3" (75 mm) at time of installation. The joint should not be installed where traffic induced differential vertical deflections across the joint exceed $1/4"$ (6 mm) or where there are high volumes of stopping traffic. The Matrix™ 502 joint can also be used as a pressure relief joint on bridge approach slabs or as a longitudinal joint that is not in traffic lanes. The design of the Matrix™ 502 joint can also be slightly modified to use with steel armored or other joint systems. The bridge must be capable of accepting the joint with a minimum depth of 2" (50mm).

Binder Grade Selection

The polymer modified asphalt binder for the Matrix™ 502 Asphaltic Expansion Joint System is supplied in three

temperature grades for use in cold, moderate or hot climates. The three grades of Matrix Binders are climate classified in accordance with the FHWA LTPPBind V2.1 System, which determines high and low asphalt concrete temperatures throughout the U.S. and Canada in 6°C increments.

Binder Name	Matrix™ 502 HD	Matrix™ 502	Matrix™ 502 CD
Part No.	34529	34528	34530
Climate Usage	Hot	Moderate	Cold
High Temperature Usage °C	70, 64°C	64, 58, 52°C	58, 52°C
Low Temperature Usage °C	-10, -16°C	-16, -22, -28°C	-28, -34, -40°C

For 64/-16°C, 52/-28°C and 58/-28°C climates, there are two Matrix Binder selections. In these cases, select the grade by considering both traffic load and actual temperatures from LTPPBind. Select the stiffer grade for high traffic or the softer grade for low traffic. Select the softer grade for colder actual temperatures within the grade.

Materials & Quantities

The following materials are required for installation of the Matrix™ 502 Asphaltic Expansion Joint System. Specifications for each item are listed in the D.S. Brown Product Datasheet for the Matrix™ 502 Asphaltic Expansion Joint System. Quantities shown are for estimating purposes for a standard size 2" (5cm) deep by 20" (51cm) wide joint based on joint length in feet.

Item	Crafco Part No.	Estimating Quantity
Matrix 502 Binder	34528, 34529 or 34530	7.75 lb per foot
Matrix Aggregate SBG	33032	29 lb per foot
Matrix Aggregate D	33030	3.5 lb per foot
Bridging Plates	33050, 33051, 33052, 33053	1 plate per 4 feet
Locating Pins	Local Availability	1 per foot
Backer Rod	34609	1 per 6 feet

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All materials required and in sufficient quantities should be present on the jobsite before beginning joint installation. All materials should be properly stored and protected from the weather before use.

Recommended Equipment

Item	Qty
Material melter, double jacketed oil, 100/200 gallons	1
Motor driven rotating drum mixers, 3 CF	2 to 4
185 CFM air compressor	1
Hot compressed air lance or hand-held torch	1 to 2
50 ft. air hose	1 to 2
Concrete saw with diamond asphalt cutting blade	1
Asphalt breaker with chisel attachments	2
Motorized steel drum roller/compactor, minimum 1 ½ tons	1
100 lb. LPG cylinders with hoses & fittings	3 to 4
Steel cutting torch	1
High-pressure air blow pipe	1
Steel rakes	2
Flat end steel scraper	2
Fire extinguisher	1
Straight edge utility shovel	1
Heavy-duty push broom	1
Steel bucket, 5-gallon	2 to 3
Hand tools:	
3 lb. hammer	2
50' chalk line	1
50' tape measure	2
2" masking tape rolls or duct tape	3
Wire brushes	2
Box cutter utility knife with replacement blades	3
Heavy-duty work gloves	6
Heavy-duty flashlights	4
Equipped toolbox	1
First aid kit	1
Hand-held temperature gauge	1

Temperature & Weather

Pavement temperature during installation of the Matrix™ 502 joint should be a minimum of 40°F (5°C) and weather should be dry with no signs of imminent rain. Cutout, cleaning and preparatory work can be done at lower temperatures.

Cutout Preparation

The Matrix™ 502 joint shall be centered within 1" (25 mm) over the existing expansion joint gap to the recommended width of 20" (50 cm). Variation in the width of the joint of up to 24" (61 cm) may be necessary to accommodate site conditions as determined by the manufacturer and/or engineer.

Saw cut the pavement transversely at the determined width which is normally 10" (250 mm) on each side of the expansion gap centerline, and parallel to the expansion gap, and then remove all material between the sawcuts, including the waterproofing, riser bars, old expansion joint material and loose concrete from the bridge deck. This will form the bridge joint cutout. The cutout must be cut to a minimum depth of 2" (50 mm). In some cases, this may require scarifying of the concrete bridge deck with a small scabber. Abrasive blasting may be required to obtain intact surfaces. The joint expansion gap shall be cleaned of all loose debris. Care should be taken to yield a level joint base. The cutout base should be intact and sound and be flat without elevation differences across the joint expansion gap. If the joint surfaces are not level, the steel plate may not bridge the joint correctly and may rock and displace under traffic loads to cause debonding or cracking on the installed joint. Quick-setting concrete may be required to repair uneven blockout surfaces or additional substrate material may be removed to level the joint surfaces. When removing loosened surfacing, take care to not damage the deck.

Cleaning and Drying

The joint cutout shall be further prepared by cleaning and drying all horizontal and vertical surfaces and at least 6" (150 mm) of the road surface adjacent to the vertical sawcuts. The use of a hot compressed air (HCA) lance or a hand-held torch is recommended. If there is an interruption due to weather or other causes, the cleaning and drying operation is to be repeated immediately before placing the backer rod and binder.

