

Asphalt Additives

Engineer

Azad Ali Baker

Sources: Internet Sites

Introduction

Civil infrastructure systems represent huge public budget and are expected to provide services for very long periods of time. Their use spans several generations during which society will experience dramatic changes.

This lengthy time span means that future developments in the transport of goods and people must be assessed and planned well in advance in order to make the right choices for today.

Some current solutions might not resolve the problems of tomorrow.

Looking ahead into the future and considering the probable developments in society enables us to search for proper solutions and guards us from bad expenditure and major disappointments. This is why predicting and identifying the needs of the future must become a more integral part of everyday work. The seeds of tomorrow's kudistan road networks are sown today.

Hot Mix Asphalt concrete (HMA), is a mixture of coarse and fine aggregate, and asphalt binder.

HMA is mixed, placed and compacted at elevated temperatures.

Asphalt concrete pavements can also be placed at ambient air temperatures. HMA is the primary placement method for roads and highways. The HMA is typically applied in 4-8 inch thick layers, with the lower layers acting to support the top layer, known as the surface or friction course. The aggregates in the lower layers are chosen to prevent rutting and failure, while the aggregates in the surface course are chosen for their friction properties and durability.

When designing a HMA pavement the aggregate used must be strong and durable, and have a good angular shape to help resist rutting. The fine aggregate (mineral filler) is used to fill in the voids between the coarse particles, which increases the density of the asphalt concrete and provides load transfer between the larger particles. The asphalt binder is typically 5-6% of the mixture, and serves to bind the aggregates together.

Importance of Asphalt Additives

The benefits and advantages of using Additive materials in asphalt pavement are producing of more durable pavement which can save money by improving performance thus lessening the amount and frequency of required maintenance treatments to keep the pavement in good functioning condition.

Based on the applicable codes, a series of experiments have been conducted on using Asphalt additives to evaluate the effectiveness of these additives materials in the mixture of asphalt concrete. Three cases of additives including rock flour, rock flour with 1% lime and rock flour with 1% cement were analyzed to make comparisons. The experiment results have shown that in the conventional mineral filler such as rock flour, the addition of lime or cement in the mixture have the advantages of increasing the viscoelastic property and the stiffness and compactness to reduce negative impacts on the asphalt concrete road surface.

In particular, by adding 1% of lime in the rock flour as the filler, several positive data could be obtained including:

1. A higher stability value.
2. A lower flow value.
3. A higher retained strength.
4. A higher percentage of wrapped asphalt in the grains(coating).
5. A lower resilient modulus in low temperature (10[degrees]) but a higher value in high temperature (40[degrees]).
6. A higher dynamic stability,
7. A lower rutting deformation rate.
8. Acts as anti-stripping agent.

Most important Asphalt Additives

1-AD-here® LOF 65-00

Description: AD-here® LOF 65-00 is a liquid anti-stripping agent derived from amidoamines. It increases the adhesion of asphalt cement to aggregate and reduces the potential for moisture damage. It also improves the retention of aggregates in chip seals.

ADhere ® LOF 65-00 unique property is its low odor characteristics.

Typical Properties: Appearance: Brown Viscous Liquid

Typical Viscosity, 77°F: 900 cps

Typical Viscosity, 100°F: 300 cps

Density, Pounds/Gallon, 77°F: 8.05

Flash Point (P.M.C.C.): > 300°F

Features: Very effective in reducing stripping and in increasing the tensile strength values in the AASHTO T-283, ASTM D4867, or similar test methods.

Low odor and low smoke generation at elevated temperatures when compared to most liquid anti-strips, therefore, lower fume exposure for paving crews.

AD-here® LOF 65-00 can also be used as an adhesion promoter in anionic emulsions to enhance aggregate coating.

Very effective in improving aggregate retention on chip seals.

Increases the wetting ability of asphalt cements and cutback asphalts and non Corrosive.

