WARM MIX ASPHALT

PLANT FOAMING TECHNOLOGIES
Benefits of WMA

- Reduced Fuel Usage
- Reduced Emissions
- Increased Reclaimed Asphalt Pavement (RAP) Usage

Paving Benefits
- Compaction Aid/ General workability
- Cold Weather Paving
- Longer Haul Distances
- Reduction in exposure to asphalt fumes
What are “Foamed” or “Foam” WMA Systems?

- Water injection into asphalt cement as a way of producing WMA mixes
- No chemicals used
- Standard water used as additive
- No additional cost per ton from additives beyond one-time capital cost of equipment
History of Current “Foamed” or “Foam” WMA Systems …

- Astec responds to WMA approaches from Europe introducing water in different methods to produce WMA mixes
- Astec decides to find way to introduce water directly into the binder - selects “foaming” nozzles that inject water into AC
- Other manufacturers respond with similar technologies in order to be competitive
FOAMING PROCESS

- Foaming processes rely on the fact that when a given volume of water turns into steam, it expands by a factor of 1,673.

- When the water is dispersed into hot asphalt binder and turns into steam, there is a resulting expansion of the binder and corresponding reduction in the mix viscosity.
Foaming Process

- Hot liquid is sprayed and intermixed with a very fine mist of atomized water (2% by wt. of AC)
- Temporarily lowers viscosity of binder to allow better coating of aggregates.
- Mix temperatures are typically 35°F – 50°F cooler than conventional mixes
- Allows up to 50% RAP addition
How much water?

- 1 ton mix - 2,000 lb.
- 5.3% liquid - 106 lb.
- Volume of liquid - 1.63 cu. ft.
- 1 lb. H₂O when converted to steam = 30 cu. ft.

\[
\text{Expansion} - \frac{30}{1.63} = 18
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Asphalt Binder Coating Thickness

NORMAL COATING

DB GREEN FOAM COATING
Viscosity / Temperature (Approx.)

Temperature (°C)

Viscosity
Manufacturers Offering “Foamed” WMA Systems …

- Astec “Double Barrel Green”
- Terex “Foam Mix Asphalt System”
- Gencor “Ultrafoam GX”
- MAXAM “Aqua-Black”
CONCLUSIONS

- Many technologies for producing Warm Mix
- Many benefits to producing Warm Mix
- PROMOTE WARM MIX
- PRODUCE WARM MIX