

# Pavement Crack Treatment

## Crack treatment overview.

Why and when to treat cracks.

Evaluating pavement and selecting product.

Proper application and equipment.



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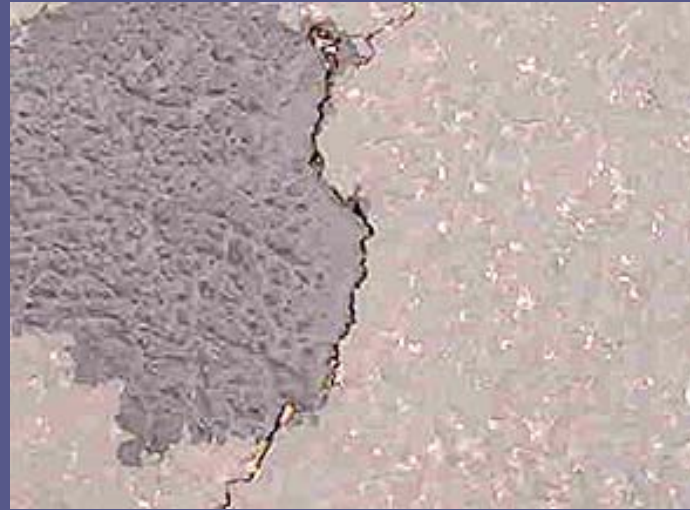
Proper  
application  
and  
equipment.



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# Why treat cracks?

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Prevents water intrusion into the sub-base.



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# Why treat cracks?

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**Prevents incompressible intrusion.**  
– Improves ride quality smoothness.



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# Why treat cracks?

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Slows down pavement deterioration.



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# Why treat cracks?

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U.S. Department  
of Transportation

**Federal Highway  
Administration**

“ Cracks are inevitable, and neglect leads to accelerated cracking and potholing, further reducing pavement serviceability.”

(FHWA-RD-99-147)



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# Why treat cracks?

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U.S. Department  
of Transportation

**Federal Highway  
Administration**

“With proper and timely application, crack sealing and filling can extend pavement life past the point where the cost-benefit of added pavement life exceeds the cost of conducting the operation.”

(FHWA-RD-99-147)



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# Why treat cracks?

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- Protect your largest investment.
- Pavement failure imminent
- Crack treatments are cost-effective, up to 9 years of performance.
- Extends pavement life.



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# When to Seal Cracks?

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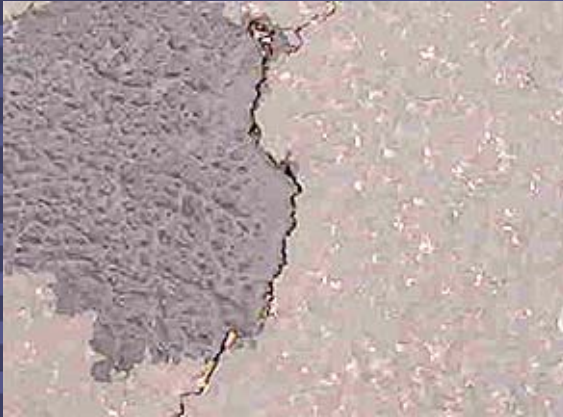
- **Soon after they appear...**  
any crack opening will allow moisture penetration into pavement foundation (sub-base).
- At minimum all cracks  $\geq 1/8''$ .



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# What cracks to treat?

Water Intrusion



Incompressible Intrusion



Edge Joints



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# Crack Evaluation

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- **“Working”** (high movement)
  - ≥ 3mm movement
  - Thermal
- **“Non-working”** (low or no movement)
  - < 3mm movement
  - Longitudinal
  - Block
  - Fatigue



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# Two Different Treatments

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## Crack Sealing

“ **Working**” cracks - [10% of cracks]-

“The placement of specialized treatment materials above or into working cracks using unique configurations to prevent the intrusion of water and incompressibles into the crack.”

(FHWA-RD-99-147)



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# Crack Sealing Treatment

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## Use:

- In thermal cracks.
- Routed reservoirs.
- Pavements in good condition- >20' transverse crack spacing, minor other cracking.
- Sealants that are flexible and extensible at lowest temperatures encountered.



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# Type of crack- “thermal (*transverse*)”

## Definition:



- Moving cracks formed by temperature related pavement/sub grade movement.
- Generally in transverse direction. (perpendicular to center line)
- Generally full width of street or road.
- Generally >20 foot spacing.
- Considered “working” cracks-  $\geq 3\text{mm}$  movement.
- Will develop in 2-7 years on most new pavements, 1-3 years on overlaid concrete.



