

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

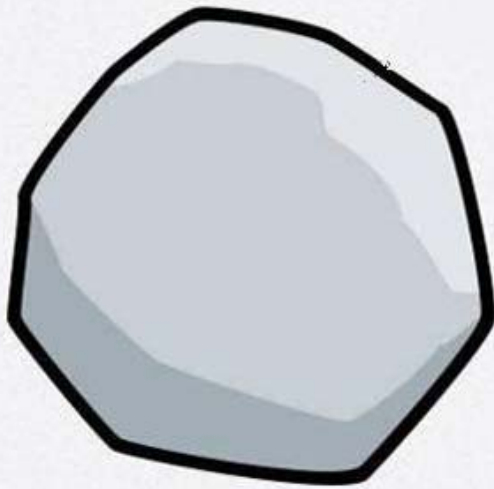
Foaming Process

- 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 35⁰F – 50⁰F 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.
- Expansion - $\frac{30}{1.63} = 18$

Asphalt Binder Coating Thickness

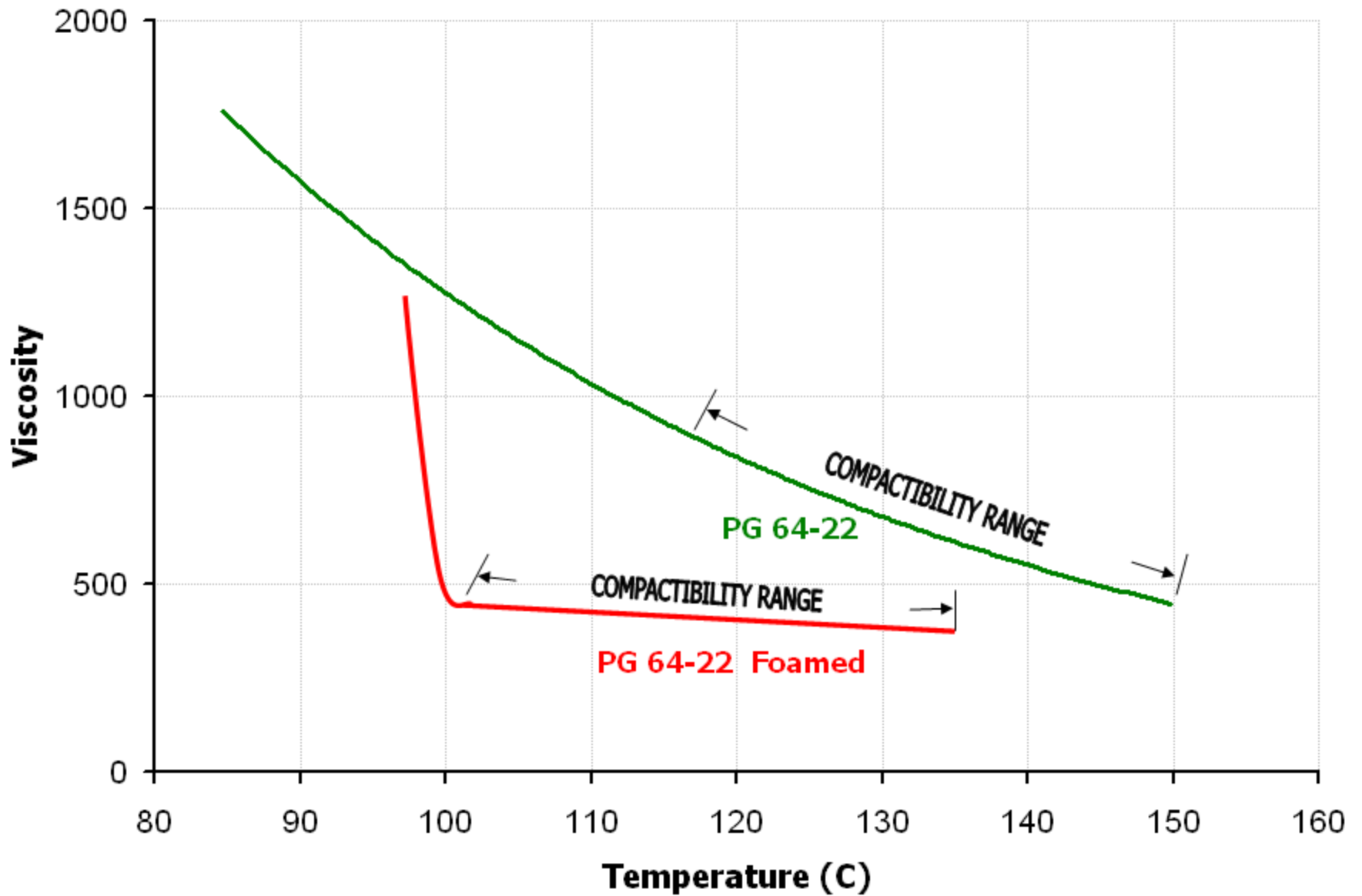


**NORMAL
COATING**



**DB GREEN FOAM
COATING**

Viscosity / Temperature (Approx.)



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