

## Proper Storage and Handling of PG Asphalt Binders



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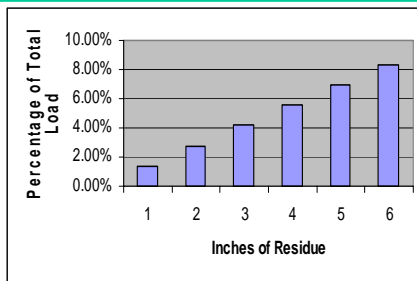
## Handling PG Binders at the Plant



- 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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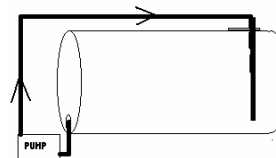
## Handling PMA at the Plant



- **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

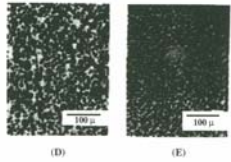
PG Binder	Storage Temperature (°F)	Mixing Temperatures (°F)
64-22	285-315	265-320
70-22	300-325	280-330
76-22	315-340	285-335

Extended Storage <275°F

Source: EC-101

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## Effect of High Storage Temperature

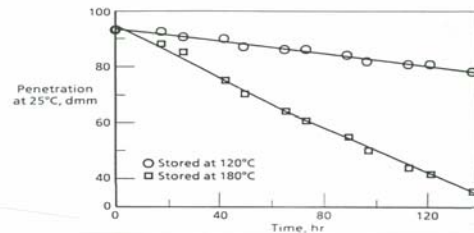


Flourescne micrographs showing the effect of time and temperature on the compatibility of a 10% SBS/10% Aromatic Oil/80% asphalt binder  
 (D) 220°C (425°F) 1 hour  
 (E) 220°C 4 hours  
 (F) 220°C 7 hours

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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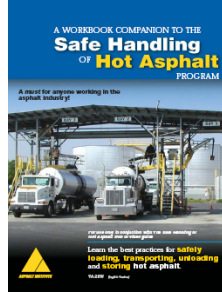
## Summary



- 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](http://www.asphaltinstitute.org)

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## Thank You For Your Attention

- Questions?

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