



# Everything You Always Wanted to Know About Paving with HP

(But Were Afraid to Ask)

Available Languages—  
English, Metric



# Highly Modified Asphalt - HiMA

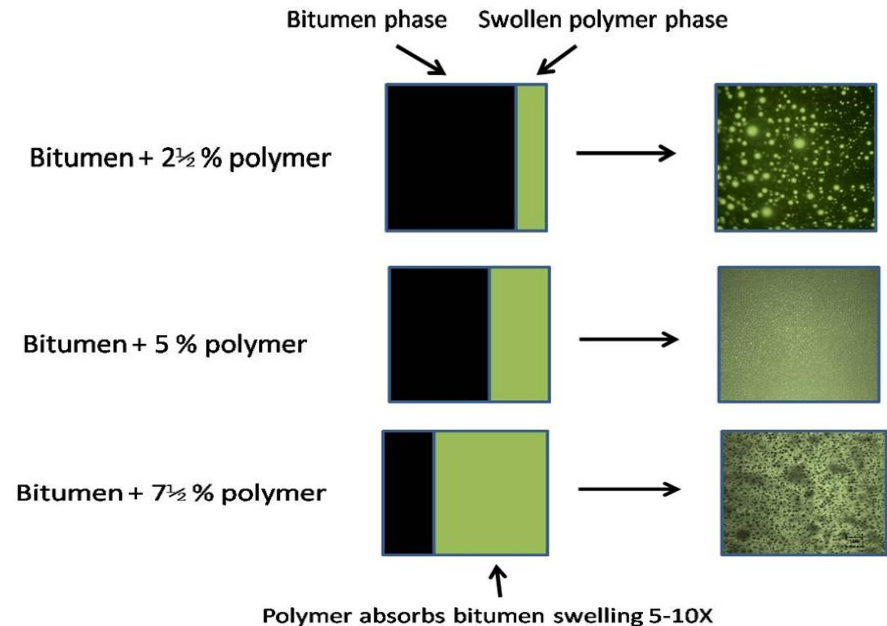
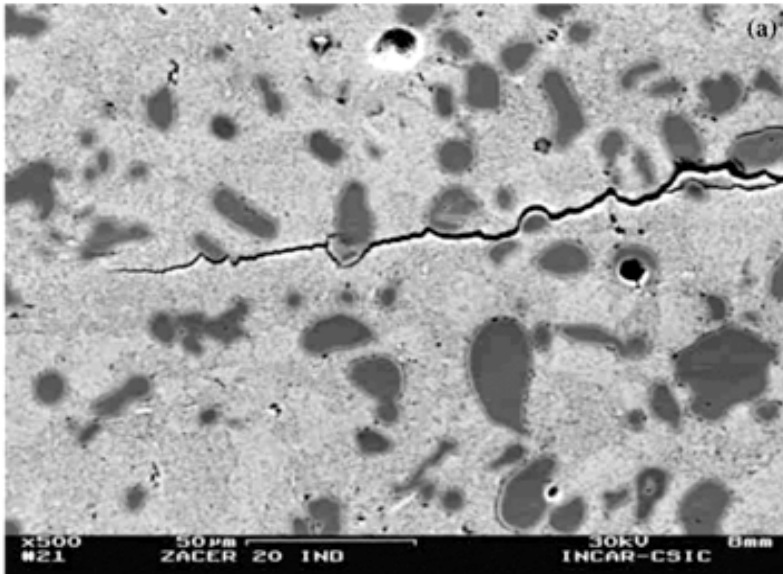
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- **What Is It?**
- **What Are the Market Applications?**
- **As a Contractor, What Do I Need to Know?**

# What Is Highly Modified Asphalt?

Highly Modified Asphalt is exactly what it says, asphalt with more than double the normal amount of SBS polymer.

This gives a much denser polymer network with up to 10X rutting and fatigue cracking resistance.



Current FDOT spec is PG 76E-22 with  $J_{nr3.2} \leq 0.1 \text{ kPa}^{-1}$  and  $R_{3.2}\% \geq 90$ . Over 5,000,000 tons in over 70 projects around the world have demonstrated superior performance at reduced thickness.

