

PAVEMENT PRESERVATION AND MAINTENANCE



SPOTLIGHT

Crack Treatments



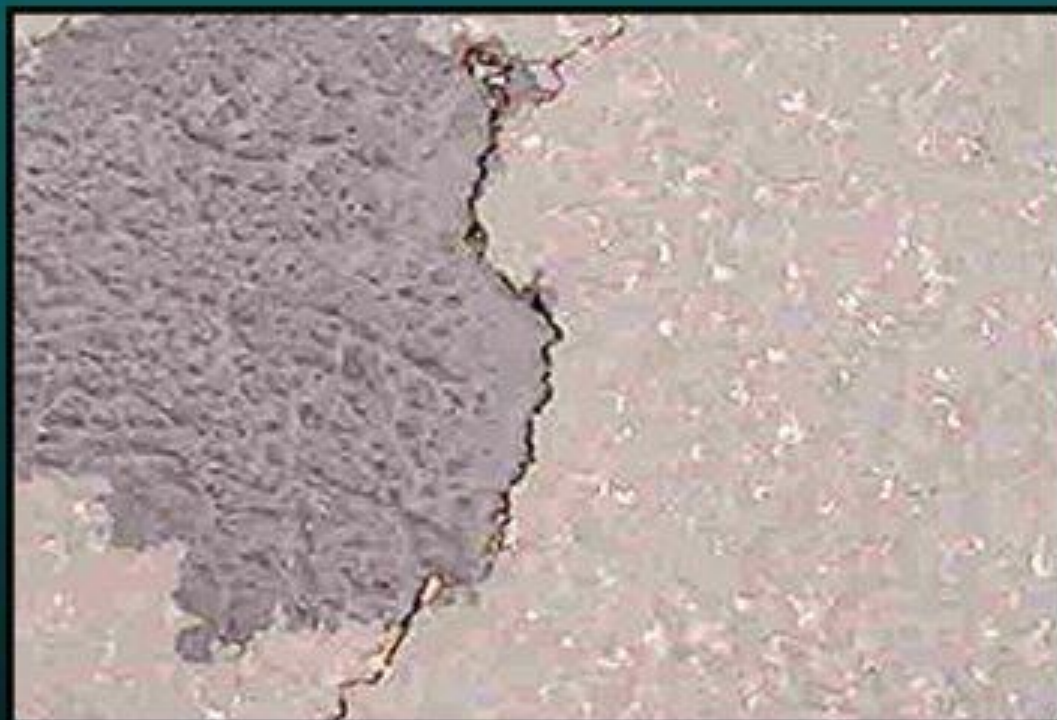
SPOTLIGHT

**Asphalt
Crack Treatments**

Asphalt Crack Treatments

- Why Perform Crack Treatments
- When and Where to Perform Crack Treatments
- Crack Treatment Process
- Sealant Specifications

Why treat cracks?



Prevents water intrusion into the pavement sub-base.

Why treat cracks?



- Prevents incompressible intrusion.
- Improves ride quality smoothness.

Why treat cracks?



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

(FHWA-RD-99-147)



U.S. Department
of Transportation

**Federal Highway
Administration**

Why treat cracks?



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)

Why Perform Crack Treatments?

Federal Highway Administration

*“Crack Sealing is the single
most cost effective preventive
maintenance tool available”*

When and Where to Perform Crack Treatments

Crack Types

When and Where to Perform Crack Treatments

Different types of cracks develop in asphalt concrete pavements. The type of crack formed depends on the cause of the crack.

Cracks are generally either thermal related, or load associated, but other type can also occur.

Following are descriptions of crack types:



Fatigue Cracking

Fatigue Cracking (or Alligator Cracking)

-Caused by the inability of pavement to resist deformation from repeated traffic loadings.

-Occurs in wheelpaths

-Cracks appear as a close, interconnected block-like pattern.

-Presence indicates that the pavement system is experiencing structural failure of the base and asphalt concrete layers.

Transverse Cracking



Traverse Cracking

-Caused by inability of asphalt concrete to withstand low and falling temperatures. As temperatures drop, the pavement thermally contracts and the asphalt cement binder stiffens.

-Will develop if rate of contraction imposes stresses greater than those which the asphalt concrete can resist.

