WarmGrip D-450 EU is a next-generation, worker-friendly warm mix additive that enables easier compaction at reduced paving temperatures and extends pavement life by creating powerful chemical adhesion of bitumen to aggregate, protecting from moisture damage and resultant pavement distresses such as raveling, pothole development and rutting. It is engineered to deliver reliably strong performance with a wide variety of bitumen and aggregate combinations. WarmGrip D-450 EU is added directly to bitumen and is compatible with all bitumen types and modifiers. WarmGrip D-450 EU is used to design mixes that conform to typical specifications including AASHTO T283: Method of Test for Resistance of Compacted Bituminous Mixture to Moisture Induced Damage, AASHTO T324: Method of Test for Hamburg Wheel-Track Testing of Compacted Hot Mix Asphalt (HMA), AASHTO R35: Standard Practice for Superpave Volumetric Design, and equivalent BS EN test standards including EN 12697-11: Determination of the affinity between aggregate and bitumen.

Applications

Bitumen Paving

Features

Easier compaction at lower temperatures
Improves mat density with fewer roller passes even with high Recycled Asphalt Pavement (RAP) mixes
Extends paving season and lengthens haul distance
Adds workability to mix for easier hand-work
Enables greater RAP utilization
Reduces virgin bitumen costs
Heat stable
Effective for several weeks to months in 160 °C bitumen
Reliable anti-stripping effectiveness
Passes rolling bottle and Hamburg wheel tests with wide variety of bitumen and aggregate combinations
No odor & no smoke
Worker-friendly for improved comfort of plant and paving crew personnel
No heated storage required
Easy to handle and pump in cold temperatures

Compatibility

bitumen
Compatible with all bitumen types including those modified with polyphosphoric acid (PPA), styrene-butadiene-styrene (SBS), styrene-butadiene rubber (SBR), ethylene-vinyl acetate (EVA) polymers, ground tire rubber (GTR) and recycled asphalt shingles (RAS)

Aggregates
Compatible with various aggregate types including granite, diabase, diorite, basalt, gabbro, rhyolite, andesite, dacite, chert, quartzite, gneiss, limestone, dolomite, marble, sandstone, natural sand and gravel, slag and recycled asphalt pavement (RAP)
USAGE RECOMMENDATIONS

NEAT AND MODIFIED BITUMENS:
- 0.25 – 0.75% by weight of total bitumen in mix
- Usage rate should be determined by user based on degree of aggregate coating and moisture sensitivity testing at desired production temperature

OPTIONS FOR ADDING WARMGRIP D-450 EU TO BITUMEN:
1. Add to bitumen storage tank and agitate mechanically or through pump circulation
2. Add at bitumen terminal by injecting into bitumen line as transport tanker is being charged
3. Add at bitumen mix plant by in-line injecting into the bitumen line (continuous plant) or weigh hopper (batch plant)

PHYSICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>Property</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance, 25 °C</td>
<td>Brown</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild</td>
</tr>
<tr>
<td>Density, 25 °C</td>
<td>0.92 kg/L</td>
</tr>
<tr>
<td>Viscosity, 25 °C</td>
<td>110 cP</td>
</tr>
<tr>
<td>TSCA Inventory</td>
<td>Listed</td>
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<tr>
<td>REACH</td>
<td>Compliant</td>
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<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 WarmGrip D-450 EU in accordance with Safety Data Sheet (SDS) and Road Science Asphalt Additives Handling and Storage Guidelines document. Avoid product contamination with other materials. Recommended product handling temperature range is 0 – 38 °C.

AVAILABILITY

WarmGrip D-450 EU is available in 1,000 L IBC totes (907.2 kg net weight) and 208 L plastic drums (186.0 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.