# HP Market Applications - Where Does It Add Value?

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## Structural Applications

- With a sound base, thinner pavements with lower upfront cost

- Demonstrated at NCAT and in many field applications

- With weak base, much longer lifetime can be achieved

## Thin Overlays

- Superior resistance to reflective cracking BUT requires finer, richer mix.

## Micro Surfacing

## Open Grade Mixes for Reduced Raveling

## SAMI Layers

## High Stress Applications - ramps, intersections

## AASHTOWare® Pavement ME Design works for HiMA designs

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Storage, Mixing, Hauling, Paving,  
Compaction with HP

We largely defer to...



# An Introduction to Modified Asphalt Binders

*Presented by:*



Short Course 2015



# Handling Modified Binders (Contractor's View)



Presented By:  
**Bob Kluttz**

Prepared for the Association of  
Modified Asphalt Producers  
Training Program

# Outline

- Handling of Modified Asphalts
  - Handling of Asphalt Binder at the Terminal
  - Handling of Asphalt Binder at the Hot Mix Asphalt Plant
  - Recommended Plant Operations
  - Laydown of Modified Asphalt Mix
  - Contractor Liquid Asphalt QC Plan



# Handling Modified Asphalts



# Handling Modified Asphalts



- 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**

# Handling Modified Asphalts



- Mixing PMA with other asphalts can cause the asphalt to fail to meet the PG grade requirements
- Reduce contamination at the terminal
  - Tanker truck empty before loading at terminal
  - Load from correct loading arm at terminal

# Handling PMA at the Plant

- Reduce contamination at the HMA plant
  - Pump into correct tank at HMA plant
  - Use dedicated tanks, if possible
  - If dedicated tank is not available
    - Empty tank as much as possible if previous material was different
    - Add 2 or 3 full loads of PMA before testing and/or using the material in the tank
- Diluted PMA may fail PG grade!!!





# Handling PMA at the Plant



- Vertical tanks
  - Vertical tanks provide more efficient agitation
  - Very few PMAs requires agitation to prevent separation
  - Agitation is recommended for GTR modified asphalt
  - Check with supplier
- Check and maintain proper temperatures

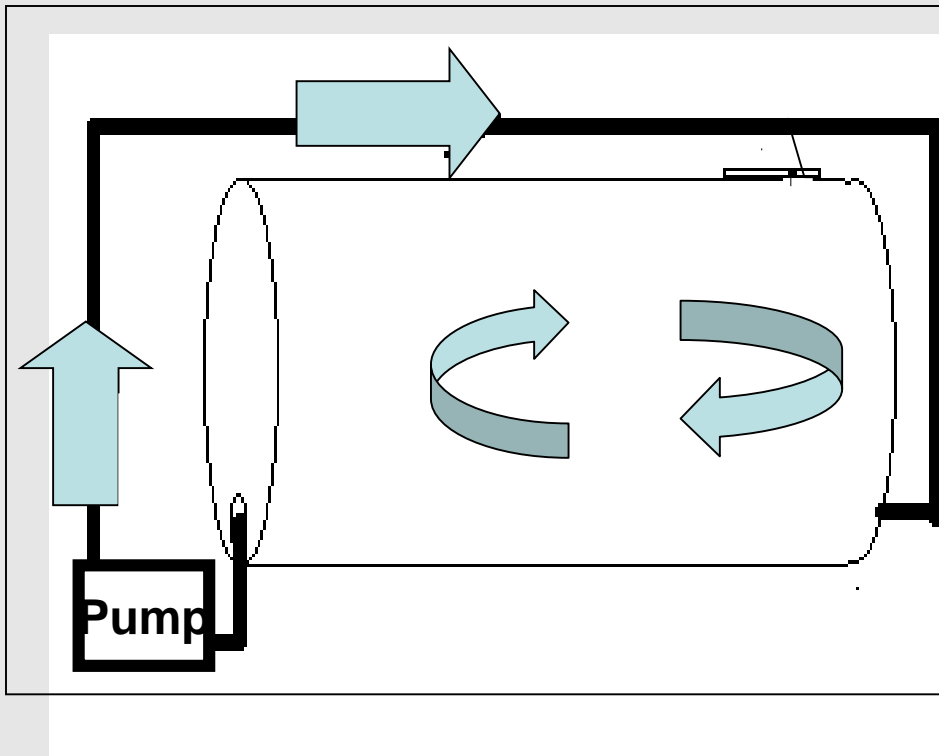
# Handling PMA at the Plant



- Horizontal Tanks
  - Horizontal tanks work fine for most PMAs
  - Circulate to achieve uniform temperatures above and below heating coils