-Will generally develop within 2-5 years in most pavements.

Transverse Cracking

- Most common in colder climates.
- Have been observed to start at the surface and progress downward.
- Cracks can experience large amounts of movement with temperature changes
- Will generally occur at large spacings early in the life of the pavement. As pavement ages, cracking will develop at closer intervals. In older pavements in cold climates, transverse cracking can be spaced as close as 9'ft to 12'ft.

Longitudinal Cracking



Longitudinal Cracking

- Occurs primarily in the longitudinal direction of the pavement.
- Can occur from thermal contraction effect
or
- May occur at longitudinal paving joints or form in wheel paths due to repeated pavement loadings
- Generally experience lesser degrees of movement than transverse cracks due to their closer spacing.

Reflection Cracking



Reflection Cracking

- Results from the effects of horizontal or vertical movements at the underlying cracks or joints.

- Cracks are typically narrow, can occur early in the life of the overlay, and may be longitudinal, transverse, or random depending on the underlying pattern.

Block Cracking



Block Cracking

- Generally forms in relatively old asphalt concrete pavements as a result of shrinkage and thermal effects.
- Form in a somewhat rectangular pattern with sides ranging up to about 3m long.
- Longitudinal and transverse cracks which form at a close spacing as opposed to fatigue cracking, which forms only in areas subjected to traffic.
- Block cracking will occur in non-traffic areas.

Edge Cracking



Edge Cracking

- Can form within the outer 0.5m of asphalt concrete pavements which border on unpaved shoulders.
- Can be either longitudinal or semi-circular shaped
- Cracks form due to movement at the pavement edge resulting from weak support of the shoulder, or weakened bases near the pavement edge.

When and Where to Perform Crack Treatments

**What Cracks
Should I Seal?**

All Of Them!

When Should I Seal Cracks?

Within One Season After They Appear; Sub-Base Deterioration Begins When Cracks Appear



What Sealant Should I Use?

The Type Of Sealant To Use
Varies Based On:

- Pavement Type
- Climate
- Desired Performance

Hot-Applied Rubberized Asphalt Offers:

- A Variety Of Specifications,
- Performance That Exceeds 5 Years,
(Report In SHRP H106 Study)
- A Wide Range Of Applications.

SPECIFICATIONS

1. ASTM D-3405
2. ASTM D-1190
3. AASHTO M-173
4. Federal Specification SS-S-164

SPECIFICATIONS

ASTM D6690

Type I:

Type II:

Type III:

Type IV:

Sealant Quality

- Don't try to save a few dollars on the sealant and sacrifice performance!!!



CRACK SEALING

APPLICATION TECHNIQUES

Basic Needs In All Installations

- Clean
- Dry
- Structurally sound pavement
- Proper temperature

Surfaces Need To Be Clean

- Pavement Surface and crack walls free from dirt and debris

Surfaces Need To Be DRY


- Dry pavement surface and crack interior
- NO dampness
- NO darkening or discoloration due to moisture
- NO frost or dew

**Did I mention the
pavement must be
DRY?**

**Moisture will guarantee
failure**

Pavement Temperature

- 40° F minimum
- CAUTION should be observed when applying products below the dew point.
- Heat lance can be used to warm the pavement.

A close-up photograph of a hot air lance being used on a wet pavement crack. The lance is a long, cylindrical metal tool with a nozzle at the end, held by a person whose leg and foot are partially visible on the right. The pavement is dark and wet, with a large puddle of water reflecting light. The crack is filled with a light-colored sealant. The background is a blurred asphalt surface.

THIS PAVEMENT IS
TOO WET. HOT-AIR
LANCE WILL NOT BE
EFFECTIVE. MOISTURE
WILL RE-ENTER CRACK
BEFORE SEALANT IS
APPLIED.

Hot Air Lances should only be used to dry slightly moist pavement or heat pavement up to 40F. Use extreme care not to scorch or damage pavement surfaces. No discoloration of pavement.

