

International Surfacing Systems (ISS) Hot Applied Binder Materials – Position Statement

Due to the many variables when considering a pavement preservation technique and consequently what type of binder to utilize in the various chip seal or cape seal systems, the following information is offered as a step by step aid for municipal and state agencies to assist in the decision making process. Proper binder design and aggregate retention testing should be considered as part of an overall chip seal design effort to account for some of the variables discussed in this document.

Pre-maintenance Selection

Look to your Pavement Management System and the Pavement Condition Index (PCI) as a guide concerning the correct use of the many binder materials available in the construction industry today. Keep in mind that PCI will not identify the many deficiencies such as removal and replacement of base failure along with necessary crack sealing and surface patching that should be required as a pre-maintenance effort to prepare the road or street for the selected pavement preservation strategy.

All base failed areas should be removed and replaced with adequate base course and patched with a minimum of two inches of the appropriate hot mix material. The resulting repair should be flush with the existing surface after compaction.

All thermal or block type of cracking 3/8 of an inch or wider should be blown clean and sealed with the appropriate type of sealant material.

Surface patching or leveling course applications should be considered when there are “low” or “depressed” areas in the pavement that are not considered base failed areas. An agency may also consider these types of options when the existing pavement is severely alligator cracked (PCI normally 30 or below). Leveling course options may include miscellaneous hot mix or cold mix surface or “skin” patching, scrub sealing, a complete hot mix leveling course or multi-layered cape seal systems. *Note: The specifying agency needs to allow proper cure time of crack sealant and if utilizing a cold mix patching material. Recommendations for cure time usually range from one day to six months, depending on the material utilized, prior to the chip or cape seal application. Also, depending on what type of binder is being utilized for the chip seal on a project, it may be necessary to “tack” new patches to avoid binder absorption, which will result in surface deficiencies. Also, consider removal of all thermoplastic striping prior to resurfacing.*

Selection Strategy

Once you have identified your PCI now you can look at the options concerning what type of pavement preservation strategy is appropriate for the pavement condition you are dealing with. The following are suggested maintenance techniques based on a range of pavement condition.

- PCI (75-90) Fog Seal, Scrub Seal, Slurry Seal, Conventional Emulsion Chip Seal, Polymer Modified Emulsion (PME) Chip Seal, Rejuvenation Emulsion Chip Seal, or (Conventional) Cape Seal.
- PCI (50-75) Micro Surface, PG 76-22PM and PG 76-22TR (Field or Terminal Blend) Chip Seal, Scrub Seal (in conjunction with PG 76-22PM or PG 76-22TR chip seal) or (Modified) Cape Seal.
- PCI (35-50) A-R (Asphalt-Rubber) Chip Seal, PMAR (Polymer Modified Asphalt-Rubber) Chip Seal, RASS (Rubberized Asphalt Scrub Seal) in conjunction with A-R/PMAR chip seal, A-R/PMAR Cape Seal or A-R/PMAR Three Layer Cape Seal System.
- PCI (20-35) A-R/PMAR Three Layer Cape Seal System, A-R/PMAR Two Layer Overlay System, AR/PMAR Three Layer Overlay System or Reconstruction.

Keep in mind that the various binder materials that may be selected for a chip seal have limitations concerning application rate which will dictate proper aggregate gradation, and in turn will limit long term performance, based on the condition of the pavement being re-surfaced. Also, it is important to know that binder materials such as PASS, Styroflex or Terminal Blend (PG 76-22TR / PG 76-22PM) are patented proprietary materials. Suppliers and various Contractors in the industry have chosen to promote these materials as equal or alternate to Asphalt-Rubber or Polymer Modified Asphalt-Rubber binder, rather than make the investment in proper asphalt-rubber field blending equipment and distributor trucks. We view this practice to be deceiving to the agency based on the difference in binder properties, application rate and performance history. Only in the state of California do they require the use of air quality devices concerning the use of A-R or PMAR binder materials is a result of opacity issues during application and is strictly monitored by each air quality district in California. The air quality device is patented and ISS pays royalties for its use. Other Suppliers and Contractors oppose the payment of royalties associated with the air quality device and have chosen to promote their own proprietary materials mentioned above.

When specifying the type of slurry seal to use as the wearing course for the various types of cape seal systems or three-layer A-R or PMAR cape seal systems the type of street (residential vs. collector or major arterial) should be considered along with the pavement condition. ISS recommends that when dealing with residential streets a Type II Slurry Seal should be considered and for collector or major arterial streets a Type III Slurry Seal

or Micro-surface should be considered. As part of the three layer cape seal a Micro-surface or Rubberized Scrub Seal should always be placed as the first layer.

Individual Project Variables

Each pavement preservation project has its own specific set of variables to consider. Not only from the standpoint of surface condition, pre-maintenance activities, materials and the appropriate system to specify, but variables concerning construction issues, traffic conditions (current and future), ambient and surface temperature, climate and weather. If project variables can be accounted for before and during construction of a pavement preservation project overall quality and long term performance will be improved.

Construction Variables can be overwhelming as so many different issues need to be considered through proper specifications and specification enforcement. Construction procedure variables range from proper binder application rate (.30 to .75 gallons per square yard depending on the specified binder), proper aggregate gradation, aggregate quality and application rate (based on the application rate of the specified binder), along with consideration regarding the aggregate being pre-coated. Usually pre-coating is only required when the hot-applied binder materials are specified. Proper and timely rolling, with the appropriate number of rollers, is critical to the overall embedment and end result retention of the aggregate into the binder, this is why surface temperature is so important as temperature variation will indicate necessary adjustments to the speed of the chip seal “train”. Timely brooming of loose aggregate will negate potential windshield damage and so aggregate application rate and aggregate retention through good rolling technique will reduce the amount of sweepage. Most specifications address ambient and surface temperature requirements and these requirements should not be allowed deviation, especially if a project is being built early in the spring or more importantly late in the fall months. When cooler temperatures are a factor (chip sealing at night), construction procedures need to be adjusted to account of the temperature variable.

No chip seal construction should be allowed to continue if the existing surface is wet or damp, or if inclement weather is imminent

Cost Effectiveness and Long Term Performance

As the agency struggles to choose proper materials, specify good construction practice and re-surface as many square yards as possible, along with considering all the variables mentioned above, a strategic “balancing act” surfaces regarding the trade off between initial cost and long term performance. As consideration is given to pavements with very low PCI, alternatives are few. Usually the strategies recommended as part of this document are very cost effective initially, as the only remaining options are usually re-construction or a thick overlay. Long term performance can only be determined through evaluation over a period of time as the pavement preservation system is subjected to environmental conditions, traffic, and loading (ESAL’S). When consideration is given to

long term performance A-R and PMAR systems have the longest documented performance history.

Utilizing proper pavement preservation techniques is not an exact science so accounting for the variables discussed above will result in a higher quality project every time. As the agency looks at maintaining pavements with any level of PCI there is a chance for continued surface deviations due simply to the existing pavement surface condition, pre-maintenance that was done (if any) and the maintenance application that was chosen. This is certainly the case as the PCI gets lower. In our opinion placing a pavement preservation system that is initially cost effective, while giving the specifying agency the longest life cycle and performance is what we all should be striving for. This can only be done if focus is placed on the variables discussed above, and knowing the limitations of the various pavement preservation systems that are available today.