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PUT YOUR SEAL ON BETTER PAVEMENT PERFORMANCE

This presentation is based on the ACPA technical bulletin "Concrete Pavement Joint Sealing/Filling" and on the work of the Seal/No Seal Committee

Photo Courtesy of D.S. Brown

Joint Sealing and Joint Filling

For most concrete pavements, proactively sealing or filling transverse and longitudinal joints improves long-term pavement performance. These procedures reduce water penetration, which can lead to erosion and subsequent pavement damage, and also reduce entry into the joint of incompressibles that exert pressure on the pavement.

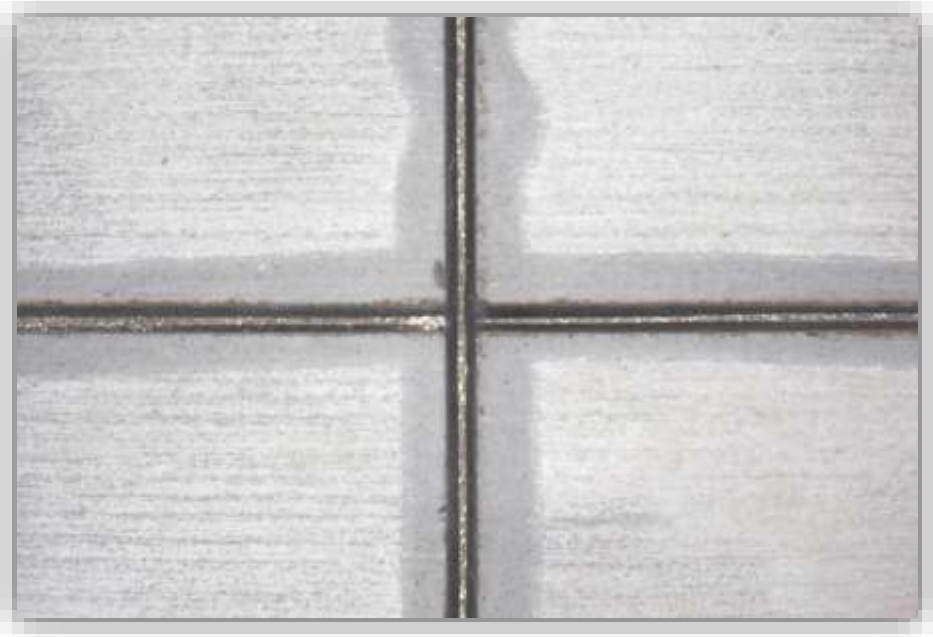


Photo Courtesy of D.S. Brown

Benefits of Joint Sealing and Joint Filling

Joint sealing and filling can impede or prevent:

- **Spalling.**
- **Base/subgrade softening.**
- **Dowel bar corrosion.**
- **Pavement joint blow-ups.**
- **Some types of materials-related distress.**

The Difference between Joint Sealing and Joint Filling

Photo Courtesy of D.S. Brown

Joint sealing involves more rigorous preparation of a sealant reservoir.

Joint filling may be appropriate when the reservoir is narrow and difficult to prepare. Full adhesion of the filler may be difficult to achieve, however; therefore, some moisture penetration may occur through the joints and into the existing bases.

To Seal or Not To Seal?

Photo Courtesy of D.S. Brown

Joint treatment will depend upon:

- Environment.
- Drainage condition.
- Pavement use.
- Performance need.
- Life-cycle cost.
- Joint type/spacing.
- Concrete characteristics.
- Sealant type and material.

Applications of Joint Sealing

While analysis of an individual pavement is necessary to determine if joint sealing/filling is necessary, it is highly recommended (or required) in the following situations:

- Previously sealed joints.
- Roadways where incompressibles or base erosion is a concern.
- Airfield applications.

Photo Courtesy of D.S. Brown

Sealant Materials

There are two primary categories of joint sealant material for roadways:

- Pre-formed neoprene compression seals.
- Formed-in-place sealants (liquids that are pumped into place). Includes hot-pour and silicone.

