Resealing Joints in PCC Pavements

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Joint Resealing Overview

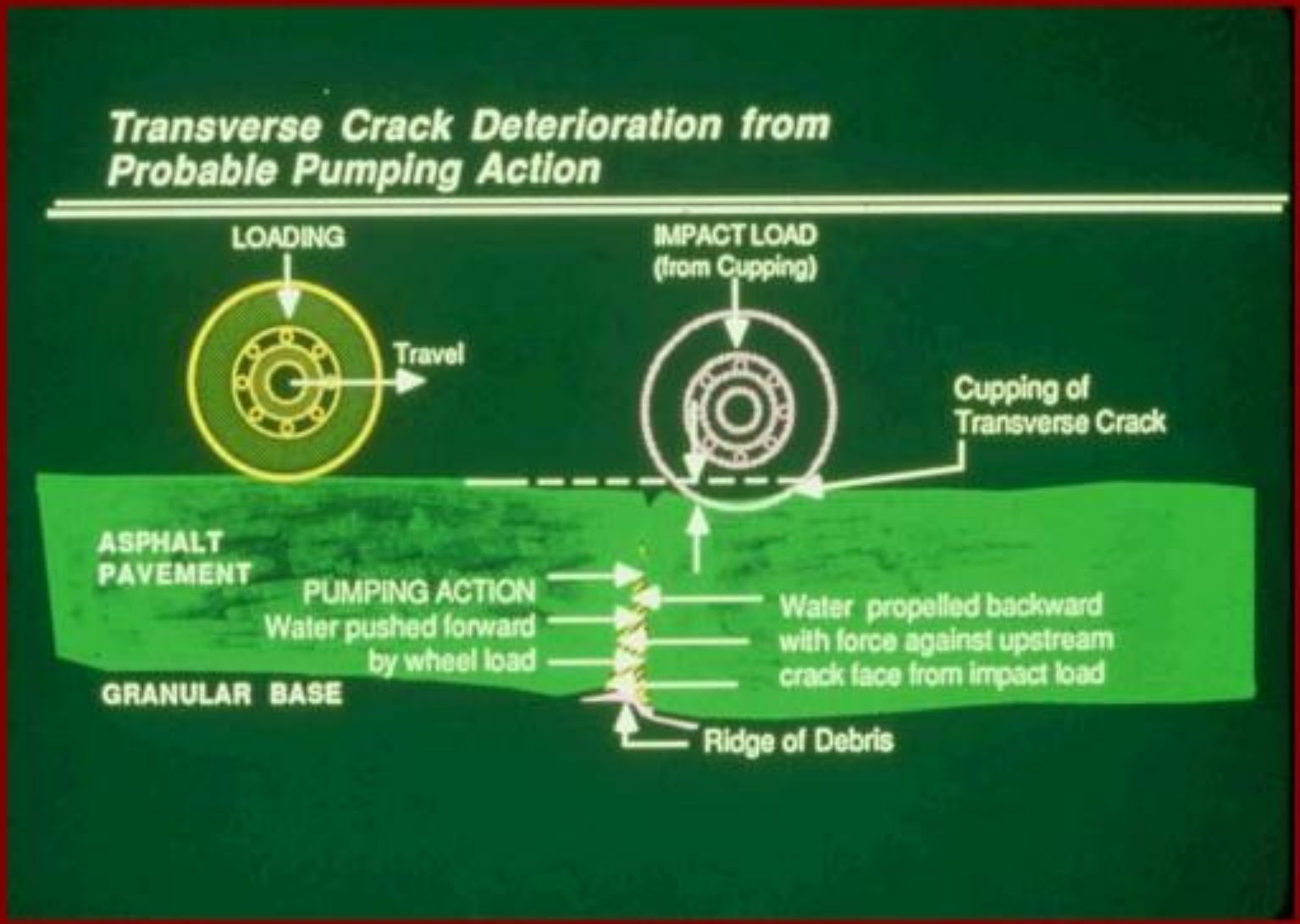
- Why seal joints?
- Methods & Materials
- Equipment
- Joint Preparation
- Proper Resealing
- Common Problems
- References / Resources

