Seal / No Seal GROUP

Tech Brief

Evaluation of Backer Rod Absorption

Introduction

This study was conducted as a result of concerns that backer rod absorption may be a contributing factor in premature joint deterioration. To evaluate this, a limited survey of contractor practices was conducted to determine the types of backer rods in use.

A limited backer rod absorption study was then conducted to determine if they absorbed and retained water[1].

Although only closed cell backer rods are intended for use with silicone and hot poured sealed joints, a small survey of silicone sealant installations found that open cell backer rods and a hybrid backer rod were also in use.

The hybrid backer rod consisted of an inner open cell core, surrounded by a closed cell perimeter lining. Concern existed that if the perimeter lining was breached, the rod could absorb water and potentially create a joint durability issue.

Backer Rod Absorption Experiment

To evaluate the three different types of backer rods, a simple experiment was performed to assess the absorption characteristics.

Figure 1 Backer Rods Submerged in Tap Water

The experiment consisted of submerging six inch long specimens of each backer rod type into a glass of tap water and removing and weighing the backer rods at periodic intervals. The scale used to weigh the samples was accurate to 0.005 lbs which is approximately the weight of a dime or a 6" by 11" paper towel. Figure 1 is a photo of the samples submerged below the water level in each glass.

Initially, five backer rods were submerged in water in excess of 87 hrs and weighed periodically to determine the absorption. The four closed cell backer rods indicated no absorption, while the open cell rod indicated a significant absorption. Upon completion of the submerging phase, the samples were placed in a freezer for five days and then removed. The four closed cell samples remained flexible while the open cell material broke in half when bending was attempted. Figures 2 & 3 indicate the backer rods after freezing

Figure 2 Closed Cell Backer Rod After Freezing

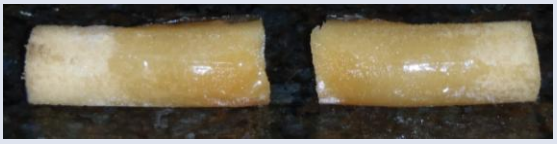

Figure 3 Open Cell Backer Rod After Freezing

A second round of testing was conducted to evaluate the hybrid backer rod, a product that uses an open cell inner core with a closed cell outer covering. The hybrid absorbed a slight amount of water during the immersion process, but could be bent after freezing similar to the closed cell material.

Impact of Backer Rod on Moisture Absorption

This effort suggested that closed cell backer rods will not absorb water as stipulated by ASTM D5249. However, open cell backer rods were found to be unacceptable for use in wet freeze areas and the hybrid backer rod questionable.

The open cell backer rod is sometimes used to fill spalled areas or widened areas where the intended backer rod is not sufficient to fill the opening size. However, the highly absorptive nature of this backer rod would suggest that it is not acceptable in a wet freeze environment.

Impact of Traditional Joint Design on Moisture Infiltration into a Joint

Traditional backer rod design and installation places the backer rod in a horizontal position throughout the joint as indicated in Figure 4. With this placement, it is possible for water to enter the shoulder joint and drain back into the reservoir cut and deteriorate the joint below the backer rod as indicated in Figure 4.

Figure 4 Joint Distress Beneath Backer Rod (Courtesy MnDOT)

Additional research should be conducted to evaluate sealant designs that will prevent backflow from the longitudinal shoulder joints into transverse joints.

The distress indicated in Figure 4 is also possible if the seal is breached and water ponds beneath the closed cell backer rod.

Field Evidence of Backer Rod Induced Joint Deterioration

At the onset of this investigation it was assumed that statements concerning backer rod induced joint deterioration were based upon physical evidence. However, no evidence was found to support this.

Several agencies and several organizations were contacted in this regard and no physical evidence was available. Until such time that physical evidence is available to support backer rod induced joint damage, it should be assumed that moisture related joint damage occurs below the backer rod and is not a result of the backer rod.

References

1. Scofield, L., “Backer Rod Absorption Study, ACPA, April 2011