Tack Coat Definitions

- **Tack Coat**—sprayed application of asphalt cement upon an existing asphalt or Portland cement concrete pavement which may or may not have been milled before an overlay, or between layers of fresh asphalt concrete.

- **Original Emulsion**—an undiluted emulsion which consists of a paving grade binder, water, and an emulsifying agent.

- **Diluted Emulsion**—an emulsion that has been diluted with additional water.
  - Critical to control
  - 1:1 typical (Original Emulsion: Added Water)

- **Residual Asphalt**—the remaining asphalt after an emulsion has set typically 57-70 percent.

- **Tack Coat Break**—the moment when water separates enough from the asphalt showing a color change from brown to black.

- **Tack Coat Set**—when all the water has evaporated, leaving only the residual asphalt. Some refer to this as completely broke.

Tack Coat Equations

Adjustment for Emulsion’s Application Temperature:

\[
\text{Standard Emulsion Reference Temperature} = 60^\circ F
\]

Both Bills of Lading and Specification rates should all be at 60°F

\[
\text{Volume of Applied Emulsion} \times \text{Temperature Factor} = \text{Emulsion Volume at 60°F}
\]

Residual Asphalt from an Original Emulsion:

\[
\text{Applied Original Emulsion} \times R = \text{Residual Applied Emulsion}
\]

Note: \( R = \text{Emulsion’s Residual Asphalt Amount (0.XX)} \)
Accounting for Dilution:

<table>
<thead>
<tr>
<th>Dilution Ratio (Emulsion:Water)</th>
<th>Divide Total Volume Applied By:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1:1</td>
<td>2</td>
</tr>
<tr>
<td>1:2</td>
<td>3</td>
</tr>
<tr>
<td>1:3</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: Yields Volume of Original Emulsion that was applied.

Must account for Original Emulsion’s water content to determine Residual Asphalt applied. (See Above)

Calculating Application Rate via Volume:

Dipstick: \( \frac{9 \times \text{Gallons Applied}}{\text{Width} \times \text{Length}} = \frac{\text{Gal.}}{\text{Yd}^2} \) (Volume of Applied Emulsion)

Notes:

9 \( \frac{\text{Ft}^2}{\text{Yd}^2} \)

If calculating in Metric, there is no “9” in the equation

Gallons Applied = Initial Gallons – Final Gallons

Width and Length in Feet

Adjust for Temperature (See Above)

Adjust for Dilution (See Above)

Adjust for Original Emulsion’s Water (See Above)

If using onboard metering to obtain volume, remember to make Temperature, Dilution, and Original Emulsion’s Water adjustments to obtain residual application rate as shown above.

Steps:

Step 1: Determine the distance traveled.

Step 2: Calculate the area sprayed = distance traveled X width sprayed and convert from sq. ft. to sq. yd. if needed.

Step 3: Calculate the gallons of diluted emulsion applied = beginning volume – ending volume.

Step 4: Correct for temperature back to 60°F by applying correction factor. (MS-19, page 91.)

Step 5: Account for dilution. (See above.)
Step 6: Calculate original emulsion application rate which is the gallons of original emulsion applied divided by the area of application.

Step 7: Calculate residual asphalt by accounting for the water in the original emulsion (H₂O%). (See above.)

**NOTE: steps 6 & 7 commonly have their order switched.**

### Calculating Application Rate via Mass:

\[
\frac{\text{Mass of Applied Material}}{\text{Area of Application}} = \frac{\text{Pounds}}{Yd^2}
\]

Notes: Typically Mass calculation works best with full loads, fully applied.

Bills of Lading should contain 60°F mass per gallons.

---

### Guide for Loading of Asphalt Products

(Adapted from Asphalt Institute IS-180)

<table>
<thead>
<tr>
<th>Last Product in Tank</th>
<th>Asphalt Cement</th>
<th>Cutback Asphalt</th>
<th>Cationic Emulsion</th>
<th>Anionic Emulsion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asphalt Cement</td>
<td>OK to Load</td>
<td>OK to Load</td>
<td>Empty to no</td>
<td>Empty to no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measurable Quantity</td>
<td>Measurable Quantity</td>
</tr>
<tr>
<td>Cutback Asphalt</td>
<td>Empty*</td>
<td>OK to Load</td>
<td>Empty to no</td>
<td>Empty to no</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measurable Quantity</td>
<td>Measurable Quantity</td>
</tr>
<tr>
<td>Cationic Emulsion</td>
<td>Empty*</td>
<td>Empty to no</td>
<td>OK to Load</td>
<td>Empty to no</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurable Quantity</td>
<td></td>
<td>Measurable Quantity</td>
</tr>
<tr>
<td>Anionic Emulsion</td>
<td>Empty*</td>
<td>Empty to no</td>
<td>Empty to no</td>
<td>OK to Load</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Measurable Quantity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude Oil or</td>
<td>Empty*</td>
<td>Empty to no</td>
<td>Empty to no</td>
<td>Empty to no</td>
</tr>
<tr>
<td>residual fuel oils</td>
<td></td>
<td>Measurable Quantity</td>
<td></td>
<td>Measurable Quantity</td>
</tr>
<tr>
<td>Any product not</td>
<td>Tank must be</td>
<td>Tank must be</td>
<td>Tank must be</td>
<td>Tank must be</td>
</tr>
<tr>
<td>listed</td>
<td>cleaned</td>
<td>cleaned</td>
<td>cleaned</td>
<td>cleaned</td>
</tr>
</tbody>
</table>

*Any remaining material will be dangerous.*
Reduced Tracking Materials

- TRACKLESS™ (NTSS-1HM)
  - Blackridge Emulsions Product
  - Patented Product
  - Anionic Emulsion
  - 0-20 Pen Base Asphalt

- CAT-TAC (CNTT)
  - Hunt Refining Company Product
  - Patent Pending
  - Cationic Emulsion
  - 45-90 Pen Base Asphalt

- FastTack™
  - Colas Solutions™ Product
  - Catalyst induced system (COLNET®)
  - Breaks in non-ideal conditions
  - Night paving
  - Cooler conditions

- eTac™ (CBC-LT)
  - Ergon Asphalt & Emulsions Product
  - Reduced Tracking
  - Fast Breaking
  - Heavy Application Rates

- EM-50-TT
  - Seaboard/Specialty Emulsions
  - 0-20 pen base asphalt
  - No VOCs or HAPs
  - Cationic Non-Tracking Tack Coat (CNTTC)

- Hammaker East Product
  - 40-60 pen base asphalt

- Emulvia Clean® (NTCRS-1hM)
  - Eurovia Product (BCI Materials/Blythe Construction)
  - Hard Pen (70 max, typically 20-30)
  - Modified and Unmodified Options (in Europe)
    - EVA Modified
    - Cross-linked Elastomer

- FastSet® Tack
  - Western Emulsion Product
  - Originally developed as a fast setting fog seal emulsion
  - Cationic Emulsion
  - Specialty Based Binder
  - Polymer Modified

- MOS-50
  - Professional Coating Technologies Product
  - 0-12 pen base asphalt
  - Cationic, polymer modified product
  - 0.20 application rate (not residual rate)
Heavy Bonding Materials

- BondTekk®
  - Road Science™ Product
  - Spray paver applied
  - Polymer modified engineered emulsion
- UltraFuse™
  - Blacklidge Emulsions Product
  - Polymer modified material
  - 0-25 pen base asphalt
  - High application rates
  - Standard distributor truck

Tack Additive

- Nanotac™
  - Zydex Industries Product
  - Cationic emulsion additive
  - Reportedly improves wetting while reducing tracking