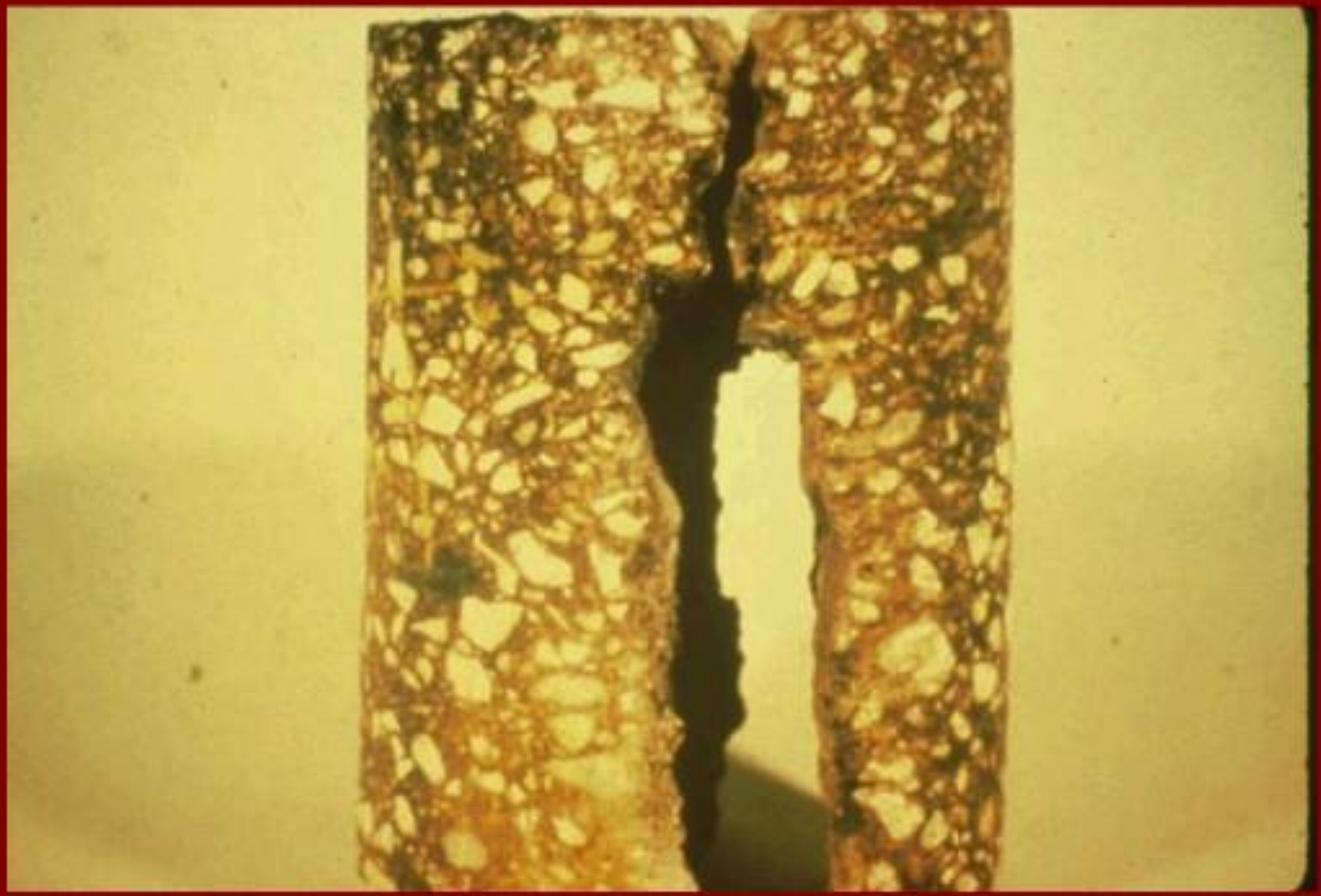
JOINT SEALING

- 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
GRANULAR BASE
Water propelled backward with force against upstream crack face from impact load
Ridge of Debris