Applications: AD-here® LOF 65-00 is added to the asphalt cement, typically in the amount of 0.25- 1.0% by weight of the asphalt cement. The specific dosage should be based on a laboratory design method, such as AASHTO T-283.

Packaging: AD-here® LOF 65-00 is available in bulk quantities (1000 - 5500 gal.) and in 55 gallon non-returnable drums (420# net).

Storage: and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 100° - 120°F.

2-AD-here® LOF 65-00 LS

Description: AD-here® LOF 65-00 LS is an amidoamine derived asphalt anti-stripping agent.

It increases the adhesion of asphalt cement to aggregate and reduces moisture damage. It performs extremely well on calcareous rock including limestone, sandstones, and dolomites.

Typical Properties: Appearance Brown Viscous liquid

Viscosity, 77°F: 3300 cps

Viscosity, 100°F: 1000 cps

Viscosity, 120°F: 700

CPS Density, Pounds/Gallon, 77°F: 7.85

Flash Point (P.M.C.C.): > 300° F

Features: Very effective in reducing moisture damage and in increasing the tensile strength ratio in performance test procedures such as AASHTO T283, ASTM D4867, and similar methods.

Non Corrosive

Low odor and low fume generation at paving temperatures compared to most liquid anti-strips, therefore, lower fume exposure for paving crews.

Applications: AD-here® LOF 65-00 LS is added to asphalt in the amount of 0.25 - 1.0% by weight of the asphalt cement, depending on the asphalt and aggregate type.

Packaging: AD-here® LOF 65-00 LS is available in bulk quantities (1000 - 5500 gal.) and in 55- gallon non-returnable drums (420 pounds net).

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 100° - 140°F.

3-AD-here® LoVisk

Description: AD-here® LoVisk is a non-amine based liquid anti-stripping agent. It increases the adhesion of asphalt cement to aggregate and reduces the potential for moisture damage. It also improves the retention of aggregates in chip seals. AD-here® LoVisk unique property is its low viscosity and pour point characteristics.

Typical Properties: Appearance Brown Liquid

Typical Viscosity, 40°F: 3300 cps

Typical Viscosity, 50°F: 2000 cps

Typical Viscosity, 77°F: 540 cps

Density, Pounds/Gallon, 77°F: 8.91

Flash Point (P.M.C.C.): 290°F

Features: Very effective in reducing stripping and in increasing the tensile strength values in the AASHTO T-283, ASTM D4867, or similar test methods.

Low odor when compared to most liquid anti-strips.

Very effective in improving aggregate retention on chip seals.

Non Corrosive

Very low operating temperatures

Applications: AD-here® LoVisk is a non-amine based liquid anti-stripping agent. It increases the adhesion of asphalt cement to aggregate and reduces the potential for moisture damage. It also improves the retention of aggregates in chip seals.

AD-here® LoVisk unique property is its low viscosity and pour point characteristics.

Packaging: AD-here® LoVisk is available in bulk quantities (1000 - 5500 gal.) and in 55 gallon.

Non-returnable drums (450# net).

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing.

4-AD-here® HP PLUS

Description: AD-here® HP PLUS is a 100 percent active high performance asphalt anti-stripping agent derived from polyamines. It greatly increases the adhesion of asphalt cement to aggregate and reduces moisture damage.

Typical Properties: Appearance: Dark Brown Liquid

Viscosity, 77°F: 225 cps

Density, pounds/gallon, 77°F: 8.15

Flash Point (P.M.C.C.): > 300° F

Features: Highly effective in reducing moisture damage and in increasing the tensile strength through test methods such as AASHTO T283. Recommended for very difficult to coat aggregates. Gives satisfactory results when all other products fail.

Applications: AD-here® HP PLUS is added to asphalt in the amount of 0.2 - 0.8 % by weight of the asphalt cement, depending on the asphalt and aggregate type.

Packaging : AD-here® HP PLUS is available in bulk quantities (1000 - 5500 gal.) and in 55-gallon. Non-returnable drums (420 net pounds).