CRACK PREPARATION

- Cracks Must Be Clean & Dry
- Use Compressed Air or Heated Air Lance if needed

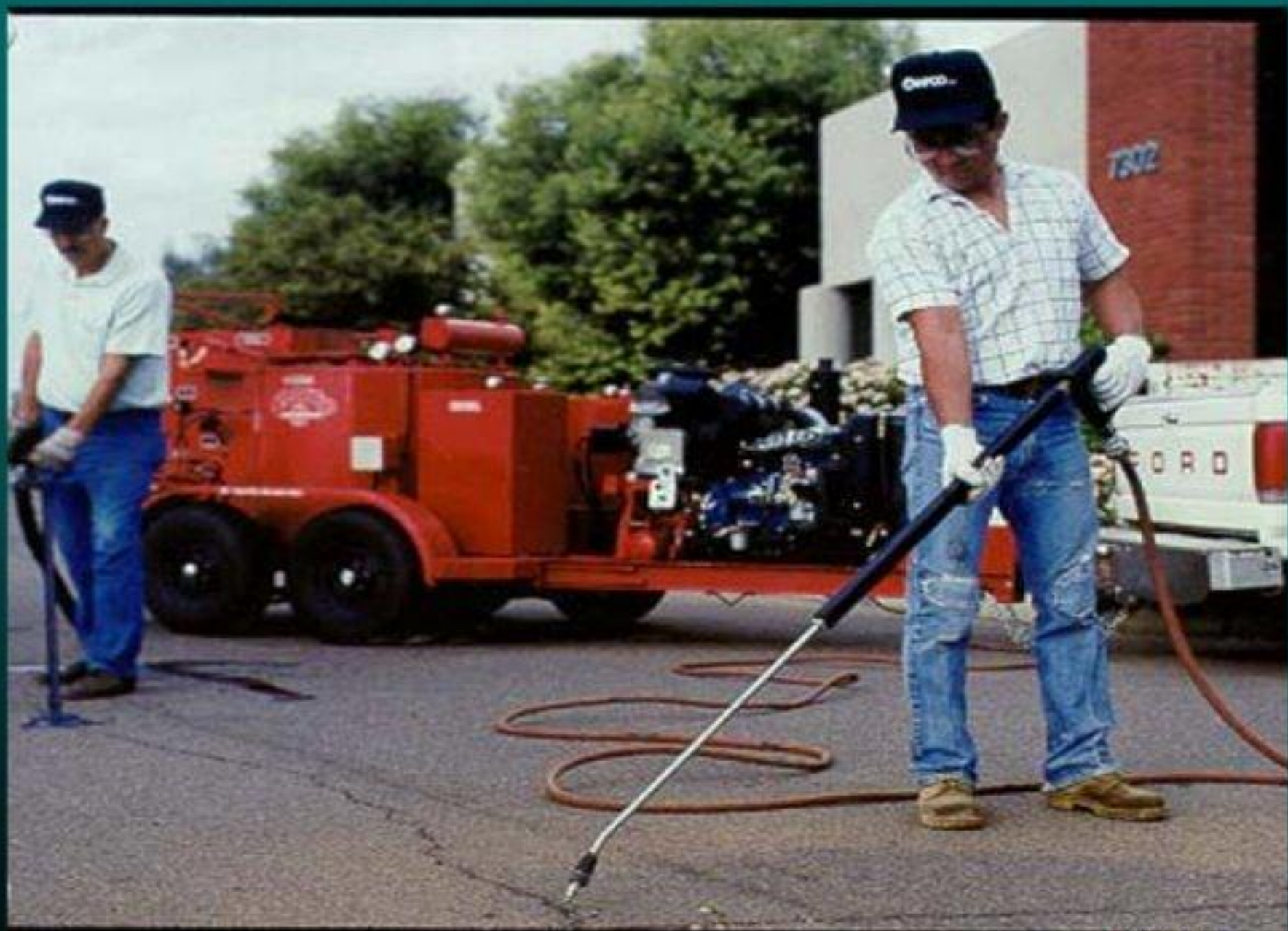
Note: Be Sure Compressor Is Equipped With A Moisture Trap