Incompressibles

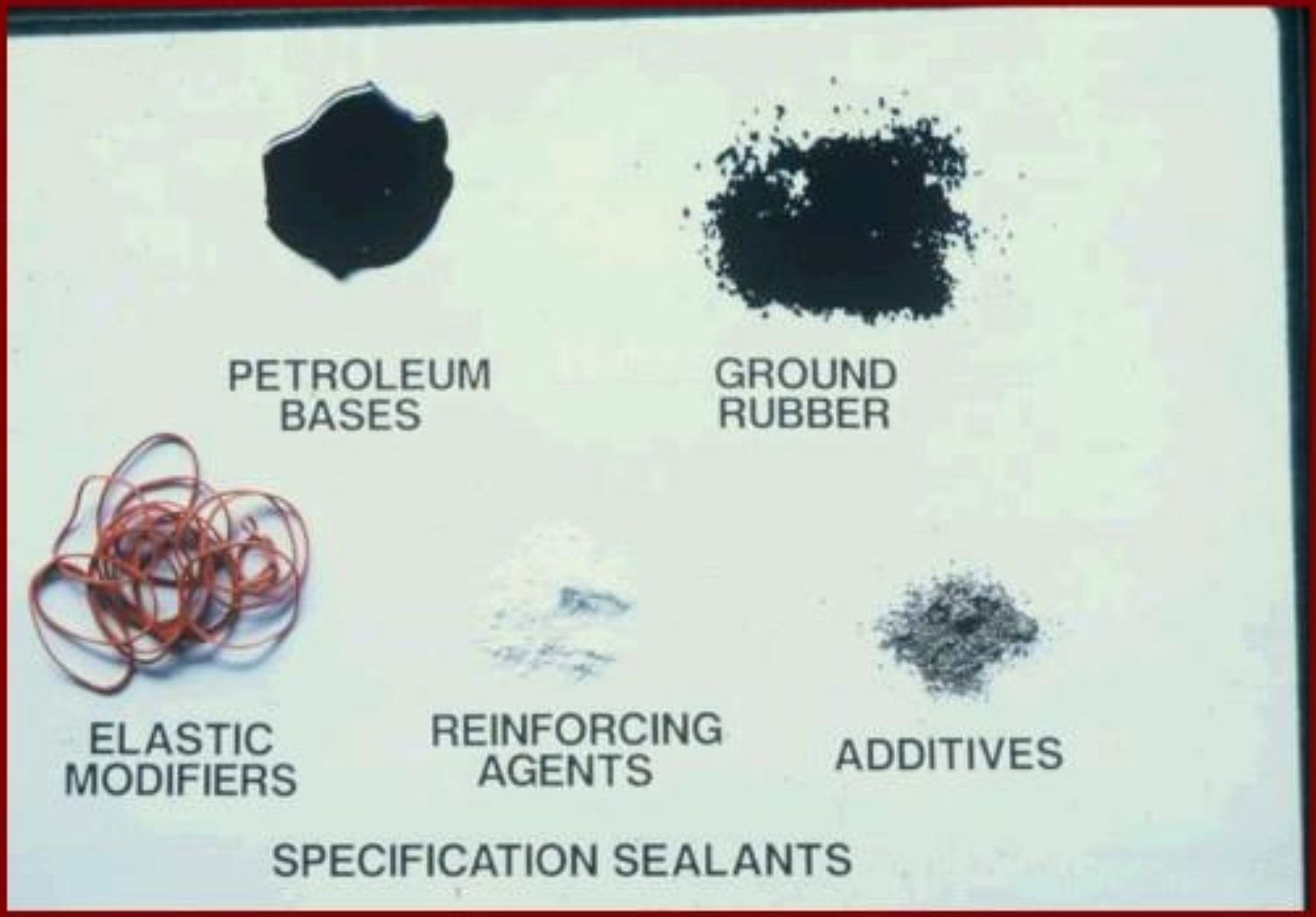
-Joint spalling
  -Blowups (extreme cases)
-Buckling
-Slab shattering