Image Courtesy of D.S. Brown

Sealant Properties

Basic sealant properties necessary for long-term performance depend on the multiple factors, but properties to consider include:

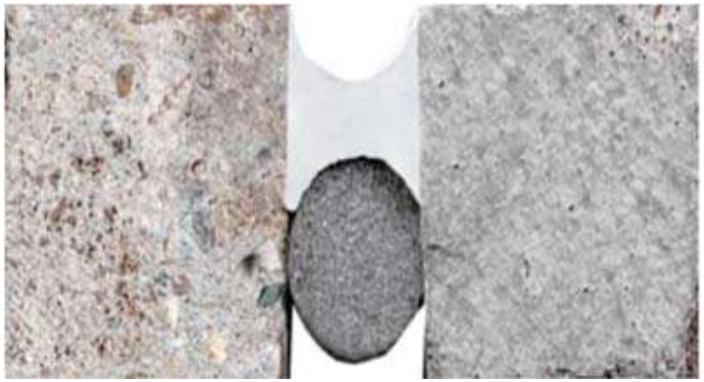
- Extensibility (ability to stretch).
- Modulus (stiffness).
- Adhesion.
- Cohesion (tear-resistance).
- Compatibility with adjacent materials.
- Durability.
- Jet-fuel resistance.

Photo Courtesy of D.S. Brown

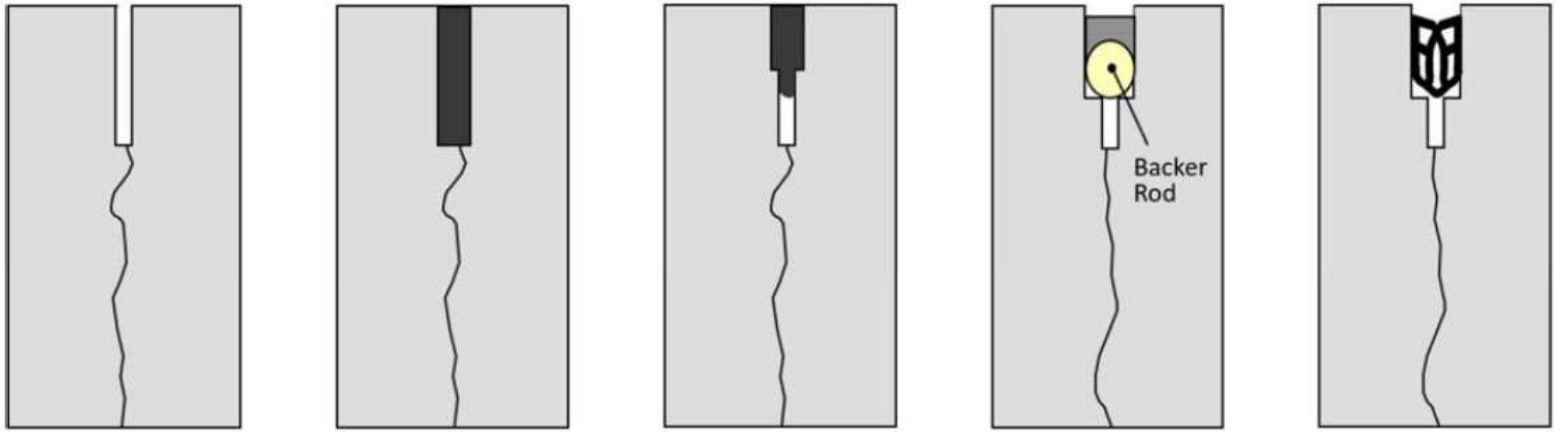
Backer Rods

Backer rods are necessary when using formed-in-place sealants. They:

- Prevent sealant material from flowing to the bottom of the reservoir.
- Prevent three-point adhesion.
- Control width-to-depth ratios. Attention should be given when installing rods in outdoor, weather-exposed environments. Closed-cell backer rods should be used in these applications.



Reservoir Design and Cutting



Reservoir dimensioning has a significant impact on sealant design and performance. A common starting reservoir width is 1/4 to 3/8 in. (6 to 10 mm) for formed-in-place sealants; for compression seals a common starting reservoir width is 1/4 to 1/2 in. (6 to 12 mm). 1/2 in. (12 mm) is typical for airfield pavements. However, designers should always determine anticipated joint movement before establishing final joint width and sealant requirements.

Sealant Installation

Installation consists of these basic steps:

- Cleaning (the most critical step of a joint sealing operation).
- Backer rod installation, if required.
- Cleanliness Check.
- Sealant installation.
- Checking the installation (using a knife test, a sample stretch test or a hand-pull test).

