

Crack Sealing 101: Hot Mixed Asphalt Pavements

Introduction

The two primary types of crack sealing methods commonly used in Minnesota include: *ROUT AND SEAL* and *CLEAN AND SEAL*. The *ROUT AND SEAL* method is preferred on transverse cracks less than 3/4" wide. The clean and seal method is recommended for longitudinal cracks, or if the cracks are too numerous or too large for the route and seal method.

Crack Sealing is intended to prevent moisture from entering the base and sub-grade, which can weaken the pavement's subsurface structural layer and contribute to pavement deterioration. Sealing the pavement cracks and preventing the intrusion of moisture can be expected to extend the pavements' service life and slow the rate of deterioration.

Timing

Rout and seal is recommended as soon as the pavement starts to crack, it may be necessary to reseal additional cracks. Crack sealing is used for active cracks in hot mix asphalt (HMA) pavements; those open in winter and closed in summer. Generally, transverse cracks are considered active, and longitudinal cracks show little movement.

Sealant installations are affected by the weather, crack preparation method, and material handling/finishing. It is appropriate to crack seal or fill during spring or fall conditions as the crack width is not too wide (winter) nor too small (summer).

Consider crack condition and density when selecting the type of project. Clean and sealing may be the best option when the crack density is moderate and there is little deterioration, but is not recommended for pavements in an advanced state of decay. Crack treatments on pavements in poor condition are not effective and it may be

more suitable to take other measures including using a more durable mastic type product or patching.

Pavement management data should be used to optimize maintenance strategies and identify cost-effective alternatives for maintenance and rehabilitation. Consider *TIME TO REHABILITATION*, *AGE OF SURFACE*, *TRAFFIC*, and *PAVEMENT ROUGHNESS*.

Materials

There are currently three Mn/DOT material specifications for HMA pavement crack treatment.

- ✓ Mn/DOT 3725 has low resiliency properties, and is recommended sealant for transverse rout and seal applications. It is also recommended sealant for agencies that saw and seal.
- ✓ Mn/DOT 3723 exhibits good adhesion qualities. This product can also be used for the clean and seal method and also for rout and seal in situations where wider reservoir widths are needed.
- ✓ Mn/DOT 3719 is the recommended sealant for clean and seal.

Mn/DOT sealant typically performs well down to -29°F to -40°F. Polymer-modified asphalt emulsion or AC-3 should not be used because of brittle behavior.

Studies have measured the viscosity of sealants and fillers at installation temperature, tested cohesion and adhesion at low temperatures, and evaluated tracking at high temperatures. Mn/DOT Materials periodically updates the Approved Products List based on field evaluations and test results.

Best Practices

Comparisons of field performance to installation methods has shows that poor



application practices often influence performance as much, or more than the type of material used. In addition, proper material handling is also critical to success.

- ✓ Trained inspection personnel is important
- ✓ Kettle temperatures should be monitored with a thermocouple.
- ✓ Sealant samples should be obtained from application wands to assure overheating has not occurred.
- ✓ A double walled kettle with applicator wand should be used to fill routs and cracks.
- ✓ PCC curb-HMA pavement joint should be sealed when urban sections are receiving a clean and seal or rout and seal treatment. It is also recommended that the longitudinal joint between a PCC pavement and HMA shoulder be sealed.

Basic Treatment Guidelines

Timing

- ✓ Recommend spring or autumn time frame during dry conditions.

Preparation options

- ✓ Refer to Mn/DOT Special Provision 2331, S-135.1 Rout and Seal at Transverse Cracks.
- ✓ Transverse cracks less than or equal to 19 mm [0.75 inches] wide shall be routed, cleaned and sealed.

Material choices

- ✓ Longitudinal cracks – Clean and seal, do not rout. Use Mn/DOT specification 3723 sealant, or 3719 sealant on more severe longitudinal cracks with approval of the Engineer.

Methods

- ✓ Follow proper acceptance procedures as outlined in Mn/DOT 2332 S-135.1D
- ✓ Mn/DOT standard rout configuration is ¾-in. x ¾-in. A rout Width/Depth ratio ≥ 1 may improve sealant performance, but excessive widths are prone to failure.
- ✓ Use a square die to inspect routed cracks.
- ✓ Avoid wide, thick overbands.
- ✓ Sealant temperature in the application equipment shall not exceed the safe

heating temperature recommended by the manufacturer. Reject material

- ✓ heated above the safe heating temperature.
- ✓ Sealant placement is not permitted if the temperature of the material is below the manufacturer's recommended minimum application/pouring temperature.
- ✓ Pavement and crack must be dry before starting crack sealing operations.
- ✓ Mixing of different manufacturer's brands or different types of sealants is prohibited.
- ✓ The specified air compressor is capable of producing a continuous stream of clean, dry air at the specified pressure and rate. Backpack blowers (leaf blowers) not allowed.
- ✓ Heat Lance: shall operate with propane and compressed air in combination and be capable of achieving the specified a temperature and velocity of heated air.

For More Information:

Minnesota Department of Transportation
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1400 Gervais Ave North
Maplewood, MN 55109

www.dot.state.mn.us/materials/research

A list of Mn/DOT certified crack sealant sources is available at:

<http://www.mrr.dot.state.mn.us/materials/materials.asp>

A list of Mn/DOT certified crack sealant sources is available at:

<http://www.dot.state.mn.us/pre-letting/prov/pdf/sp2005.pdf>

View the NRC-CNRC Infra-guide at

http://sustainablecommunities.fcm.ca/files/infraguide/roads_and_sidewalks/guidelines_sealing_fil_cracks_pavmnt.pdf