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


PETROLEUM BASES
GROUND RUBBER
ELASTIC MODIFIERS
REINFORCING AGENTS
ADDITIVES
SPECIFICATION SEALANTS

NON-SAG

SELF-LEVELING

LOW MODULUS SILICONE

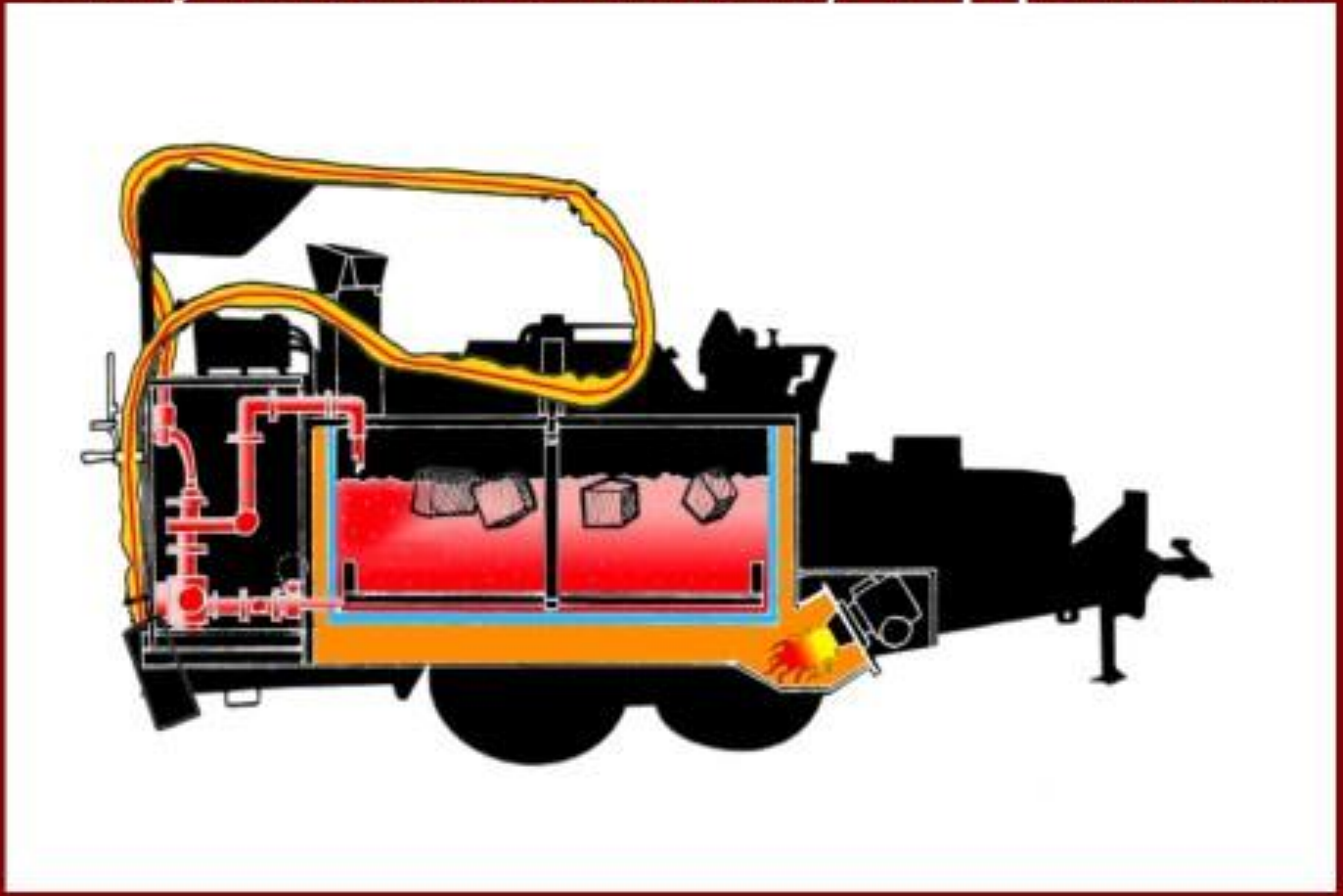
Joint Prep Equipment

- 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

