ARRMULS® ESS
Emulsion Rheology Modifier and Stabilizer

CHEMISTRY THAT DELIVERS HIGHER EMULSION VISCOSITY AND LONGER SHELF LIFE

ArrMuls ESS is a liquid additive used to increase emulsion viscosity and extend storage shelf-life. It is added to the emulsifier soap solution or to the emulsion when producing chemically-stabilized emulsions, and to the clay slurry when producing clay-stabilized emulsions. ArrMuls ESS can save producers money by decreasing the amount of binder needed in formulations and by reducing the occurrence of customer returns related to long-term emulsion stability. ArrMuls ESS is used to formulate emulsions and pavement sealers compliant with typical specifications, including AASHTO M-140/ASTM D-977: Standard Specification for Emulsified Asphalt, ASTM D 8099/D 8099M-17: Standard Specification for Asphalt Emulsion Pavement Sealer and ASTM D5727: Standard Specification for Emulsified Refined Coal Tar (Mineral Colloid Type).

**APPLICATIONS**
- Anionic asphalt emulsion
- Clay-stabilized asphalt emulsion
- Clay-stabilized coal tar emulsion
- Clay-stabilized petroleum residue emulsion

**FEATURES**

**INCREASES VISCOSITY**
- Allows for higher viscosity at lower binder percentages
- Viscosity remains stable during extended storage
- Allows for increased dilution of water to pavement sealer while maintaining proper viscosity for spray and/or squeegee application

**REDUCES LONG-TERM SETTLEMENT**
- Inhibits binder particle and compounding additive settlement during storage
- Yields emulsion settlement values of less than 1% over a storage period of two or more weeks

**PREVENTS LATEX SEPARATION**
- Keeps latex homogeneously dispersed in emulsion
- Enables easy compliance with specifications prohibiting appearance of white latex film in emulsion at top of settlement cylinder

**EASY TO USE**
- Liquid product that does not require heat

**COMPATIBILITY**

**EMULSIFIERS**
- Compatible with ArrMuls® asphalt and petroleum resin emulsifier chemistries
- Compatible with ACRA asphalt and coal tar emulsifier chemistries

**ADHESION PROMOTERS**
- Compatible with AD-here® and NovaGrip® performance-improving additive chemistries

**POLYMER MODIFIERS**
- Compatible with most modifiers including acrylic and styrene-butadiene rubber (SBR) latexes

**COMPOUNDING ADDITIVES**
- Compatible with most clays, fibers, fillers, pigments, sand and other compounding agents
USAGE RECOMMENDATIONS

ASPHALT EMULSION:
- 0.20 – 0.60% by weight of emulsion

CLAY STABILIZED EMULSION:
- 0.50 – 1.50% by weight of clay slurry

OPTIONS FOR ADDING TO ASPHALT EMULSION:
1. Add to soap solution last and agitate. Adjust soap solution to desired final pH.
2. Post add by in-line injecting into emulsion transfer lines.

OPTIONS FOR ADDING TO CLAY-STABILIZED EMULSION:
1. Add to clay slurry last and agitate.

Preferred pH range of soap solution and clay slurry is 7.5 to 12.0. For optimal results, maintain pH range of 8.0 to 10.0.

PHYSICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance, 77 °F (25 °C)</td>
<td>White Liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild</td>
</tr>
<tr>
<td>Density, 77 °F (25 °C)</td>
<td>9.1 lb/gal</td>
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<tr>
<td>Viscosity, 77 °F (25 °C)</td>
<td>220 cP</td>
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<tr>
<td>TSCA Inventory</td>
<td>Listed</td>
</tr>
<tr>
<td>DSL Inventory</td>
<td>Listed</td>
</tr>
<tr>
<td>REACH</td>
<td>Compliant</td>
</tr>
<tr>
<td>C.A.S. Number</td>
<td>Proprietary</td>
</tr>
</tbody>
</table>

The density and viscosity data reported are typical and not specifications. Typical ranges for density and viscosity values are ± 2 and ± 20%.

HANDLING AND STORAGE

Always handle ArrMuls products in accordance with Safety Data Sheet (SDS). Avoid product contamination with other materials. Recommended product handling temperature range is 50 – 100 °F (10 – 38 °C). Do not allow product to freeze as this will cause irreversible coagulation.

AVAILABILITY

ArrMuls ESS is available for shipment in bulk by tank truck. Packaged quantities are available in 275 gal/1,000 L IBC totes (2,200 lb/998 kg net weight) and 55 gal/208 L steel drums (474 lb/215 kg net weight).

TECHNICAL SUPPORT

To request additional product information, contact your regional Road Science representative. You can also contact us at 918-960-3800 or customerservice@roadscience.net, or visit our website at www.roadscience.net.

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