

**READ BEFORE USING THIS PRODUCT**

**INTRODUCTION** These installation instructions detail requirements and procedures to be followed for proper installation of the Matrix 502 Asphaltic Plug Bridge Joint System. Usage, binder grade selection, equipment, materials, preparation, cleaning and construction requirements are covered. Installation consists of constructing the joint blockout, 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. The Matrix 502 Asphaltic Plug Bridge Joint System meets requirements of ASTM D6297, Standard Specification for Asphaltic Plug Joints for Bridges.

**USAGE** The Matrix 502 Asphaltic Plug Bridge 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 multispans and in either new construction or rehabilitation. The Matrix 502 Joint can be used for maximum joint movements of  $\pm 1$  inch ( $\pm 25$ mm), and maximum expansion gap widths of 6 inches (15 cm) at time of installation. The Matrix 502 Joint can be installed on joints with up to a 45 degree skew. 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 deck surface must be capable of accepting a minimum joint depth of 2 inches (5 cm). Maximum joint depth is 8 inches (20 cm). Standard installed joint width is 20 inches (51 cm), with a maximum width of 24 inches (61 cm).

**MATRIX BINDER GRADE SELECTION** The polymer modified asphalt binder for the Matrix 502 Asphaltic Plug Bridge Joint System is available in 2 grades. Matrix 502 (Part No. 34528) is the standard grade for use in cool to moderate climates. Matrix 502 HD (Part No. 34529) is a stiffer grade for use in hotter climates or in high traffic areas.

**MATERIALS and QUANTITIES** The following materials are required for installation of the Matrix 502 Asphaltic Plug Bridge Joint System. Specifications for each item are listed in the Crafcro Product Data Sheet for the Matrix 502 Asphaltic Plug Bridge Joint System. Quantities shown are for estimating purposes for a standard size 2 inch (5cm) deep by 20 inch (51cm) wide joint with a 1.5 inch (38mm) joint gap based on joint length in feet.

<u>Item</u>	<u>Crafco Part No.</u>	<u>Estimating Quantity</u>
Matrix Binder	34528 or 34529	10 lb/ft (15 kg/m)
Structural Aggregate	33033	30 lb/ft (45kg/m)
D Surface Dressing Aggregate	33030	3.3 lb/ft (5kg/m)
Steel Bridging Plates	Local availability	Quantity as needed
Locating Pins	Local Availability	1 per foot (30 cm)
Backer Rod	34609	1 per 6 ft (1.8m)

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

**EQUIPMENT** Following is a list of equipment that is needed for proper joint installations.

<u>Item</u>	<u>Quantity</u>	<u>Item</u>	<u>Quantity</u>
Material melter, indirectly heated oil jacketed, 50-200 gallons	1	Heavy-duty push broom	2
Motor driven rotating drum mixers, 3 CF, or Patcher I or II	3 or 4	Hand tools:	
125 CFM air compressor	1	3 lb. hammer	2
Hot compressed air lance or hand held torch	1 to 2	50' chalk line	1
50 ft. air hose	1 to 2	50' tape measure	2
Concrete saw with diamond asphalt cutting blade	1	Steel bucket, 3 gallon	2 to 3
Asphalt breaker with chisel attachments	2	Wire brushes	2
Motorized steel drum roller/compactor, minimum 1 1/2 tons	1	2" masking tape rolls	3
100 lb. LPG cylinders with hoses & fittings	3 to 4	Box cutter utility knife with replacement blades	3
Steel cutting torch	1	Portable scale for weighing binder	1
High pressure air blow pipe	1	Rapid Set Concrete Patch	As Required
Steel rakes	3 to 4	Heavy-duty work gloves	6
Flat end steel scraper	2 to 3	Heavy-duty flash lights	4
Straight edge utility shovel	2	Equipped tool box	1
		First-aid kit	1
		Hand Held Non Contact Temp. Gauge	1

**TEMPERATURE and WEATHER** Pavement temperature for installation of the Matrix 502 Joint shall be a minimum of 40°F (5°C) and weather should be dry with no signs of imminent rain. Blockout and preparatory work can be done at lower temperature.

**TRAFFIC CONTROLS:** Place traffic controls in accordance with Part 6, Temporary Controls, of the FHWA Manual on Uniform Traffic Control Devices (MUTCD) to protect the work site for the duration of the project.

