

Proper Storage and Handling of PG Asphalt Binders



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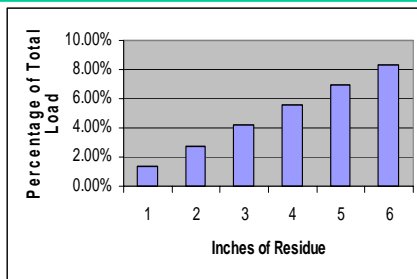
Handling PG Binders at the Plant



- Use dedicated tanks
 - Eliminate contamination
 - Tanker truck empty before loading at terminal
 - Load from correct loading arm at terminal
 - Pump into correct tank at HMA plant
 - Pump into empty tank at plant if previous material was different – add at least 2 or 3 loads & circulate before sampling
- Mixed PG binders may fail PG grade

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Residue as % of Load



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Sampling Asphalt at the Plant



- Representative Sample
- Procedure is important!!
 - Piping behind valve may contain more than 1 quart of product
 - Different product previously in tank?
 - Aged product
 - Waste at least 1/2 gallon before filling sample can
 - Use clean can for wasted material – return to top of tank

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Sampling Asphalt at the Plant



- Where to sample?
 - Tanker Truck
 - Storage tank
 - Prior to injection into the plant

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Sampling Asphalt at the Plant



- Tanker truck
 - Indicates dilution from residue in tanker
 - Does not indicate asphalt quality used in mix
 - Valve not heated
 - Difficult to open
 - May require heating
 - Material may spurt out after cold material is cleared – SAFETY!!

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Sampling Asphalt at the Plant



- **Storage Tank**
 - Indicates product quality in tank
 - Does not indicate asphalt quality used in mix
 - **Valve not heated**
 - Difficult to open
 - May require heating
 - Material may spurt out after cold material is cleared – SAFETY!!

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Sampling Asphalt at the Plant



- **Prior to injection into plant**
 - At AC pump
 - Indicates asphalt quality in mix
 - **Valve close to heat jacketing**
 - Typically easy to open
 - Requires less waste because short piping connection
 - Waste 1 quart
 - Material less likely to spurt out – SAFETY!!
- **Requires coordination with Plant Operator!!!**

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Contractor QC Plan



- **Contractors need to establish QC plan to prevent PG asphalt contamination and failing test results**
 - Identify all hardware – label or number
 - Tanks
 - Pumps
 - Piping
 - Valves
 - Sample points
 - Heat system
 - Establish standard procedures and hardware settings for asphalt flow into storage and into HMA plant

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Special Handling is Required for Modified Binders



- **Between 5-20% of all asphalts are currently modified**
- **Most modified binders are in the PG 64-28 to 76-22 range**
- **Be safe and follow manufacturer's recommendations**

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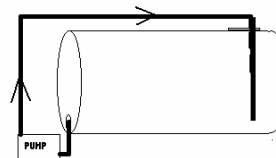
Handling PMA at the Plant



- **Vertical or Horizontal Tanks?**
 - Both work for most PMA
 - Circulate to achieve uniform temperatures above and below heating coils

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Proper Circulation in Horizontal Tanks



- **Suction and return lines at opposite ends of tank to completely circulate material**
- **Return line near bottom of tank to prevent oxidation**

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Handling PMA at the Plant



- **Vertical or Horizontal tanks?**
 - Some PMA requires agitation to prevent separation
 - Vertical tanks provide more efficient agitation
 - Check with supplier
- **Check and maintain proper temperatures**

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General Guidelines for Storage and Mixing Temperatures

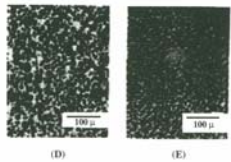
PG Binder	Storage Temperature (°F)	Mixing Temperatures (°F)
64-22	285-315	265-320
70-22	300-325	280-330
76-22	315-340	285-335

Extended Storage <275°F

Source: EC-101

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Effect of High Storage Temperature

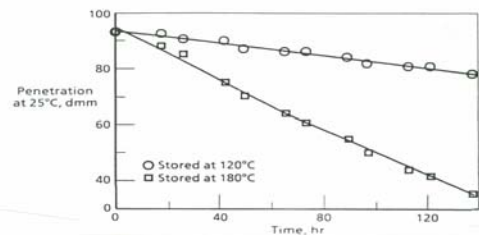


Flourescne micrographs showing the effect of time and temperature on the compatibility of a 10% SBS/10% Aromatic Oil/80% asphalt binder
 (D) 220°C (425°F) 1 hour
 (E) 220°C 4 hours
 (F) 220°C 7 hours

Ref: B Brule, Y Brion and A. Tanguy, Asphalt Paving Technology 60, 43 (1991)

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Effect of Time and Temperature on Asphalt Properties



Ref: J H Collins and M Bouldin, Rubber World, 206(5) 32, (1992).

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Selecting Proper Mixing and Storage Temperatures



- **Mixes containing PMA harder to handle and to compact**
 - PMA stiffens at higher temperatures
 - Mixes are stickier
- **Compaction issues and a lack of guidance can lead to excessively high mix temperatures**

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Selecting Proper Mixing and Storage Temperatures



- **Consequences of high temperatures**
 - Damage the asphalt binder
 - Excessive aging during construction
 - Excessive fumes
 - Tender mix
 - Asphalt drain-down - SMA and OGFC mixes

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High Mix Temperature Consequences



- Each 10°F increase in mix temperature **Doubles the Amount of Fumes**
- Worker complaints – asphalt fumes are an irritant
- Asphalt industry already under attack by environmental activists – excessive fumes exacerbate the problem

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Re-Heating Modified Binders



- Bring temperature up very slowly
- If material has been held over the winter, heat incrementally 20 degrees increase at a time
- Allow 3 – 5 days to get material up to circulation temperature

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HMA Plant Asphalt Pump



- Adequately sized AC pump
 - PMA will cause higher amperage draw
- AC pump in good condition
- Calibrated
- Strainer
 - Larger than standard holes – 1/4"
 - Clean

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HMA Plant Asphalt Pump



- Circulate unmodified asphalt first before start-up
- Switch to PMA and circulate before start-up
- Switch to unmodified asphalt and circulate through pump after shutdown at end of shift
- Unmodified asphalt in AC pump, meter and strainer until next shift

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HMA Plant Slat Conveyor



- Properly sized
- Good condition
- PMA will increase amperage draw on conveyor
 - Start at reduced tonnage rate
 - Start on unmodified mix to heat conveyor

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Modified HMA Storage



- **DO NOT STORE OVERNIGHT**

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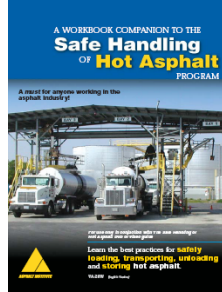
Summary



- The PG binder system improves the performance of HMA pavements
- Understand the product you are using and treat it with respect
 - Is it modified?
 - Follow suppliers recommendations
 - Establish a QC plan
- **USE SAFE PRACTICES**

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Safe Practices



- “Safe Handling of Hot Asphalt”
 - Asphalt Institute VA-26D
 - www.asphaltinstitute.org

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Thank You For Your Attention

- Questions?

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