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 90° - 100°F.

5-AD-here® LA-2

Description : AD-here® LA-2 is an asphalt anti-stripping agent derived from polyamines. It increases the adhesion of asphalt cement to aggregate and reduces moisture damage.

Typical Properties: Appearance: Dark Brown Liquid

Viscosity, 77°F: 300 cps

Viscosity, 100°F: 200 cps

Pounds/Gallon, 77°F: 8.47

Flash Point (P.M.C.C.)°F > 300°F

Applications: AD-here® LA-2 is added to asphalt in the amount of 0.25 - 1.0% by weight of the asphalt cement, depending on the asphalt and aggregate combination.

Advantages: Effective in reducing moisture damage and in increasing the tensile strength ratio in performance tests such as AASHTO T283, ASTM D4867, LADOTD TR 322M, and similar methods. Low viscosity.

Packaging: N/A

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 100° - 110°F.

AD-here® LA-2 is available in bulk quantities (1000 - 5500 gal.) and in 55 gallon.

Non-returnable drums (420# net).

6-AD-here® CB

Description: AD-here® CB is an adhesion promoter for asphalt cements, cutbacks, emulsions and coal tar. It greatly increases the adhesion of asphalt to wet or dry aggregate and as an additional benefit, provides resistance of the mixture to moisture damage.

Typical Properties: Appearance: Dark Brown Viscous Liquid

Viscosity: 77°F 4000 cps

Viscosity: 100°F 400 cps

Density, Pounds/Gallon :77°F 7.95

Flash Point (P.M.C.C.): > 300° F

Features: N/A

Applications: AD-here® CB is added to asphalt in the amount of 0.5 - 2.0% by weight of the asphalt cement, depending on the asphalt and aggregate type. It substantially increases the level of wet aggregate coating as compared to untreated mixes. ADhere® CB is an excellent dispersing and coating agent for coal tar sealers.

Packaging: AD-here® CB is available in bulk quantities (1000 - 5500 gal.) and in 55-gallon. Nonreturnable drums (420 net pounds).

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 100° - 130°F.

7-AD-here® CB

Description: AD-here® 69-00 is an amidoamine derived adhesion agent which effectively increases the adhesion of cutback asphalt to wet dry aggregates. This product is designed to be very effective on calcareous aggregates.

Typical Properties: Appearance, 77°F: Brown paste

Viscosity, 77°F: 8040 cps

Viscosity, 100°F: 2440 cps

Viscosity, 120°F: 660 cps

Density, Pounds/Gallon, 90°F: 7.95

Flash Point (P.M.C.C.) > 300°F

Features: N/A

Applications: The use of 0.5 – 1.5% AD-here® 69-00 by weight of asphalt cement substantially increases the level of aggregate coating and reduces the occurrence of moisture damage.

Advantages:

Very effective on calcareous derived aggregates, especially in cutback asphalt applications.

Packaging: N/A

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 120° - 140°F. AD-here® 69-00 is available in bulk quantities (1000 - 5500 gal.)

8-AD-here® 260L

Description: AD-here® 260L is an amidoamine based asphalt adhesion agent. It is an excellent choice for patching or stockpile/depot mixtures. It greatly increases the adhesion of asphalt to wet or dry aggregate and reduces the potential for moisture damage. It will improve the coating and workability of the mixture and increase its adhesion to the pothole.

Typical Properties: Appearance: Dark Brown Liquid

Viscosity, 25°C: 300 cps

Specific Gravity, 25°C: 0.94

Flash Point (P.M.C.C.): > 93°C

Features: N/A

Applications: AD-here® 260L is added to asphalt in the amount of 0.5 – 3.0% by weight of the asphalt, depending on the asphalt and aggregate type.

It substantially increases the level of wet aggregate coating as compared to untreated mixes. AD-here® 260L is also used as a dispersing and coating additive for coal tar emulsions.

