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Illinois Asphalt Pavement Association Scholarship
Research Report

Understanding types of Tack Coat Material

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Abstract

This dissertation aims to discover and present methods of tack coat materials that will have competitive advantages in the development of materials that are applied in the field. One is the type of emulsion and cutback that will be used for bonding. Two is the type of tack coat materials that are being used in today's industry. Then finally showing the proper preparations that are needed to have successful curing and bondage.

Introduction

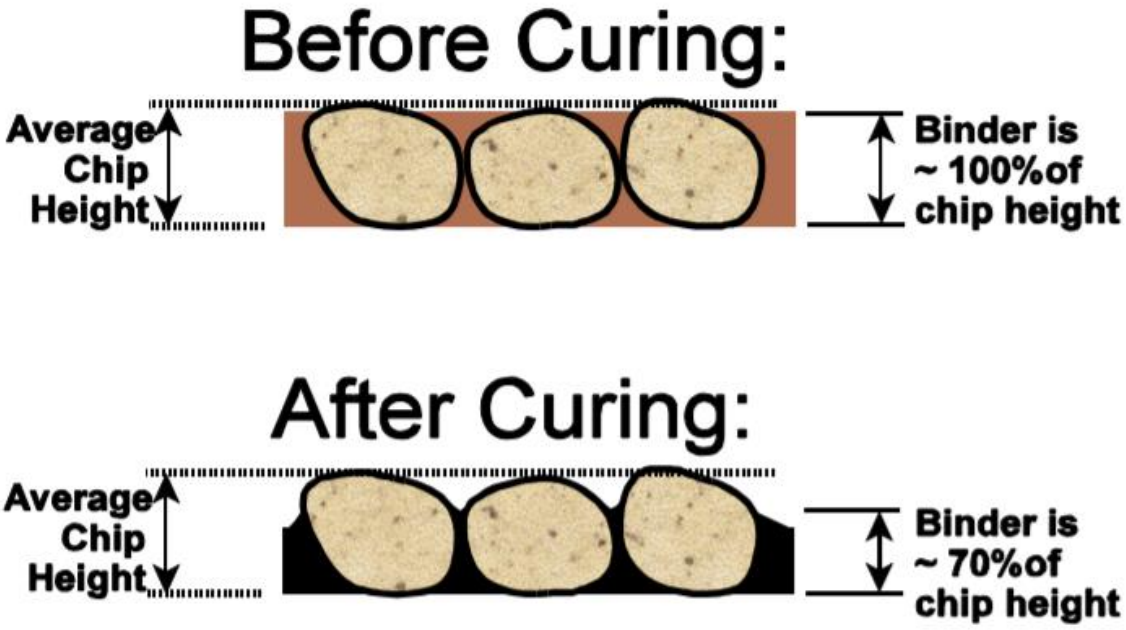
Today, the application of tack coat in the asphalt and pavement industry is increasing. The most important component of asphalt pavement is the bondage between asphalt pavement and layers. Tack coat is a sprayed application of an asphalt binder upon an existing asphalt or between layers of new asphalt concrete. The importance of this is to promote the bond between pavement layers and prevent slippage between pavement layers. This is significant for the structural performance of the pavement. To allow all layers to work together. If a pavement is properly built it will provide safe usage for its users, while meeting the needs of an agency for economical, environmentally friendly and sustainable material. In this dissertation, it will go over the types of emulsion and cutback asphalts then the importance of correct material and preparation finally leading to the curing time which delivers the final product.

1.0 - Types of Emulsions

In the early 1900s emulsions were first introduced in construction. Soon later in the early 1920s, the emulsions were applied in the transportation industry. These emulsions contain three essential elements which are water, chemical adhesives and asphalt. According to Asphalt magazine, emulsions may contain between 40% and 80% asphalt by weight. The agent that “keeps all of the emulsions have a significantly lower viscosity than asphalt itself, and so can be applied at lower temperatures” (1 Huang). There are three key sets in which asphalt can cure which are which are RS for a (rapid set), MS (medium set), SS (slow set), and QS (quick set)(Hung) RS emulsions break rapidly and are used for spray applications, such as chip seals and sand seals. Medium set emulsions are intended to be combined with aggregates and are typically used with pavements. They are applied in making cold mixes and in cold recycling applications. Slow setting emulsions are created for longer projects that do not need a quick delivery.

2.0 Cutback Asphalt

According to Pavement Interactive, cutback asphalt is simply a combination of asphalt cement and petroleum solvent, it is like emulsions; however, cutbacks are used because they reduce asphalt viscosity for lower temperatures. There are two types of cutbacks asphalts that are common in the construction industry and those are slow curing and medium curing.



The figure above is a representation of before and after the curing process. Some cutback curing rates are faster than others. Such as Rapid curing cutback asphalt, which is used mainly for surface treatments and tack coat.

3.0 - Types of Tack Coat Materials

When identifying the types of tack coats, you must indicate the number and letter following the type of setting. For example, if you read RS – 1H, The number one indicates low viscosity presented on the emulsion that is present. If the number two was present we will know that it has a higher viscosity. The letter H behind the letter indicates that it is a hard-base asphalt.

Emulsified Asphalts	Classification	Usage
SS-1	Anionic	Tack Coat / Dust control
SS-1H	Anionic	Tack Coat / Fine grade mixes
CSS-1	Cationic	Tack Coat / Fog Sealing
CSS-1H	Cationic	Tack Coat /Base Stabilizations
RS-1	Anionic	Tack Coat / Binder for application
RS-1H	Anionic	Tack Coat / Dust Control
RS-2	Anionic	Tack Coat / Bondage
CRS-1	Cationic	Tack Coat /Dust Control
CRS-2	Cationic	Tack Coat /Fog Sealing
PMAE (Polymer-Modified Asphalt Emulsions)	Anionic	Spray Pavers

The chart above indicates the most common type of tack coat material that are used in today's pavement industry.

4.0 - Preparation for Application

The greatest preparation for the surface condition of the pavement is a fresh, dry surface that boosts layer bonding. However, studies have shown that this may not be the best form of preparation anymore.

According to the National Asphalt Pavement Association these are the requirements for a successful tack coat application:

1) The existing pavement surface must be dry and thoroughly cleaned.

2) A proper tack coat rate must be applied.

3) Uniform coverage of tack must be placed over the entire area to be paved.

The application temperature should be from 45°C to 70°C. The lower application temperatures will not damage the asphalt.

Conclusion

In conclusion to this dissertation, there are various materials that can be used for tack coats. As for today's construction industry, we are striving to make more advanced materials so that roads will improve at a lower cost. The best material discovered in this research is asphalt emulsions, with slow setting emulsions (SS-1, SS-1h, CSS-1, and CSS-1h). It tends to give the best results when it is finished curing and the option is very cost-efficient. Hopefully, with time more studies can find more efficient solutions for tack coat but as for now, asphalt emulsions are the best option.

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