# 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

# Handling PMA at the Plant

- **BEWARE OF MIXING MODIFIED ASPHALTS FROM DIFFERENT SUPPLIERS!!!**



- Different suppliers may use different polymer technologies
- Differing technologies may not be compatible
- Polymer separation may occur

# Handling PMA at the Plant

- **BEWARE OF USING DIRECT-FIRE HEATERS WITH MODIFIED ASPHALTS!!!**



- Direct-fire heat tubes may develop hot spots
- Hot spots will immediately destroy the polymer network in the asphalt

# What's Different with HP?

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## Modified Asphalt Storage

Not much.

Follow all the same general guidelines.

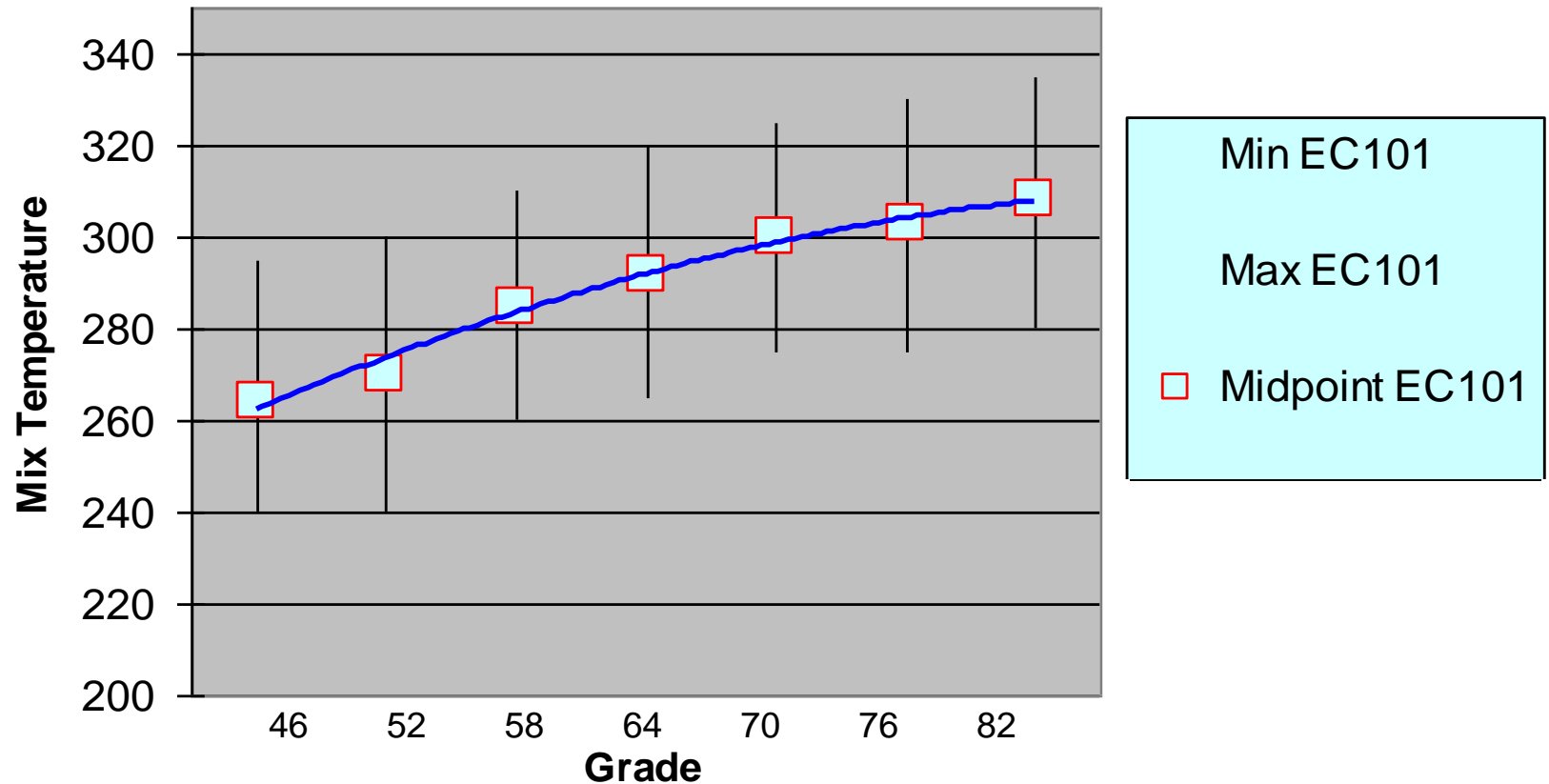
Ideal storage temperature ~320 °F.