Cleaning Methods



Cleaning Methods

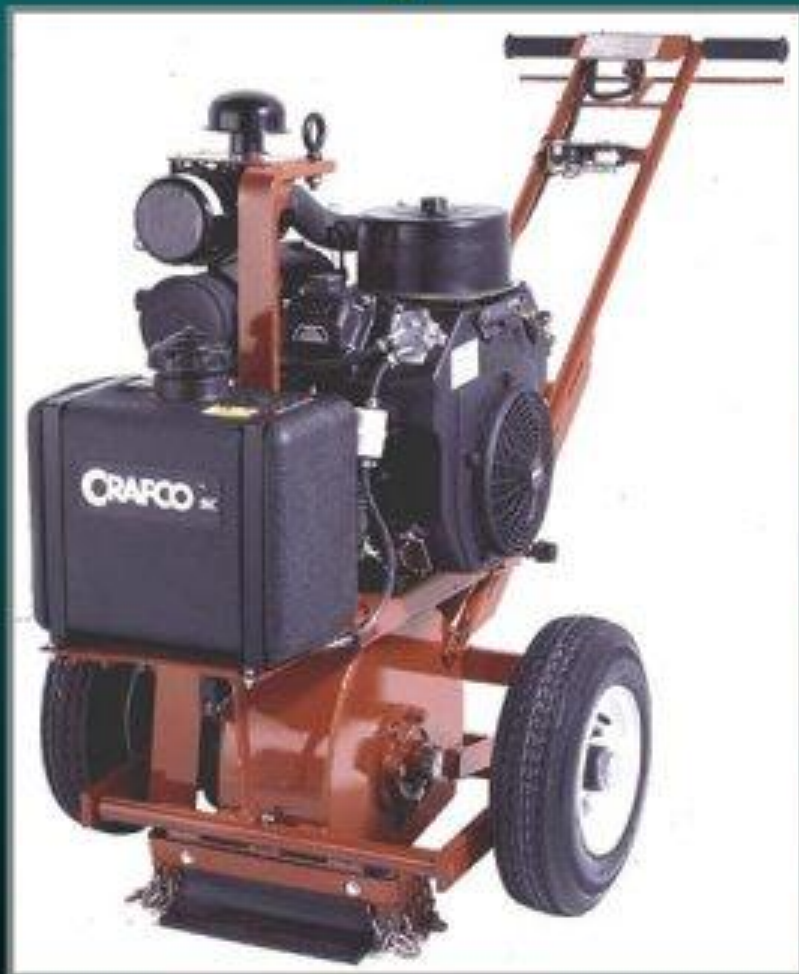
- **Compressed air - sufficient pressure and velocity – moisture traps**
- **Vacuum - in combination with compressed air**
- **Heat lance - used to warm pavement when needed**
- **Routing - clean bonding surface**





Remove all dirt and debris

Preparation Equipment



Pavement Cutter / Router

High speed rotary head impacts 6 carbide steel cutters to form reservoir

ROUTING

vs.

BLOW AND GO

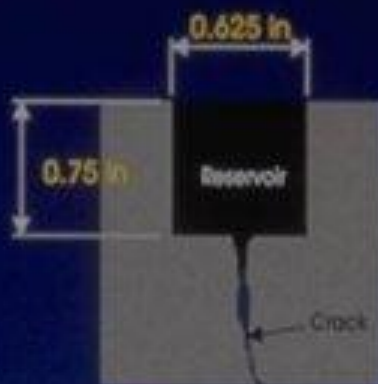
- Newer Pavements
- Anticipated service life >3 years
- Crack type primarily thermal – working cracks
- Crack density <20%
- Cracks have little or no spalling or secondary cracking
- Sealants are higher performing – more extensible

- Older Pavements
- Surface treatment within 5 years
- Crack type- block, fatigue, longitudinal, reflective, edge
- Crack density >20%
- Cracks have spalling, secondary and intersecting cracking
- Sealants generally more tenacious and internally rigid

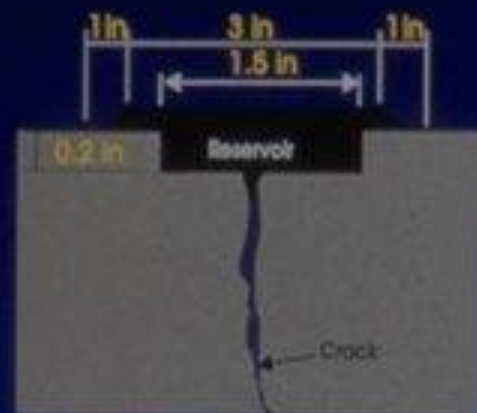
Routed Reservoir

- Performed on better pavements with thermal cracking
- Proven longer sealant performance-
SHRP/FHWA
- Widened reservoir reduces % of crack movement
- Routing provides clean vertical crack walls