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# Crack Preparation / Routing

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- Rout at least 1/8" from each crack face.
- Keep centered over crack.
- Reduce spalling by using as many cutters as possible.



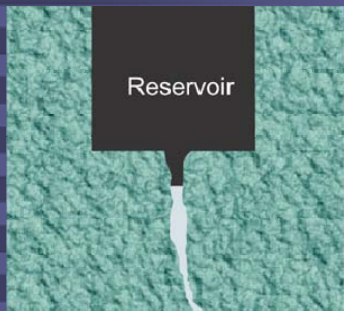
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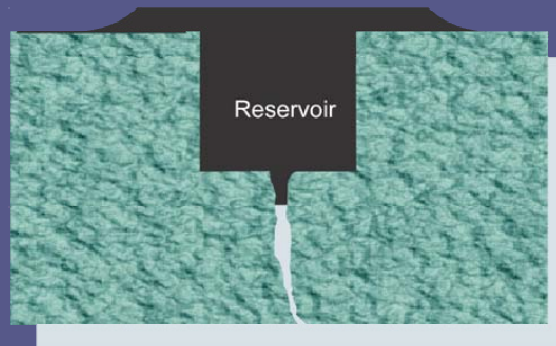
# Crack Preparation / Routing

Rout size recommendation

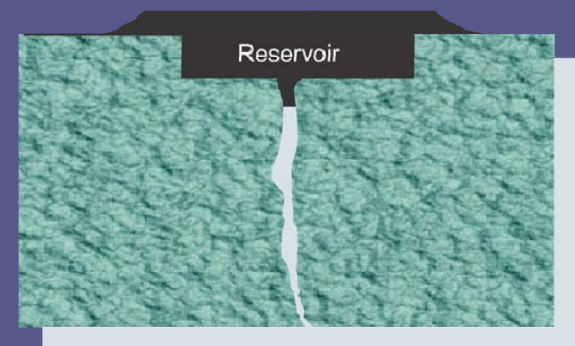
Standard Reservoir-  
and-Flush



Standard Recessed  
Band-Aid



Shallow Recessed  
Band-Aid



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# Two Different Treatments

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## Performance Crack Filling

“ **Non-working** ” cracks - [90% of cracks]- “The placement of ordinary treatment materials into non-working cracks to substantially reduce infiltration of water and to reinforce the adjacent pavement.”

(FHWA-RD-99-147)



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# Crack Filling Treatment

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## Use:

- In longitudinal, block, fatigue and closely spaced transverse cracks
- (< 20' spacing).
- In wheel paths and high traffic areas.
- Stiffer more “traffic resistant” product.
- Routed or non-routed reservoirs (use discretion), over-band application.
- Pavements in fair to poor condition.



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# Crack Type – “*Longitudinal*”

## Definition:



- Can develop in 2-5 years along with thermal cracks.
- Occur in longitudinal (parallel to center line) direction.
- Caused by thermal movement, construction joints and edge joints.
- Considered low movement, “non-working” cracks-  $< 3\text{mm}$  movement.

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# Crack Type - “*Fatigue* (*alligator*)”

## Definition:



- Caused by repeated traffic loading
- Occurs in heavy traffic areas and wheel paths.
- Cracks form in closely spaced, interconnecting block patterns.
- Sure sign of pavement structural failure.
- Considered low or no movement “non-working” cracks- < 3mm movement.

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# Crack Type - “*Fatigue (alligator)*”

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Same street- slurry seal treatment  
two years later.



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# Slurry Seal



- Slurry Seal Industry:
- “Crack sealing is absolutely necessary for optimum slurry seal performance”.
- All cracks 1/8” and larger.
- Can slurry seal over fresh hot-pour crack sealant the next day when necessary.
- Preferably, when time permits, wait 2-3 months before slurry sealing over crack sealant.



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# Large Cracks

Polymer  
modified/aggregate  
materials

- No Air Voids
- No Compaction
- Adhesive



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# Forget It!

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## PAVEMENT PRESERVATION

# Product Selection

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Cohesive Failure

Adhesive Failure



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# Product Selection

Crack sealants and crack fillers need to remain functional over the range of anticipated pavement temperatures.