Do not overheat!

Cool down if holding for days.

# EC-101 Recommendations

## EC-101 Recommendations



# General Guidelines for Storage and Mixing Temperatures

PG Binder	Storage Temperature (°F)	Mixing Temperature (°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



# 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

# HMA Plant Asphalt Pump Operation



- 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

# 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

# What's Different with HP?

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## Modified Asphalt Mixing

Again, not much.

Ideal mixing temperature is mix dependent, but 325-330 °F is generally good.

Start up a little hotter to heat up conveyor, silos and trucks.

# Modified HMA Storage



- DO NOT  
STORE  
OVERNIGHT!!!



# Transporting Modified HMA to Paver



- Clean, smooth truck beds
- Release agent
  - Type
  - Amount
  - Powdered Tide detergent
- Tarps



# What's Different with HP?

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## Modified Asphalt Silo Storage and Hauling

Nothing.

All the same best practices for general polymer modified asphalts apply to HiMA.

# Placing Modified HMA



- No modifications to equipment
- Handwork is more difficult
- Attention to detail
- Weather Conditions – 50 °F minimum

# Compacting Modified HMA



- Compaction Equipment
  - Number - 3 or 4
  - Type – high frequency
  - Size
- Mix temperature
  - Only high enough to allow proper compaction
  - Extra 10 °F doubles fumes
  - High temperatures can damage PMA
- Roller pattern
  - Front roller close to paver
- Field monitoring
  - Temp
  - Density

# Compacting Modified HMA



- Compacting mixes with PMA may actually be easier than un-modified asphalt mixes
  - Compaction requires confinement
  - PMA may eliminate tender zone

# What's Different with HP?

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## Modified Asphalt Placing & Compacting

Again, not much.

Aim for temperature behind screed to be about 300 °F.

Keep breakdown roller close to the paver.

Only significant caveat - HiMA mixes will stiffen faster than conventional PMA so do not let it cool too much.

This especially applies to clean up!



# Best Practices Per ACAF

- Laydown of HP binders doesn't pose a significant problem as reported thus far, but keep in mind good construction practices:
  - Follow best practices to prevent end of load segregation. HP binders will magnify poor practices!
  - Balance your production rates (plant = trucking = paver = rollers). Keep the mix moving and avoid long stops.
  - Be ready when the trucks arrive on project. Temperature is critical for this mix.
  - Keep compactors tight with paver and adjust rolling pattern as needed to maintain your target density.
- Plant Storage of HP binders is different and requires attention:

Jim Warren, Executive Director, ACAF

[https://www.floridaasphalt-digital.com/facb/0119\\_spring\\_2019](https://www.floridaasphalt-digital.com/facb/0119_spring_2019) HP Binder Tech Brief



# HP Storage Per ACAF

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- Limited shelf life
- Scheduling & frequent communication with binder supplier
- Do not store indefinitely
- Follow supplier specific handling instructions (storage temperature, storage time, circulation, etc.)
- Best practices will vary with supplier

Jim Warren, Executive Director, ACAF

[https://www.floridaasphalt-digital.com/facb/0119\\_spring\\_2019](https://www.floridaasphalt-digital.com/facb/0119_spring_2019) HP Binder Tech Brief

# HP Storage Per Kraton

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- Some additional recommendations:
- Do not overheat. High temperature accelerates viscosity rise.
- Monitor viscosity daily.
- Warm mix is good.
- Definitely circulate, a sidearm mixer may not be adequate.
- Leftover or high vis product - dilution to PG 76-22 is definitely viable.
- Do not overheat.

# Summary



- PMA improves the performance of HMA pavements
- Understand the product you are using and treat it with respect
  - **Follow supplier's recommendations**
  - Best Practices

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