Sealing & Bridging the Joint Expansion Gap

Backer rod capable of withstanding the elevated temperature of the binder shall be placed into expansion joint gaps that are 1/8" (3 mm) or wider. Place the backer rod at a minimum depth of 1/2" (12 mm) and not exceeding 1" (25 mm). Heat Matrix™ 502 Binder in a jacketed double boiler melter with effective agitation that meets requirements of Appendix X1.1 of ASTM D6690. Do not use direct-fired

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or air-heated machines. Heat transfer oil should not exceed 525°F (274°C). The unit must be capable of safely heating product to 410°F (210°C). CAUTION: Do not agitate when adding product due to splashing. To use, binder is heated to between the recommended installation temperature and the maximum (safe) heating temperature of 380 to 410°F (193 to 210°C).

Pour the heated Matrix™ 502 Binder into the expansion gap, overfilling the joint gap to allow the binder to be spread onto the cutout base at least 4" (10cm) on each side of the joint gap. The binder will form a bond breaker between the cutout and the bridging plates. The bridging plates are then centered over the existing expansion gap and joined together to cover the entire joint length before they are embedded into the hot Matrix™ 502 Binder. The use of centering pins placed through the holes in the bridging plates and down into the expansion joint gap is to ensure proper centering, if necessary. Bridging plates shall be cut to the appropriate length as required to extend the full length of the joint and shall be joined without overlap.

Sealing the Joint Cutout

All prepared exposed horizontal and vertical surfaces of the joint cutout, including the bridging plates, shall be sealed with Matrix™ 502 Binder. Pour Matrix™ 502 Binder into the joint cutout and screed to coat all exposed surfaces. The binder shall achieve a minimum thickness of 1/32" (1 mm) and should not exceed 1/8" (3 mm) throughout. The binder application temperature shall be between 380 and 410°F (193 and 210°C).

Mixing Matrix Binder & SBG Aggregate

The SBG aggregate shall be heated to 275-375°F (135-190°C) using the air lance or in a rotating drum mixer to remove dust and all moisture. The temperature of the aggregate shall be monitored by using a hand-held, calibrated, digital temperature sensor. Add Matrix™ 502 Binder at the installation temperature range of 380-410°F (193-210°C) to the heated SBG aggregate in the mixer in a ratio of approximately 1 gallon (9.0 lbs.) of binder per 50 lb. bag of SBG aggregate. Minor variation in the amount of Matrix™ 502 Binder added to the heated SBG aggregate is allowed. The heated SBG aggregate must be completely coated prior to placement and the mixture should be at 250-350°F (149-177°C).

Placing the Matrix 502 Mixture

All of the Matrix™ 502 mixture should be poured from the mixer into the joint opening as quickly as possible. Depending on the depth of the joint, it may require pouring

in two or three spots. The Matrix™ 502 mixture is then raked to desired thickness. Joint depth is the determining factor in how much material is placed. On a 2" (50mm) typical block out, layering is not required. If necessary, flood the leveled mixture surface with Matrix Binder to fill voids before placing the next layer. Use a roller at least 1-1/2 ton going across the joint to compact the mixture and then lengthwise to smooth it.

Installing Surface Dressing D Aggregate

The completed joint surface is carefully heated to dry any water left by the roller with the heat lance or hand-held torch without burning. Place a thin layer of binder over the surface, extending one inch over the pavement. Duct tape can be used as a guideline. Reapply binder to any areas where the binder has soaked through to ensure coverage. Put the dress aggregate on top of the binder in a uniform way to completely cover the binder. Roll over the joint to embed the dress aggregate into the binder. In colder weather, it may be necessary to warm the top layer of binder before placing dress aggregate. The Matrix™ 502 joint must be allowed to cool before allowing traffic. Curing time depends on the depth of the joint and ambient temperatures. Usual curing time is between one and three hours.

Safety Precautions

Since joint installation requires products that are heated to elevated temperatures, it is essential that operations be conducted safely. All personnel need to be aware of the hazards of using hot applied materials and safety precautions. Before use, the crew should read and understand product use and safety information on the box and the product MSDS. User should check D.O.T. requirements for transportation of product at elevated temperatures above 212°F (100°C).

Hazards Associated with Hot Applied Materials

Skin contact with hot materials causes burns. Overexposure to fumes may cause respiratory tract irritation, nausea or headaches. Precautions are to be taken to prevent contact with hot material and to avoid inhalation of fumes for everyone in the vicinity. Safety precautions should include:

1. Protective clothing to prevent skin contact with hot material
2. Care when adding product to melters to reduce splashing
3. Careful operation of mixing and application equipment
4. Traffic and pedestrian control measures which meet or exceed local requirements to prevent access to work areas while product is in molten state

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5. Avoidance of material fumes
6. Proper application configurations with a minimum amount of material excess
7. Appropriate cleanup of excessive applications or product spills

Additional Information

Additional information about the Matrix™ 502 Asphaltic Expansion Joint System is available by contacting your distributor or The D.S. Brown Company. This information includes Product Datasheets and Material Safety Data Sheets.

The D.S. Brown Company

Founded in 1890 and based in North Baltimore, Ohio, USA, The D.S. Brown Company is a worldwide designer, manufacturer and supplier of engineered products for the highway and bridge construction markets.