Tech Brief

Proper Joint Preparation Prior to Sealing and Resealing Concrete Joints

November 2024

IGGA International Grooving & Grinding Association

Seal / No Seal GROUP

INTRODUCTION

To seal or not to seal has been a strongly debated question for more than a quarter century. This debate has continued due to the variable performance of installed sealants and the inability to relate sealant condition to pavement performance.[1]

Joint sealing has been a process in constructing concrete pavements for over a hundred years, yet the challenge of quality installation continues. With the introduction of the OSHA PM10 regulations (29 CFR 1926.1153), this challenge has become even greater with the need to ensure environmental worker safety.

The cost of cleaning joints amounts to about 5% to 8% of the total installed sealant cost; however, if done correctly, it can significantly increase sealant performance life.[1] Quality of installation may be the single most important factor in sealant performance.

The purpose of joint sealing is to reduce the amount of water entering a pavement structure and to prevent the filling of joints with incompressible materials. Water entering a pavement structure through joints can lead to pumping, faulting, base and subbase erosion, and loss of support. Unsealed joints also allow the introduction of deicing chemicals and other contaminants. Incompressible materials filling pavement joints can result in joint spalling, blowups/buckling, or shattered slabs.[2]

Independent of the type of sealant, or final joint configuration, the following steps should be used to ensure proper joint preparation prior to sealing and resealing operations.

- Power wash joint immediately after “final” sawing
- Media blast joint faces followed by air blowing joints prior to sealant installation
- Visually check for cleanliness and moisture to approve workmanship – See RTU 17.01-2017 Wikipave.org
- Air blow joints again, just before backer rod and sealant installation

Narrow joints are generally more difficult to clean and should be at least 3/16 inch minimum in width and preferably a minimum of 1/4 inch. (See SNS Tech Brief on Narrow Joints[1]).

Although some specifications indicate that a separate pass for each side of the joint should be made, for narrow joints, a single pass with an alignment nozzle has been successfully used (see Figure 1).[1] The alignment tool directs the media material towards both sides. Since the joint is very narrow, it is only possible to clean the upper portion of these joints.

Figure 1
Media Blast Alignment Fixture

Initial sawing (contraction joint sawing) occurs soon after concrete placement and its purpose is to prevent random cracking of the pavement. Typically, walk-behind saws are used with down cutting blades. Wet sawing is still the most common process and is the focus of this Tech Brief. Early entry sawing is a different process and may require a different approach.

It should be noted that in the remainder of this document, unless indicated otherwise, it is recommended to leave the slurry in the joint and power wash only after the “final” cut. However, as a reminder, slurry residue left on the pavement surface can increase roughness measurements 3 to 4 in/mi. It is recommended to remove the slurry from the surface prior to roughness measurements if this is a concern.

Although the joint preparation procedures are similar, airport facilities typically have more stringent requirements, and these differences will be addressed at the end of the Tech Brief. The procedures outlined herein are more applicable to roadway joint preparation.

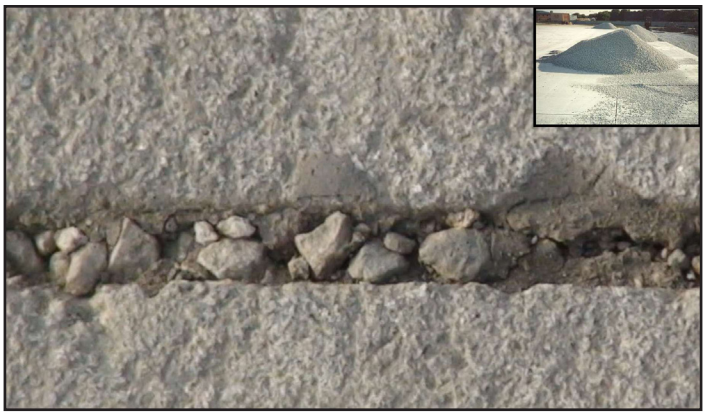

Figure 2
Incompressibles Accumulating in Joint During Construction

NEW CONSTRUCTION JOINT SEAL PREPARATION WHERE NO TRAFFIC IS ALLOWED BEFORE SEALING OCCURS

Narrow Joint/Contraction Joint Preparation

Once contraction joint sawing is completed, the slurry should be left in the joint to protect the joint from damage created by incompressibles and construction traffic. Intrusion of incompressibles from construction operations are more common than typically understood. Figure 2 is an example of incompressibles that accumulated in the joint during construction.