Equipment Required

For hot pour sealants, equipment includes:

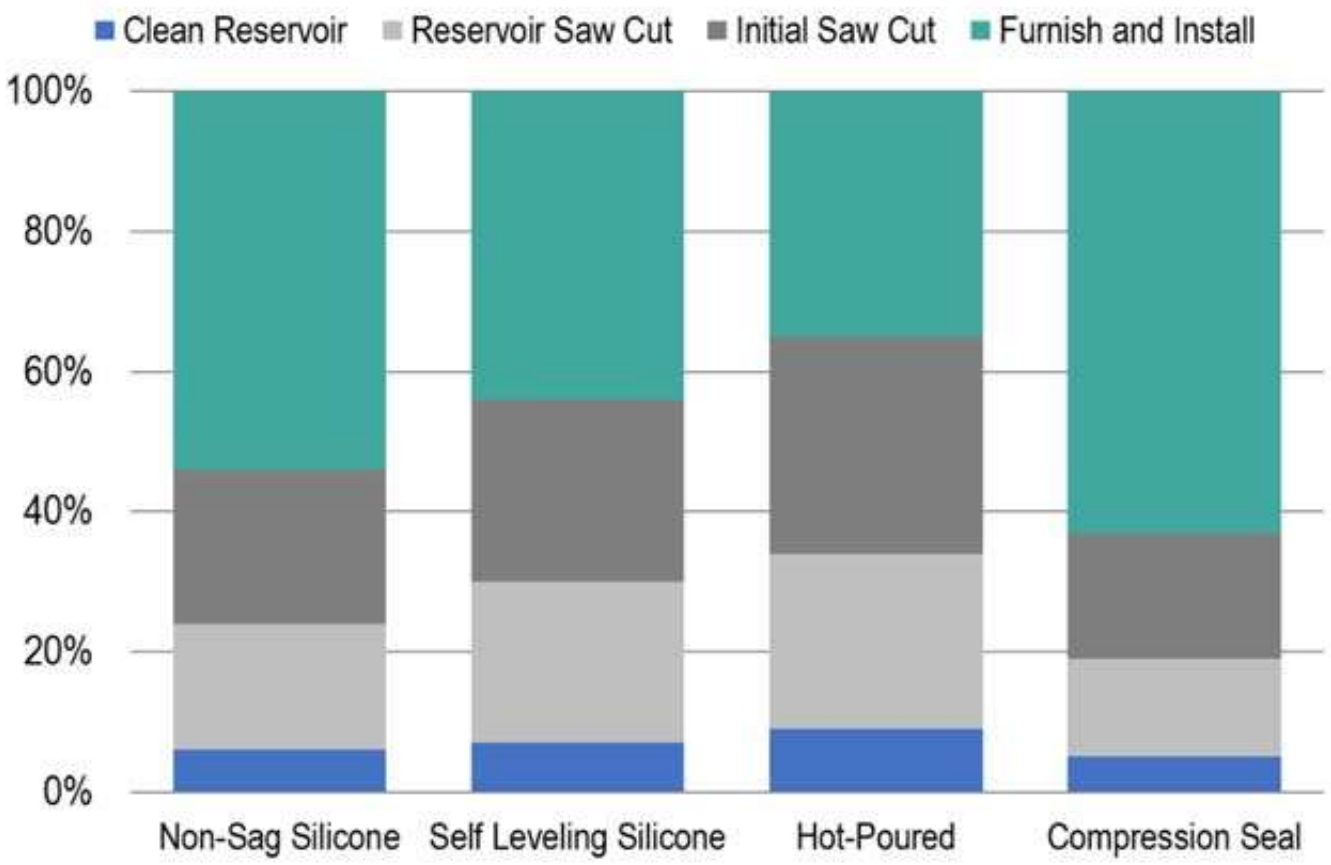
- Melter/double-boiler tank
- Pump
- Heated applicator hose
- Wand
- Nozzle

For silicone pavement sealants, equipment includes:

- Extrusion pump
- Air compressor

A preformed compression seal is mechanically compressed and inserted into the reservoir using specially-designed equipment, usually self-propelled and equipped with a guide to keep it on course This equipment also applies a lubricant/adhesive to the sealant edges and/or reservoir sidewalls.

Cost of Joint Sealing



Relative costs of joint sealant installation steps.

For more details on joint sealing, refer to the ACPA Technical Brief, "Concrete Pavement Joint Sealing/Filling."

Contact the IGGA today to learn more.

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