**JOINT BLOCKOUT PREPARATION** The Matrix 502 Joint shall be centered within 1 inch (25 mm) over the existing expansion gap at the recommended width of 20 inches (51 cm). If needed, due to site conditions, joint width can be increased to a maximum of 24 inches (61 cm). Saw cut the pavement transversely at the determined width which is normally 10 inches (25cm) on each side of the expansion gap centerline, and parallel to the expansion gap through the surface and down to the concrete deck. Remove all material between the saw cuts, including the waterproofing, riser bars, old expansion joint material and loose concrete from the bridge deck. This will form the joint blockout. The blockout must be to a minimum depth of 2 inches (5 cm). 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 expansion gap shall be cleaned of all loose debris. Care should be taken to yield a level joint base at the bottom of the blockout. The blockout base shall be clean, intact and sound, and should be flat without elevation differences greater than 1/8 inch (3 mm) across the expansion gap. If the blockout base surfaces are not level across the expansion gap, the bridging plate may not span the joint correctly and may rock and displace under traffic loadings causing debonding or cracking of the installed joint. A properly installed and cured rapid setting concrete patch material may be used to level the blockout base surfaces. Additional substrate material may also be removed to level the surfaces. When removing loosened surfacing, care should be taken to not damage the deck.

**CLEANING and DRYING** The joint blockout shall be prepared by cleaning and drying all horizontal and vertical surfaces and at least 6 inches (15 cm) of the road surfacing adjacent to the vertical saw cuts with a hot compressed air (HCA) lance. If there is an interruption due to weather or other causes, cleaning and drying operations are to be repeated prior to continuing with joint installation.

#### **SEALING and BRIDGING the EXPANSION GAP**

**Backer Rod** - Backer rod capable of withstanding elevated temperature of the binder shall be placed into expansion gaps that are 1/8 inch (3mm) or wider. Place the backer rod at a minimum depth of 1/2 inch (12mm) and not exceeding 1 inch (25mm).

**Matrix Binder** – Heat the Matrix Binder in an indirectly heated oil jacketed melter with effective agitation that meets requirements of appendix X1.1 of ASTM D6690, such as the Crafcro Supershot or EZ series melters. Do not use direct fired or air heated machines. Heat transfer oil should not exceed 525°F (274°C). The unit must be capable of safely heating product to 400°F (204°C). CAUTION: Do not agitate when adding product due to splashing. To use, binder is heated to the recommended application temperature range of 380 - 400°F (193 - 204°C). Pour heated Matrix Binder into the expansion gap, overfilling, and spreading the binder onto the bottom deck surface of the joint blockout on each side of the expansion gap, at a depth of 1/8 inch (3mm), and to extend just beyond the edges of the bridging plates. The Matrix Binder forms a flexible adhesive bond between the bridging plate and the bottom surface of the joint blockout.

**Bridging Plates** – Bridging plates are then immediately placed by centering over the expansion gap and butt jointing to cover the entire joint length and are embedded into the hot Matrix Binder. Use centering pins placed through the holes in the bridging plates and down into the expansion gap to assure proper centering. Bridging plates shall be cut to the appropriate length to cover the entire joint length without overlap. For expansion gaps up to 3 inches (7.6 cm) wide, 1/4 inch (6.4 mm) thick steel bridging plates that are 8 inches (20 cm) wide shall be used. For joint gaps between 3 and 6 inches (7.6 to 15 cm) wide, 3/8 inch (10mm) thick steel plates which are 12 inches (30 cm) wide shall be used. Plate length shall be between 36 and 60 inches (0.9 to 1.5 m). Plates shall be clean, free from surface rust, oil or other residues and contaminants when installed.

**TANKING (COATING) the JOINT BLOCKOUT** All prepared exposed horizontal and vertical surfaces of the joint blockout, including the bridging plates, shall be tanked (coated) with hot Matrix Binder. Pour Matrix Binder into the joint blockout and spread to coat all exposed surfaces. The binder coating shall achieve a minimum thickness of 1/32 inch (1mm) and should not exceed 1/8 inch (3mm) throughout. The Matrix Binder application temperature shall be between 380 and 400°F (193 and 204°C).

**HEATING STRUCTURAL AGGREGATE** The Structural Aggregate shall be heated to 275-325°F (135-163°C) using an air lance or torch in a rotating drum mixer or using a Crafcro Patcher I or II mixer (or other approved indirectly heated unit). During heating, mixing and agitation shall be constant to uniformly heat and dry the aggregate. Heating shall remove all moisture from the aggregate. The temperature of the aggregate shall be monitored by using a hand held, calibrated, non-contact digital temperature sensor. Do not use aggregate other than Structural Aggregate.