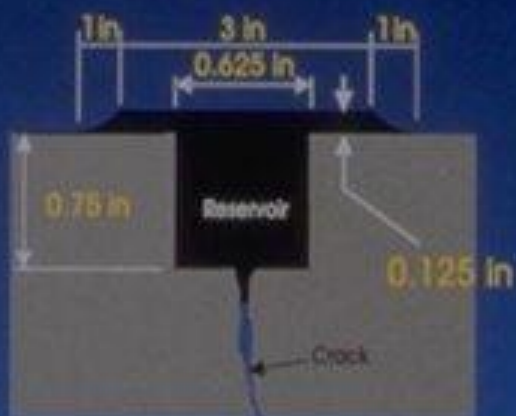




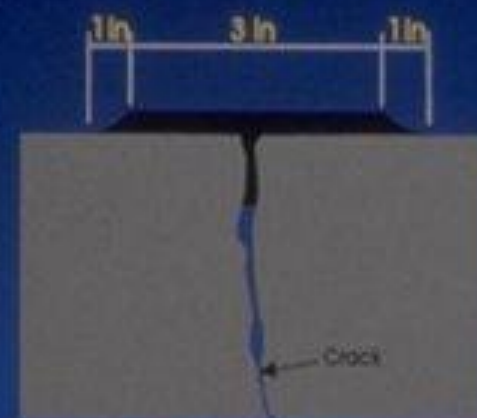
Configuration A
Standard Reservoir-and-Flush



Configuration C
Shallow Recessed Band-Aid



Configuration B
Standard Recessed Band-Aid



Configuration D
Simple Band-Aid

Sealant Application - Recess

- 1/4" to 3/8" below the pavement surface
- Recommended when overlay will be placed soon
- NO material on the surface
- Limits overlay bumps

Sealant Application

Flush Fill

- Fill the reservoir to surface level from bottom up
- Strike off flush
- Standard installation



3 18 56



Crack Fill BLOW and GO

- Cracks > 1/4" wide
- Intact pavement surface
- Clean with compressed air
- Flush fill (Squeegee)
- Overband – narrow and tight to the pavement



PROPER OVERBAND

- **Narrow**
- **Tight to the
pavement**
- **Pavement
texture
visible
through
sealant**





**Sealing of
Asphalt Cracks
or Shoulder
Joints between
Asphalt and
Concrete
Pavement is
vital**



After application, protect sealant from traffic until cooled.

OPTIONS

- **Maintain Lane Closure**
- **Spray Pavement with water**
- **Apply liquid barrier material- Detack**

Blotting materials such as sand, portland cement, lime, slag, etc. are not recommended. These blotters can be abrasive and alter the properties of the sealant affecting flexibility and extension.