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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

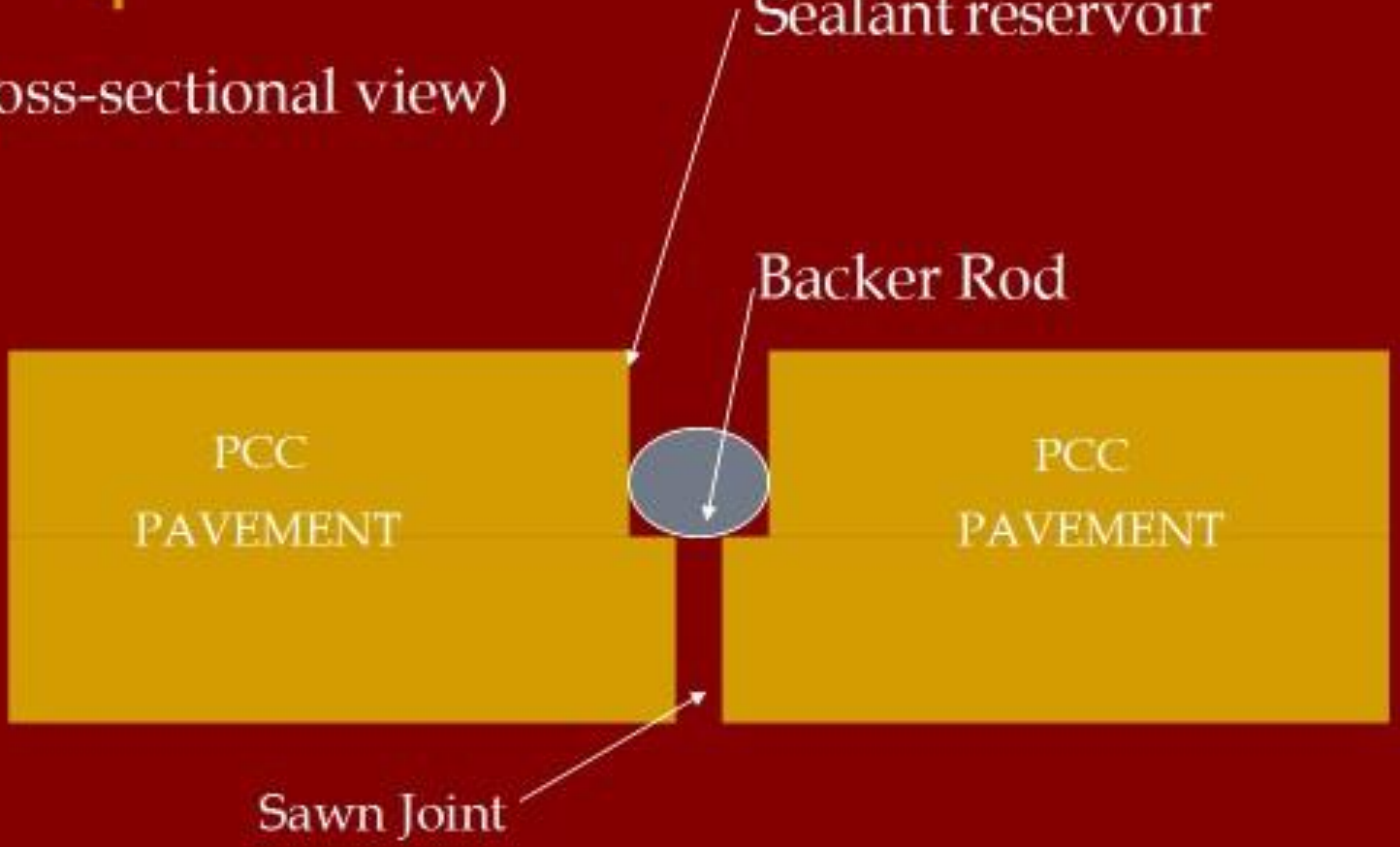
- CLEANING
  - FINGER TEST
    - Inspect joint prior to sealing by running your finger along the walls to insure no moisture or contaminants exist.
    - If oil, dried saw slurry or dust are present joint must be re-cleaned.