Packaging: N/A

Storage and Handling: Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. AD-here® 260L is available in bulk quantities and in 200-liter non-returnable drums (190 kg net).

9-AD-here® ACRA-500

Description: ACRA-500 is an asphalt additive that improves adhesion in asbestos free wet patch roofing compounds, hot mix, and anionic hi-float emulsions.

The product is unique in that it accomplished this adhesion increase without interfering with the emulsification systems or clay/surfactant ratios.

Typical Properties: Appearance: 25°C Dark Viscous Liquid

Density, Pounds/Gallon: 25°C 0.95

Flash Point, (P.M.C.C.): >150°C

Viscosity 37°C: 750 cps

Features: N/A

Applications: Use Level Method of Application

Hot mix paving 0.5 - 1.0% (Based on weight of asphalt)

Blend with asphalt prior to plant mix.

Packaging ACRA-500 is available in bulk quantities and in 210 liter non-returnable drums (190 kg net) or 1000 kg totes .

Storage and Handling: N/A

10-AD-here® SC-901

Description: SC-901 is a 100% active amine based additive that is useful in improving adhesion in hot mix, cold mix, cold patch and anionic hi-float emulsions.

The product is unique in that it accomplishes this adhesion without interfering with the emulsification systems.

Typical Properties: Appearance 25°C: Dark Paste

Pounds/Gallon 25°C: 0.91

Flash Point, PMCC: > 150°C

Viscosity 38°C: 80-100 cps

Features: N/A

Applications: Use Level Method of Application

Hot mix paving 0.4 - 0.75% (Based on weight of asphalt)

Pretreated asphalt

Packaging : SC-901 is available in bulk quantities and in 210 liter.

Non-returnable Drums (170 kg net) or in 1000 kg totes.

Storage: and Handling Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing.

11-AD-here® 240

Description: AD here® 240 is an amidoamine derived adhesion agent. It effectively increases the adhesion of asphalt cement cutbacks and emulsions to wet and dry aggregates. This product is designed primarily for use in cold patching mixtures and is very effective in coating improvements on both calcareous aggregates and siliceous aggregates.

The use of 2-3 % of AD-here® 240 (by weight of asphalt cement) substantially increases the coating of the aggregate and increases the stockpile's workability and longevity. An additional benefit is the increased resistance of the mixture to moisture damage.

Typical Properties: Appearance: Viscous brown liquid

Viscosity, 77°F: 620 cps

Viscosity, 120°F: 145 cps

Density, 77°F: 8.1

Flash Point, (PMCC), °F: > 300

Features: N/A

Applications: N/A

Packaging: N/A

Storage and Handling: Refer to MSDS prior to handling the material. AD here® 240 is available in bulk quantities (1,000 5,500 gallons) and in 55 gallon non-returnable drums (400 net pounds). AD here 240 is manufactured in Mulberry, FL.

12-D-Scent 0119

Description D-Scent 0119 is a proprietary formulation that is used in small quantities to neutralize some of the odors that may be produced by hot asphalt cement. D-Scent 0119 has a high flash point, unlike many of the low flash point products currently being marketed for asphalt odor neutralization.

Typical Properties Viscosity, 25 °C: 196 cps

Specific Gravity, 25°C: 0.97-1.01

Flash Point (Closed cup) > 190° C

Features N/A

Applications D-Scent 0119 is typically added at a rate of three or four liters per tank truck of asphalt (0.01-0.02 %). The optimum use level should be determined by trial evaluations. The asphalt cement source and composition as well as the plant's operating temperatures will affect the proper dosage rate. The amount of D-Scent 0119 used per truck of liquid asphalt should be carefully controlled to just neutralize the asphalt odors. It is recommended that each user initially treated incoming asphalt shipments with two liters of D-Scent 0119 then increase the use level in one-half liter increments until the desired result is obtained. Excessive use of D-Scent 0119 will produce a strong aroma that is typically not desired.