Figure 3 is a photo of a narrow joint with the slurry remaining in the joint to help prevent intrusion of imcompressibles.

Figure 3
Photo of Dried Slurry After Narrow/Contraction Joint Sawing

When it is time to open the area to traffic, the remainder of the joint preparation should be conducted. For narrow/contraction joints with slurry remaining, they should be resawn the full depth of the cut with an upcut saw to remove the slurry deposit and any incompressible. A down cut saw can also be used, but an upcut is preferred due to efficiency.

Figure 4
Example of Properly Power Washed Joints

Immediately after this sawing operation, the joints should be power washed (see Figure 4). Power washing should extend to the full depth of the joint to remove all the slurry. Water pressures of 3500 psi are common for power washing.

Once the joint is dried, follow with media blasting and air blowing.

RESERVOIR JOINT PREPARATION

Once contraction joint sawing has been completed, wait a minimum of 7 to 10 days for the concrete to harden and moisture to leave the joint face. This also provides time for joints to activate, minimizing dominant joints forming after reservoir cuts are installed.

Reservoir cuts should be sawn with a down cut saw and then a second saw cut made with an upcut saw the same width as the contraction joint cut to remove the saw slurry and incompressibles full depth. Power wash the full depth of both cuts immediately thereafter. Power washing should be conducted on reservoir cuts independent of what type of final sealant will be installed.

Figure 5 indicates a freshly sawn reservoir cut and how much slurry is produced.

Figure 5
Indicates Slurry Produced from a Reservoir Cut

Power washing removes most of the saw slurry. However, care must be exercised to ensure the slurry is not just moved into adjacent cleaned joints. This is particularly true where joints cross as indicated in Figure 4. This is best accomplished by always power washing in one direction.

Care must also be exercised in not leaving excess slurry on the pavement surface that can become airborne from other construction operations causing OSHA compliance issues.

Once the joint is completely dried, it should be media blasted to provide additional texture to the joint faces ensuring a better bond.

Air blow the joint after media blasting and also just before backer rod installation.

Figure 6
Joint Cleanliness After Power Washing

Figure 6 indicates a clean power washed joint. Note that the power wash operation extends into the contraction joint in addition to the reservoir cut.

Figure 7
Additional Saw Slurry Removal Through Media Blasting

In Figure 7, the dust cloud from the media blasting indicates the additional slurry laitance that is being removed by the media blasting even after power washing. The media blasting also provides additional texture to the side walls providing better bonding.

NEW CONSTRUCTION JOINT PREPARATION WHERE TRAFFIC IS ALLOWED BEFORE SEALING OCCURS

Narrow Joint Design

Saw contraction joints with down cut saw leaving slurry in joint. When returning to begin sealant installation, recut the initial joint with an upcut saw. Immediately power wash full depth. Once the joint has dried, media blast followed by air blasting and sealant installation.

Reservoir Cut Joint Design

Cut contraction joint with down cut saw. Leave slurry in joint until reservoir cut is to be made. To saw reservoir cut, use down cut saw, and then a second saw cut made with an upcut saw the same width as the contraction joint cut to remove the saw slurry and incompressibles full depth of the joint.

Immediately power wash the full depth of both cuts (See Figure 6.). Once the joint has dried, media blast, air blow, install backer rod, and seal joint. If no backer rod is to be used, do not air blow at this time. Instead, air blow joint just prior to sealant installation.

JOINT PREPARATION PRIOR TO RESEALING EXISTING PAVEMENT JOINTS

Joint preparation prior to resealing existing joints is dependent upon the type of inplace existing sealant material. The joint seal removal process could be different for each sealant type.