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 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)

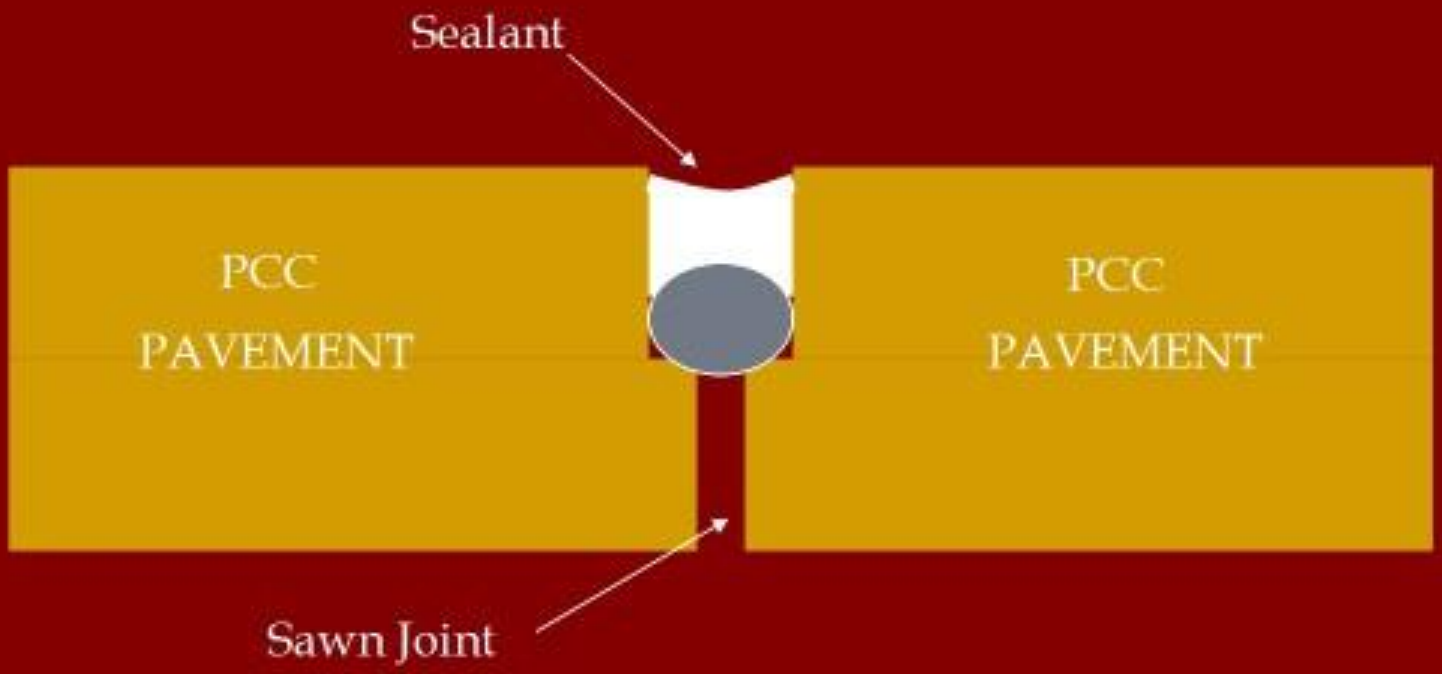
- Follow manufacturers instructions.
- Before Sealing can begin.
  - Melter Heat Transfer Oil is at proper temp.
  - Material is heated to Manufacturers minimum sealing temperature.
  - Sealant is continuously agitated and recirculated prior to application.
- Sealant should be checked periodically to 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.