Determine temperature ranges with LTPPBind

- ❑ [www.tfhr.gov/pavement/ltpp/reports/03080/](http://www.tfhr.gov/pavement/ltpp/reports/03080/)
- ❑ [www.tfhr.gov/pavement/ltpp/ppt/bind.ppt](http://www.tfhr.gov/pavement/ltpp/ppt/bind.ppt)
- ❑ [www.fhwa.dot.gov/pavement/ltpp/bind/download](http://www.fhwa.dot.gov/pavement/ltpp/bind/download)



**APPLICATION NOTES**

**Using LTPPBind to Improve Crack Sealing in Asphalt Concrete Pavements**

FHWA Contact: Antonio Nieves, 202-493-3074, [antonio.nieves@fhwa.dot.gov](mailto:antonio.nieves@fhwa.dot.gov)

**The Challenge**  
Repairing cracks in asphalt concrete pavements is essential to ensuring pavement performance and reducing life-cycle maintenance and replacement costs. One of the ways to extend pavement life is to include crack sealing treatments as part of pavement preventive maintenance practices. The effectiveness of these treatments depends on many factors, including the properties of sealant materials, installation methods, temperature extremes, pavement conditions, traffic levels, and crack movements.

Sealants with different properties are needed in different climates. Warm climates require stiff sealants to resist hot summer temperatures. If the sealant is too soft, it may flow or be pulled from the crack by vehicle tires. Softer, more flexible sealants are more appropriate for cold climates in which pavements are prone to larger crack movements, especially during the winter. In any given climate, sealant materials must function over the range of temperatures from summer to winter.

Installation methods also vary by climate. Correct installation ensures that the sealant can conform to crack movements in the pavement. The tendency of pavement cracks to widen or move in the winter increases as the distance between existing cracks and variations in winter and summer temperatures increases. If the installation is not correct, cracking or delimiting may develop as cracks widen in the winter.

Pavements in good condition that demonstrate transverse thermal cracking, but otherwise have minimal cracking, are best treated with seal and seal procedures. These procedures use very flexible and extensible sealants to seal and seal procedures with working cracks that move more than 3 millimeters (and throughout the year). For pavements with more extensive cracking, such as longitudinal, block, fatigue, and closely spaced transverse cracks in which crack movement is minimal (less than 3 mm a year), techniques such as crack filling, clean and seal, and overlaid are appropriate. These techniques use stiffer, more traffic resistant sealant materials in cracks that generally are not widened.

In the past, highway agencies from across the United States have developed area specific crack sealing treatment procedures through a series of test sections, evaluating and investigating sealant types and installation methods by trial and error. Selecting sealant materials for specific climates has been based on approximate descriptions of temperature ranges in hot, moderate, or cold climates, and with some general air temperature highs and lows.



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# Types of products: *(FHWA-RD-99-147)*

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## Crack Filling

- **Emulsion and asphalt cement fillers**
  - At best 2 to 4 years performance in un-routed non-working cracks
- **Rubber and fiber-modified asphalt fillers**
  - 6 to 8 years performance in un-routed non-working cracks



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# Types of products: (FHWA-RD-99-147)

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## Crack Sealing

- Rubberized (polymer-modified) asphalt sealants
  - 5-9 years performance in *routed* working cracks
- Rubberized (polymer-modified) asphalt sealants
  - 2.5-5 years performance in *un-routed* working cracks



