Resealing Joints in PCC Pavements

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Joint Resealing Overview

- Why seal joints?
- Methods & Materials
- Equipment
- Joint Preparation
- Proper Resealing
- Common Problems
- References / Resources
JOINT SEALING

- Why Seal?
- To minimize passage of water through joints which leads to pavement deterioration.
- To prevent incompressibles from filling the joints and affecting joint movement and performance.
Water Passage

- Pumping
- Faulting
- Base and sub-base erosion
- Loss of support
Transverse Crack Deterioration from Probable Pumping Action

- Loading
  - Travel
- Impact Load (from Cupping)
  - Cupping of Transverse Crack

Asphalt Pavement
- Pumping Action
  - Water pushed forward by wheel load
- Water propelled backward with force against upstream crack face from impact load

Granular Base
- Ridge of Debris
Incompressibles

- Joint spalling
  - Blowups (extreme cases)
- Buckling
- Slab shattering
Options for a failed joint

- Do nothing
- Short term sealing over existing material
- Remove and replace with similar material
- Remove and replace with different material
Sealing Methods

- HOT APPLIED
  - Polymer Modified Hot applied sealant

- COLD APPLIED
  - Single and two-component or preformed materials
  - Silicone, non-sag or self-leveling
Joint Prep Equipment

- Hook or plow for removing existing sealant
- Wire wheel
- Concrete saw for sealant removal and refacing sidewalls of the joint
- Water or abrasives blaster
- Compressed Air, hot &/or cold
- Backer Rod tool for installation
Equipment (Hot-Applied)

- Indirectly heated double boiler type Melter/Applicator.
- Thermostatic Controlled heating system
- Heated Sealing Hose is available.
- Effective agitation and material recirculation.
- Proper wand tip for desired application.
Oil Jacketed Melter/Applicator
Equipment (Cold- Applied)

- Single and two-component materials
- Verify pump is in proper working order
- Verify two-component pump is delivering material at the correct ratio.
- Use the appropriate wand tip.
- Hoses are not plugged.
Joint Preparation Process

- The *most important factor* in the resealing process.
- Remove all existing materials
- Saw or reface side walls to clean up and reshape the joint
- Clean thoroughly with forced air/water and/or wire wheel to receive new material.
- Install backer rod
Joint Preparation

- CLEANING (After removing most sealant)
  - Hook out and remove majority of sealant
  - Use saw to reshape, score and remove any residual sealant
  - After sawing, joints are flushed with high pressure water to remove all slurry and debris.
  - Joint is cleaned with abrasive cleaning or wire brushing.
  - Use two passes of abrasive air, each directed at one of the joint faces.
Joint Preparation

CLEANING
- Joint is blown with clean *dry* air.
- Compressor must have functioning oil/moisture filter/trap.
- Use of a Heat Lance is often effective
- Compressor should have sufficient pressure and volume.
Joint Preparation

- CLEANING
  - FINGER TEST
    - Inspect joint prior to sealing by running your finger along the walls to insure no moisture or contaminants exist.
    - If oil, dried saw slurry or dust are present joint must be re-cleaned.
Joint Preparation

- **Backer Rod Installation**
  - Installed after final cleaning and just before sealing.
  - Use backer rod installation tool.
  - Use heat resistant backer for Hot applied sealants.
  - Backer should fit snugly in joint.
  - Do not tear, stretch or damage during installation.
Properly prepared Joint

(Cross-sectional view)

- Sealant reservoir
- Backer Rod
- Sawn Joint

PCC PAVEMENT

PCC PAVEMENT
Sealant Installation

- WEATHER REQUIREMENTS
  - Follow Manufacturers recommendations
  - Surface temperature typically 4 deg. C (40 deg. F) or warmer for sawing/Sealing.
  - Sealing shall not begin if rain is imminent.

- APPLICATION SHOULD NOT BEGIN IF THERE IS ANY SIGN OF MOISTURE IN THE JOINT.
Sealant Installation (Hot-Applied)

- Follow manufacturers instructions.
- Before Sealing can begin.
  - Melter Heat Transfer Oil is at proper temp.
  - Material is heated to Manufacturers minimum sealing temperature.
  - Sealant is continuously agitated and recirculated prior to application.
- Sealant should be checked periodically to assure proper temperatures are being maintained.
Sealant Installation (Hot-Applied)

- Melting tank should be kept between 1/3 to 2/3 full to help maintain temperature uniformity.
- Joint should be filled from the bottom up to the specified level to produce a uniform surface with no voids.
  - Use the correct concrete sealing tip.
- Traffic is not allowed on project until sealant is tack-free or cooled.
- Use a sealant barrier spray to speed up traffic opening.
Properly sealed Joint

- RECESSED

PCC PAVEMENT

Sealant

PCC PAVEMENT

Sawn Joint
Properly sealed Joint (Option 1)

- Over-Banded
  - 2 pass operation
  - 1st pass recessed
  - 2nd pass over-band

![Diagram of joint sealing process]

Sawn Joint

PCC Pavement

Pass 1

Pass 2

PCC Pavement
Sealant Installation (Cold-Applied)

- Joint is filled from the bottom up to the specified level with no voids in the sealant.
- Tool non-sag sealants to force the material against the sidewalls and to form a smooth surface.
- Sealant must be permitted to cure to a tack-free condition prior to opening pavement to traffic.
Common Problems / Solutions

- Sealant not adhering to joint sidewalls
  - Joint not clean enough – re-clean
  - Wet joint surfaces – allow to dry
  - Low sealant temp. – Heat to correct temp.
  - Cold ambient temp. – allow temp to rise.
  - Concrete not cured sufficiently – allow to further cure.
Common Problems / Solutions

- **Sealant pick-up or pull-out when opened to traffic**
  - Opened to traffic too soon
  - High ambient temperature – seal in cooler temps.
  - Excessive sealant application – apply below surface or specified recess.
  - Overheated or under-heated sealant
  - Sealant contaminated with solvent or petroleum product.
  - Joint faces contaminated with old, incompatible sealant
Common Problems / Solutions

- **Sealant cracking or de-bonding in winter.**
  - Sealant too stiff for climate.
  - Poor cleaning during installation.
  - Sealing during extreme hot summer weather.
  - Joint too narrow for movement experienced.
  - Incorrect joint configuration, sealant too thick or too thin.
Common Problems / Solutions

- Voids or Bubbles in cured sealant
  - High pavement temp. and moisture content when sealed.
  - Outgassing of backer material. - wrong backer rod used.
  - Backer rod punctured or damaged during installation.
  - Moisture on backer rod from being installed night before - Replace backer rod.
Joint Sealing reference resources/ websites

- US Department of Transportation
  - Federal Highway Administration
    - www.fhwa.dot.gov/preservation
    - SHRP Report
    - Resealing Concrete Pavement Surfaces
    - Pub no. FHWA-RD-99-137

- Foundation for Pavement Preservation
  - Pavement Preservation Checklist Series
    - www.fp2.org

- ACPA American Concrete Pavement Association
  - www.pavement.com/pavTech/Tech/fundamentals/fundsealants.html

- Cimline Inc.
  - Guide to Cracksealing
    - www.cimline.com
Questions?

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