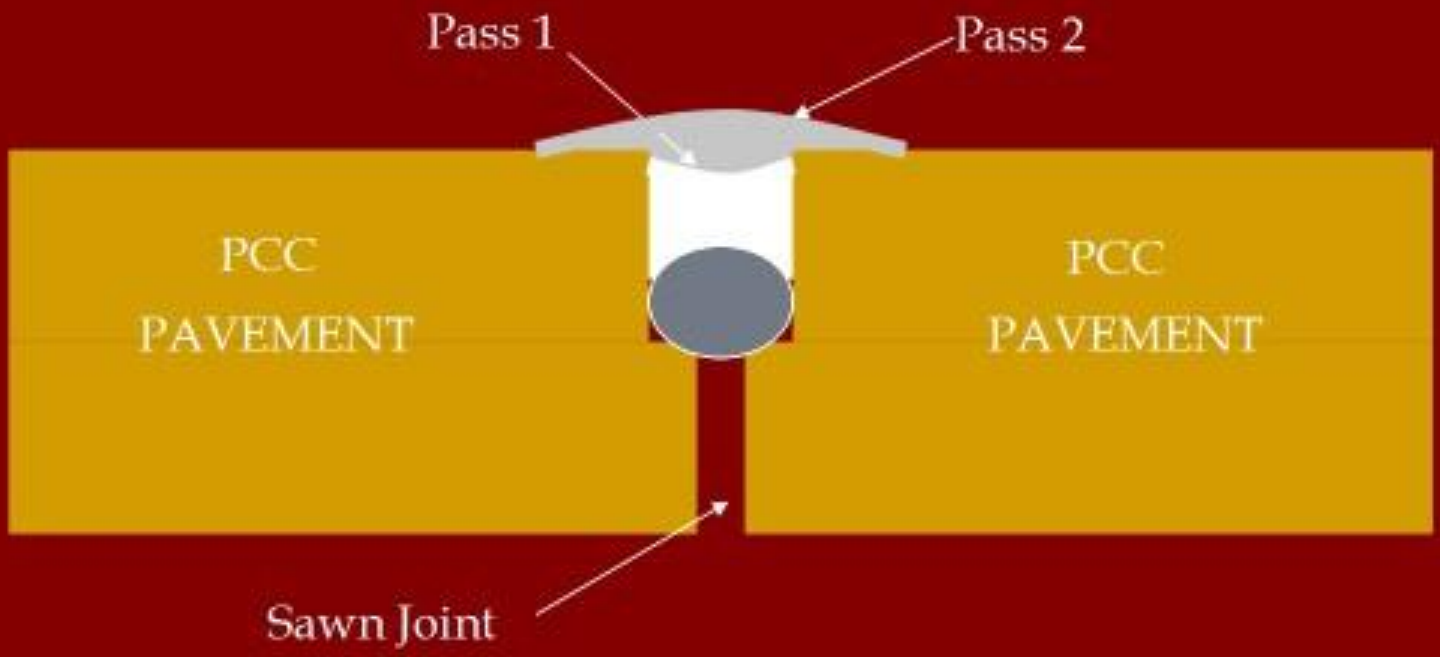
Properly sealed Joint

- RECESSED



Properly sealed Joint (Option 1)

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



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
    - Joint Sealing Portland Cement concrete Pavements.
    - 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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