Application



Equipment

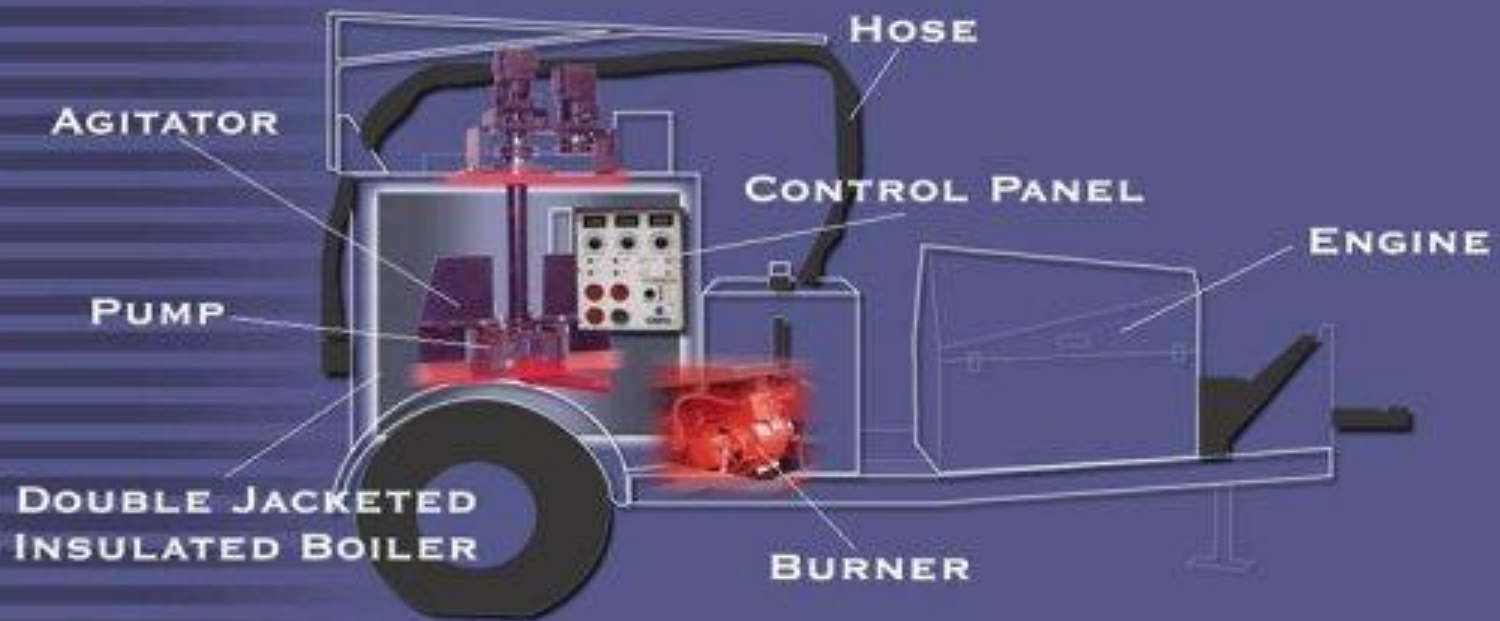
SAFETY

SAFETY

SAFETY

Proper Equipment

TYPICAL MELTER/APPLICATOR CONFIGURATION



**PAVEMENT
PRESERVATION**

©2006, Crafoo, Inc. All rights reserved



Deteriorated Paving Joint

- Early in pavement life
 - Raveling
 - Accelerating deterioration
 - Requires maintenance
- Shortened pavement life

Joint Adhesive Material:

Hot-applied, highly polymer modified asphalts with improved high temperature stiffness, sag resistance, adhesion and low temperature performance.

PERFORMANCE – RESEARCH

- NCAT -Longitudinal Joint Construction Techniques For AC Pavements
 - Michigan, Wisconsin, New Jersey, Colorado, Pennsylvania
 - Study Time Period -1992 to 2001

Pavement Joint Adhesive

- **What is Pavement Joint Adhesive?**
- It is a hot-applied modified asphalt product.
- **What is it used for?**
- Joint Adhesive is used to adhere and tack asphalt construction cold joints at the interface area between the adjacent asphalt and concrete.

Joint Pavement Adhesive

- **What are the benefits of using a joint adhesive?**
- The benefits in the use of a joint adhesive is to reduce longitudinal paving joint crack formation and deterioration.
- **What are the typical applications?**
- Applications included AC Pavement cold joints; concrete to asphalt interfaces, and perimeters of patch repairs.

PREPARATION: CLEAN AREA



INSTALLATION:

- Oil jacketed, hot applied melters
- Spray or squeegee apply to entire surface
- Approx. 1/8" thick band
- Apply ahead of paver
- Place and compact adjacent mat

MATERIAL APPLICATION



JOINT ADHESIVE APPLICATION



APPLICATION WITH SEALING TIP



JOINT ADHESIVE



JOINT ADHESIVE APPLICATION



TACK AND PAVE



SEALED JOINT



ROLL AND COMPLETE



Summary

Why Crack Seal?

*Crack Sealing is the most cost effective of all
Pavement Preservation Treatments.*

Prevents water intrusion

Prevents incompressible intrusion

Improves ride quality smoothness

Slow pavement deterioration

Summary

What Crack Treatment?

Pavement Evaluation

Determine if Crack Sealing or Crack Filling treatment is needed

Select Product

Choose Material for the Longevity desired

Proper Application

Do the job right the first time

Thank You
Buckle Up and Drive Safely