**HEATING and MIXING MATRIX BINDER and STRUCTURAL AGGREGATE** Matrix Binder is heated to the installation temperature range of 380-400°F (193-204°C) in the indirectly heated oil jacketed melter, Heated binder is then added to the heated Structural Aggregate in the drum mixer or Patcher unit at a ratio of 1 gallon - 9.3 lbs. (3.8 liters – 4.2 kg) of binder per 50 lb. (22.7 kg) bag of aggregate. Minor variation in the amount of Matrix Binder added to the heated aggregate is allowed. Mix for a minimum of 2 minutes, or longer as needed to fully coat the aggregate with Matrix Binder. The aggregate must be fully coated prior to placement and the mixture temperature shall be 300-350°F (149-177°C). This is the Matrix 502 Mixture. When using rotating drum mixers do not directly reheat the Matrix 502 Mixture using an air lance or torch after adding the binder, due to burning and overheating that may occur. The Matrix 502 Mixture may be warmed by applying the heat to the back side of the drum.

**PLACING the MATRIX 502 MIXTURE** The Matrix 502 Mixture is installed in a minimum of 2 layers. Mixture temperature when installed shall be between 300-350°F (149-177°C). The depth of the joint blockout determines the number of layers used for a completed joint. The first layer of Matrix 502 Mixture is applied between ¾ and 1.5 inches (19-38mm) thick. The mixture is spread and leveled using hot steel rakes. After leveling, additional hot Matrix Binder from the indirectly heated oil jacketed melter is applied to the mixture surface to fill voids. (The correct appearance of a completed layer will show aggregate raised above the binder level.). Additional ¾ to 1.5 inch (19 to 38mm) thick layers of the Matrix 502 Mixture, each followed by the void filling application of Matrix Binder, are then placed until the joint blockout is filled within ½ to 1 inch (12 -25 mm) below the pavement surface level. The final top layer of the Matrix 502 Mixture is then installed to approximately ¼ to ½ inch (6-12mm) above the existing surface to allow for compaction. **NOTE: Void filling with hot binder is not applied to the final top layer.** Compaction is then performed using a minimum 1 ½ ton roller parallel with the joint. Compaction is to occur when the joint material surface has cooled to 210-230F (99-110C) and continue until the Matrix 502 Mixture is level with the adjacent pavement surfaces.

**INSTALLING D SURFACE DRESSING AGGREGATE** The compacted joint surface is then carefully heated with a heat lance or hand held torch to achieve a tacky condition. Strips of masking tape are applied to the pavement surface approximately 2 inches (5 cm) from and parallel to the edge of each side of the joint along the entire joint length. A thin layer of Matrix Binder at 380-400°F (193-204°C) which is 1/32 to 3/32 inch (0.8 to 2.4 mm) thick is then uniformly applied and spread over the entire top surface of the joint, extending over the pavement surface out to the masking tape. The masking tape forms straight edges which improve the finished appearance of the joint. Immediately remove the masking tape and then immediately apply the D Surface Dressing aggregate by broadcasting at a rate of approximately 3 lbs. per lineal foot (4.5kg/m). The aggregate must be applied while the binder is hot at 225 to 250°F (107 to 121°C) to achieve proper adhesion. Partially embed the surface dressing aggregate by compacting with the roller or vibratory plate compactor. The Matrix 502 Joint is then allowed to cool to below 120F (49°C) and will be ready for traffic approximately 1-2 hours after completion, depending on joint depth and ambient temperature. Joints deeper than 3 inches (7.6 cm) may take longer than 2 hours to cool prior to opening to traffic. Following cooling, sweep the joint surface with a push broom to remove excess or loose surface aggregate. Clean the job site of packaging, loose aggregate or other debris and open to traffic.

**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 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 SDS. 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. Over exposure 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:

- Protective clothing to prevent skin contact with hot material.
- Care when adding product to melters to reduce splashing.
- Careful operation of mixing and application equipment.
- Traffic and pedestrian control measures which meet or exceed local requirements to prevent access to work areas while product is in a molten state.
- Avoidance of material fumes.
- Proper application configurations with a minimum amount of material excess.
- Appropriate clean up of excessive applications or product spills.

**ADDITIONAL INFORMATION** Additional information regarding the Matrix 502 Asphaltic Plug Bridge Joint System is available by contacting your distributor or CrafcO, Inc. This information includes:

1. Product Data Sheets,
2. Safety Data Sheets,
3. Safety Manual