Compression Seal (Neoprene)

Removal of the existing neoprene seal is accomplished by manually pulling it from the joints or using a mechanical device such as a joint plow.

Once the existing sealant is removed, media blast and air blow as previously described. Then re-install a new neoprene seal (see SNS Tech Brief: Concrete Pavement Compression Seals-May 2024).

If the joints are variable width or lane additions used a different width joint, it may be necessary to recut the joints to a constant width before media blasting and air blowing.

Silicone Sealant

In most cases, silicone sealant is installed in a reservoir joint configuration. To remove the sealant, both joint walls should be sawn to expose fresh concrete to ensure bonding. This is typically accomplished by skim sawing each joint face thus requiring two passes. If the joints are variable width or lane additions used a different width joint, it may be necessary to recut the joints to a constant width. Immediately power wash the joints after sawing.

Once the joints have dried, follow with media blasting and air blasting as described previously. Joints should be air blown again just before backer rod installation.

Hot Pour Sealant
Joint with Reservoir

Similar to silicone sealant removal, hot pour sealant can be removed by skim sawing the joint walls to remove the hot pour

sealant to provide a clean bonding surface. If the joints are variable width or lane additions used a different width joint, it may be necessary to recut the joints to a constant width.

Once the joints walls have been sawn, immediately power wash. When joints dry, media blast, air blow, install backer rod, and reseal.

Narrow Joints

Resealing of narrow joints is not well documented and little experience is available. Presumably, in the past, maintenance forces may have just capped the existing sealant if it became distressed.

Two additional options may be possible (but not based on actual experience), one would be to resaw the joint to the full depth of penetration of the hot pour sealant (2" to 4") with an upcut saw. Power wash to remove debris. When dried, media blast, air blow, and then refill with hot pour sealant.

A second approach could be to saw out a fixed depth of sealant such as one inch, followed by power washing. Once dry, media blast, air blow, and reinstall new hot pour sealant. It is preferred to flush fill the joint upon resealing.

DIFFERENCES BETWEEN AIRFIELD AND HIGHWAY JOINT PREPARATION

As mentioned previously, airfield joint preparation often requires more comprehensive procedures. In addition, airfield joints are typically wider and have beveled sides allowing better access for power washing and media blasting (See Figure 8).

Figure 8
Airfield Joints are Typically Wider and Have Beveled Sides

In airfield joint preparation, it is common for both the contraction cut and the reservoir cuts to immediately be power washed after sawing. Media blasting would occur after the reservoir cut had dried, followed by air blowing and sealant installation.

Leaving the slurry in the reservoir is typically not allowed. After power washing the contraction joint it is sometimes required to insert a backer rod to prevent incompressibles from entering the joint.

SEALANT INSTALLATION

All sealants should be installed according to the manufacturer's specifications.

REFERENCES

[1] SNS Tech Brief, "Filling Narrow Joints in Concrete Pavements", March 2021

[2] Concrete Pavement Preservation Guide, Third edition, National Center for Pavement Technology, August 2022

Seal/No Seal GROUP

The Seal/No Seal Group was formed to respond to the age-old industry question about the value of sealing concrete pavement joints. Its mission is to develop a committed membership that takes responsibility for determining the long-term effectiveness of sealants in concrete pavements.

www.sealnoseal.org

IGGA International Grooving & Grinding Association

The International Grooving & Grinding Association (IGGA) is a non-profit trade association founded in 1972 by a group of dedicated industry professionals committed to the development of the diamond grinding and grooving process for surfaces constructed with Portland cement concrete and asphalt. In 1995, the IGGA joined in affiliation with the American Concrete Pavement Association (ACPA) to form what is now referred to as the Concrete Pavement Preservation Partnership (IGGA/ACPA CP3). The IGGA/ACPA CP3 now serves as the lead industry representative and technical resource in the development and marketing of optimized pavement surfaces, concrete pavement restoration and pavement preservation around the world.

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