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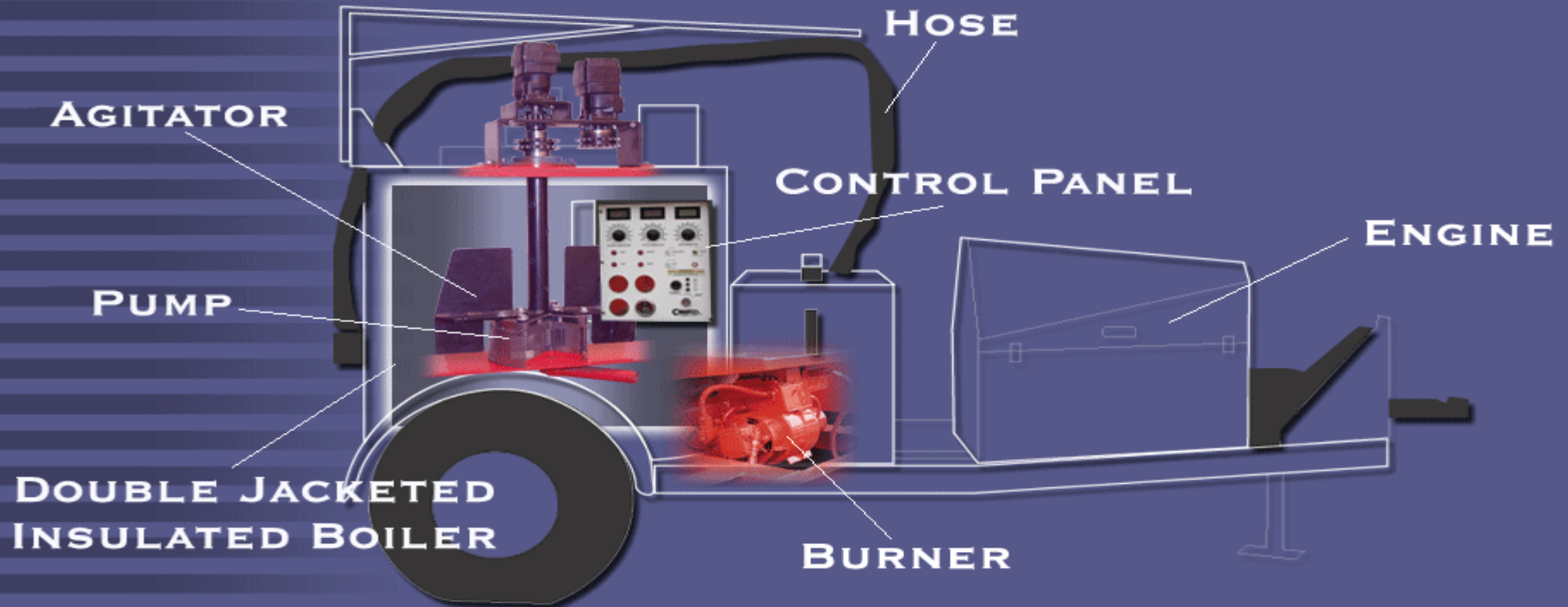
**Proper application and equipment.**



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# Proper equipment - Basics

## TYPICAL MELTER/APPLICATOR CONFIGURATION



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# Proper equipment - Basics

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## Melter Applicator

- Oil-jacketed
- Thermostatic heat controls
- Continuous agitation
- Over-heating safety controls
- Right size for operation
- Many commercial versions...

*\* Construction of HMA Pavements- Asphalt Institute*

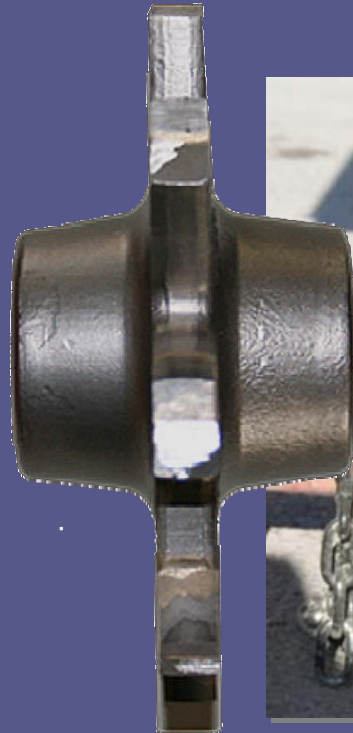


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# Proper equipment - Basics

## PAVEMENT CUTTER



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# Proper equipment - Basics

Worn Cutters will not provide a good reservoir.



New Cutter



Worn Cutter



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# Installation Choices

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- Rout or Not
- Size of Rout
- Cleaning Recess
- Flush
- Overband



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# Basic Needs Requirements

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*All applications*

- Clean- most important
- Dry
- Intact pavement
- Proper temperature

*(pavement 40°F and application 400°F)*



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# Cleaning Methods



Unclean  
Crack



Clean  
Crack

- Compressed air - sufficient pressure and velocity
- Vacuum - in combination with compressed air
- Heat lance - used to warm pavement when needed
- Routing - cuts new bonding surface



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# Flush Fill Seal

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Clean Crack



No Sealant on  
the pavement  
surface



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# Recommended Overband

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Correct



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# NOT Recommended

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## PAVEMENT PRESERVATION



# Summary *(Why Crack Seal?)*

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- Prevents water intrusion into sub-base
- Prevents incompressible intrusion
- Improves ride quality smoothness
- Slows down pavement deterioration
- Cost effective



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# Summary *(What Crack Treatment?)*

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- Pavement evaluation
- Determine if Crack Sealing or Crack Filling treatment is needed
- Determine temperature (high/low extremes)
- Select product
- Proper application



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