Packaging: N/A

Storage and Handling: Refer to MSDS prior to handling this material. D-Scent 0119 is available in 420-lb Non-returnable drums and IBC containers.

13-Safety-Solv 140 Plus

Description: Safety-Solv 140 PLUS is a biodegradable, non-chlorinated solvent used to extract asphalt cement from bituminous mixes. Safety-Solv 140 PLUS is a clear liquid having an odor similar to that of pine oil. This product contains terpene hydrocarbons and proprietary emulsifiers.

Typical Properties: Appearance: Clear Liquid

Viscosity, 77°F: 15 cps

Density, Pounds/Gallon, 77°F: 7.2

Flash Point (P.M.C.C.): > 140°F

Features: Non-hazardous and biodegradable.

Rinses easily with water. Excellent degreaser and asphalt cleaner.

Applications: Safety-Solv 140 PLUS can be used in both the centrifuge and vacuum extraction methods for asphalt content determination. Safety-Solv 140 PLUS can replace the use of hazardous trichloroethylene and trichloroethane.

Packaging: Safety-Solv 140 PLUS is available in 55 gallon non-returnable drums (385 lbs. net).

WARNING: Combustible materials such as rags, paper, etc. that are soaked in Safety-Solv 140 PLUS should be disposed in fire-safe containers approved for combustible waste. DO NOT dispose in trash cans since spontaneous combustion may occur.

Storage and Handling : Refer to MSDS prior to handling this material.

14-TBRA#8524

Description: TBRA #8254 is very high efficiency water based, biodegradable release agent. It is used to reduce the adhesion of bituminous mixtures to the walls and beds of trucks used to haul asphalt concrete. It is also used to coat shovels, lutes, and other tools to aid in cleanup. TBRA #8254 is formulated with silicones for long lasting performance.

Typical Properties: Appearance: Dark blue/green Liquid
Viscosity, 77°F: 14 - 25 cps
Pounds/Gallon, 77°F: 8.5 - 8.7
Flash Point (P.M.C.C.): Aqueous Solution

Features: N/A

Applications The recommended dosage level is 1 part of TBRA #8254 to 50 parts of water. In field applications a proportioning solution spray valve such as a DEMA 202 C is used to blend the ingredients and to spray the final solution onto the truck beds.

Packaging: TBRA #8254 is available in 55-gallon non-returnable drums (420# net).

Storage and Handling: Refer to MSDS prior to handling this

15-Catamine 101

Description: Catamine 101 is a versatile, 100% active, amidoamine emulsifier useful for the costeffective production of CQS and CSS slurry seal emulsions. Catamine 101 is one of the leading emulsifiers for this application and has been proven to give excellent mix, Set, and cure characteristics on a wide variety of aggregates. Emulsions made with Catamine 101 tend to have a more rapid cure than emulsions made with competitive materials; this is particularly important when slurry seal is applied under conditions of low temperature and/or high humidity.

Typical Properties: Appearance @ 70°F: Soft Brown Paste
Density, Pounds/Gallon @ 77°F: 8.1
Flash Point, (P.M.C.C): >300° F
Viscosity 100°F: 350 cps

Features: N/A

Applications: Starting use level for laboratory evaluation is 1.5-2.0%, by weight of emulsion.

Catamine 101 emulsifier solutions require an acid neutralization to a pH of 1.5-2.5 with HCl. Aluminum chloride or aluminum sulfate is suitable retarders for modifying mix characteristics in the field. ARR-MULS CM-88 can be used as a co-emulsifier with Catamine 101 in order to modify emulsion characteristics for especially difficult to emulsify asphalt cements. CM-88 can also assist in the production of climate responsive microsurfacing emulsions.

Packaging Catamine 101 is available in bulk quantities (1000 - 5500 gal.) and in 55-gallon nonreturnable Drums (425 pounds net).

Storage and Handling Refer to MSDS prior to handling this material. Avoid water contamination during handling and storing. For ease of pumping it is recommended to keep the product at 100° - 120°F.