Seal / No Seal GROUP

Tech Brief

Construction of Long Life Sealant Performance

Introduction

The longevity of any sealant installation is a function of the joint seal design, the materials used, the workmanship of the installation, and the prevailing environmental and traffic conditions. Long-life sealant performance is only possible through consideration of these factors and quality construction.

Through the years, high quality sealant materials have become available that can seal transverse joints when properly installed.

The SHRP H106 experiment and the subsequent FHWA Long Term Monitoring project represent the most extensive pavement surface study ever conducted[1]. In the joint re-seal portion of the study 1600 joints were resealed using 31 treatment types (e.g. combination of material and joint configuration) at five locations (e.g. five different States).

The final report on PCC Joint Reseal indicated that while the average performance life for a silicone sealant ranged between 10 to 14 years, the performance for a given silicone product could range between 5.5 and 16.5 years[1].

For asphalt sealants the average performance period ranged from 3 to 10 years for the different products and installation configurations.

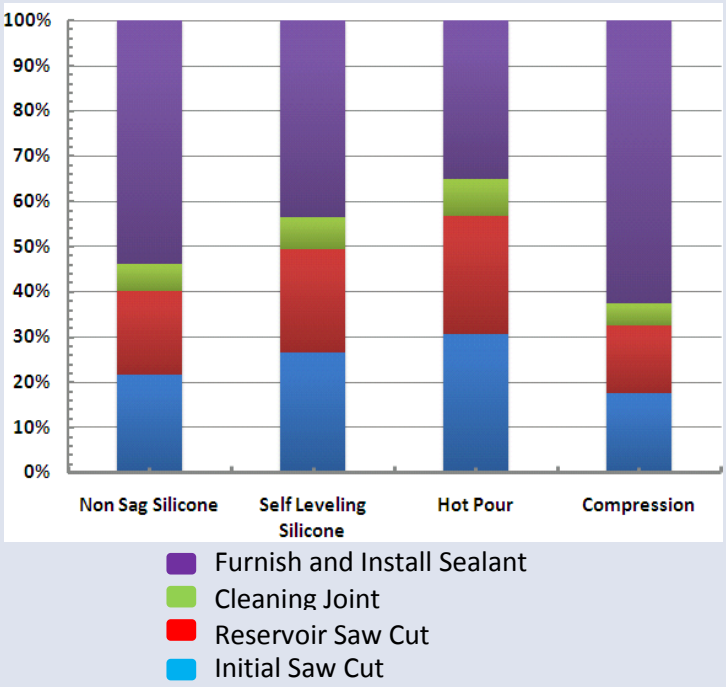

Figure 1 Percent Cost of Each Sealant Operation

This variable performance period suggests that installation techniques may impact sealant longevity for both silicone and hot pour materials. Compression seals were not evaluated by this SHRP study.

During construction of the major portions of the concrete freeway network in the US, it was not uncommon to have rigorous inspection of the saw and sealing operations.

Since the 1990s however, economic pressures have typically forced agency downsizing. At about this same time, the inspection forces responsible for construction

of much of the concrete network were also approaching retirement. The end result was not only fewer staff available for construction inspection, but in many instances inspectors with less experience.

Although the impact of these staffing changes will never be completely known, it is possible that inspection of the sealant installation process is less intense than in past times.

In 2010 the American Concrete Pavement Association (ACPA) conducted a survey of their contractors to update a 1995 survey on the Relative Cost of Concrete Features.

For the 2010 survey, it was decided to evaluate the cost of sealing joints by breaking the costs into the different work elements[2]. Specifically, initial saw-cut construction, reservoir saw-cut construction, joint cleaning prior to sealant installation, and furnishing and installing the sealant and backer rod (if necessary).

Figure 1 indicates the percent of total installation cost of each of the four steps involved in the joint sealing process. These costs are shown for hot pour, non-sag silicone, self-leveling silicone, and preformed compression seals.

As indicated in Figure 1, joint cleaning prior to sealant installation represents only 5% to 8% of the total sealant installation cost. However, when performed improperly, this aspect of joint sealant installation can have a profound impact on the performance period.

Impact of Improper Joint Preparation

With the minimal cost associated with joint cleaning and the significant impact on overall sealant performance, there is no reason to not ensure proper procedures are followed; both from a contractor and agency perspective.

Sealant performance can be significantly improved through proper joint preparation for very little cost.

References:

1. Evans, L.D., et al., "LTPP Pavement Maintenance Materials: SHRP Joint Reseal Final, Federal Highway Administration,FHWA-RD-99-142, Washington, D.C., 1999
2. Scofield, L., "Relative Cost of Concrete Highway Features", American Concrete Pavement Association, 2010