

Zydex[®]



ZycoTherm

KEY BENEFITS OF WARM MIX ASPHALT

- ❑ **Mixing temperature lower by 15 - 30 °C depending on hauls, ambient temperature and wind velocity**
- ❑ **Compaction temperature lower by 15 - 55 °C of HMA**
- ❑ **Extended Paving**

Asphalt Grade	Mixing Temperature °C	Compaction Temperature °C
VG 10	120 – 130	90 – 115
VG 30	125 – 135	95 – 120
CRMB	145 – 155	115 – 140
PMB	145 – 155	115 – 140

WARM MIX ASPHALT – KEY BENEFITS

Environment Friendly

- Reduced emissions in stack, 90 % Relief on fumes at the loading dock & paver
- VOC reduced by 60-70% at the paver
- Paving asphalt binder rated as 2B (possibly carcinogenic to humans) by IARC, Oct. 2011

Energy Saving

- Lower Fuel Cost by 11 – 14% (Ref latest practical studies, NAPA Annual meeting, Feb. 2012)

EXISTING WMA TECHNOLOGIES

Chemical additives allow easier processing & coating of aggregates

Surfactants

- Reduce surface tension of asphalt binder

Wax Additives

- Reduce viscosity of asphalt binder

EXISTING WMA TECHNOLOGIES

Water injection allows for easier coating of aggregates

Direct Water Injection

- Expand surface area of asphalt binder via water to steam expansion.

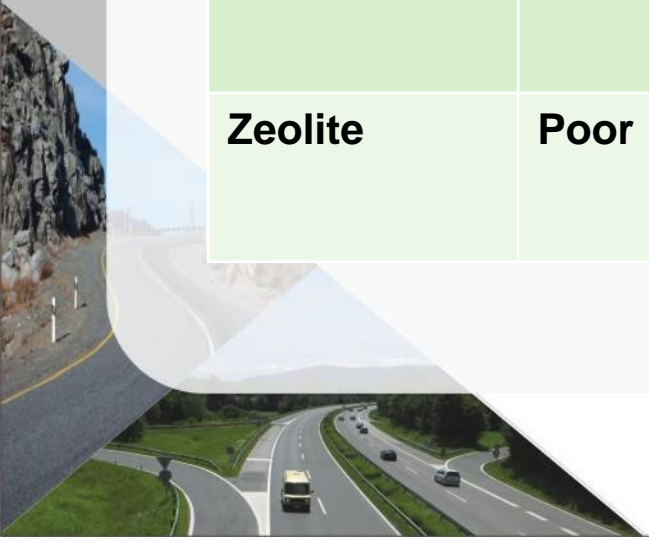
Zeolites

- Release of water from natural mineral during mixing, thereby expanding surface area via water to steam expansion

EXISTING WMA TECHNOLOGIES

DRAWBACKS

Additive	TSR	Rutting	Compactibility	Dosing / Mixing
Surfactant	OK	High possibility	Good	Easy
Wax	Poor	Not Affected	OK	Needs additional melting
Water	Poor	Not Affected	Poor	Water injection (poor control)
Zeolite	Poor	Not Affected	Poor / OK	Solid powder dosing (poor control)



ZYCOTHERM

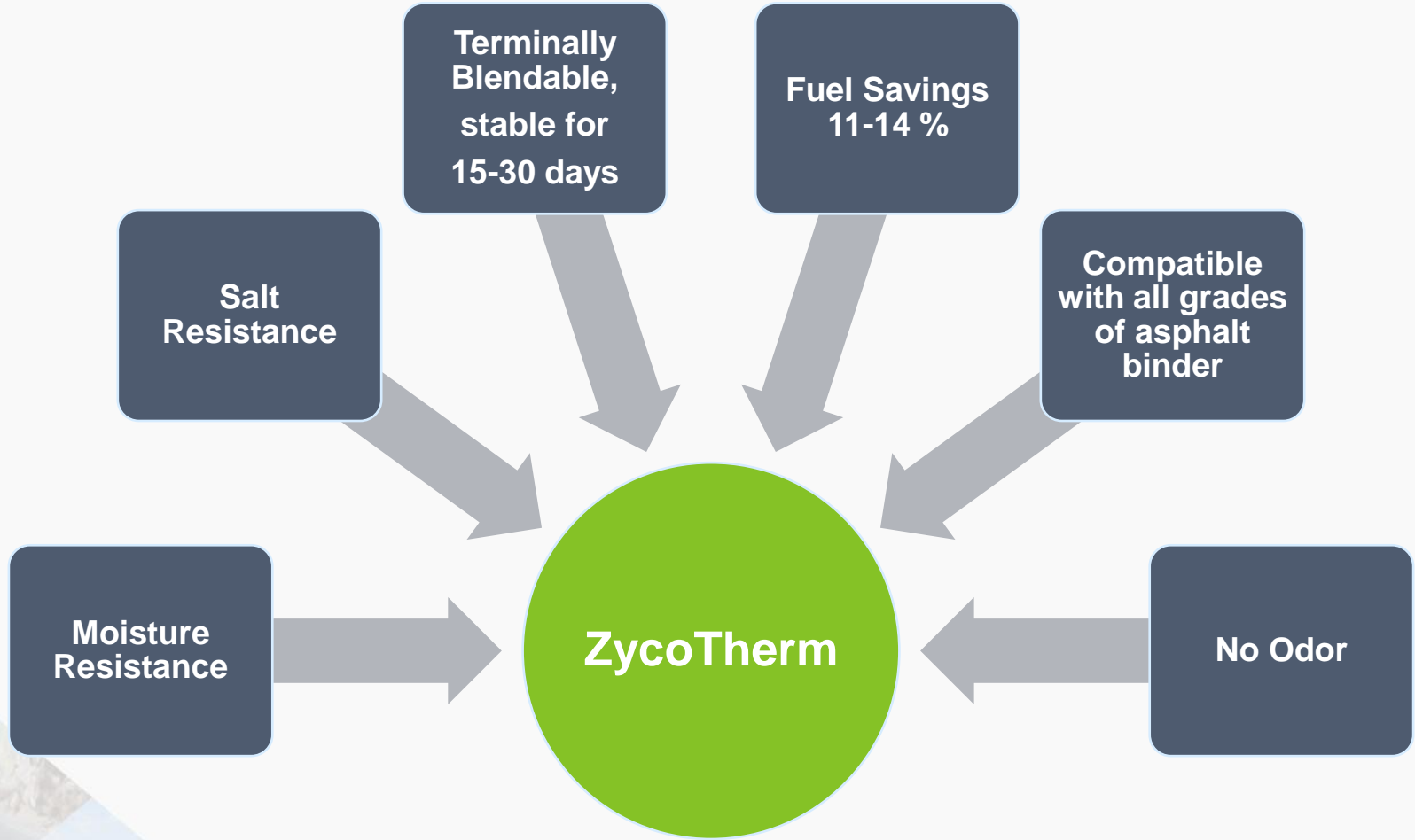


THE BEST WMA TECHNOLOGY SOLUTION

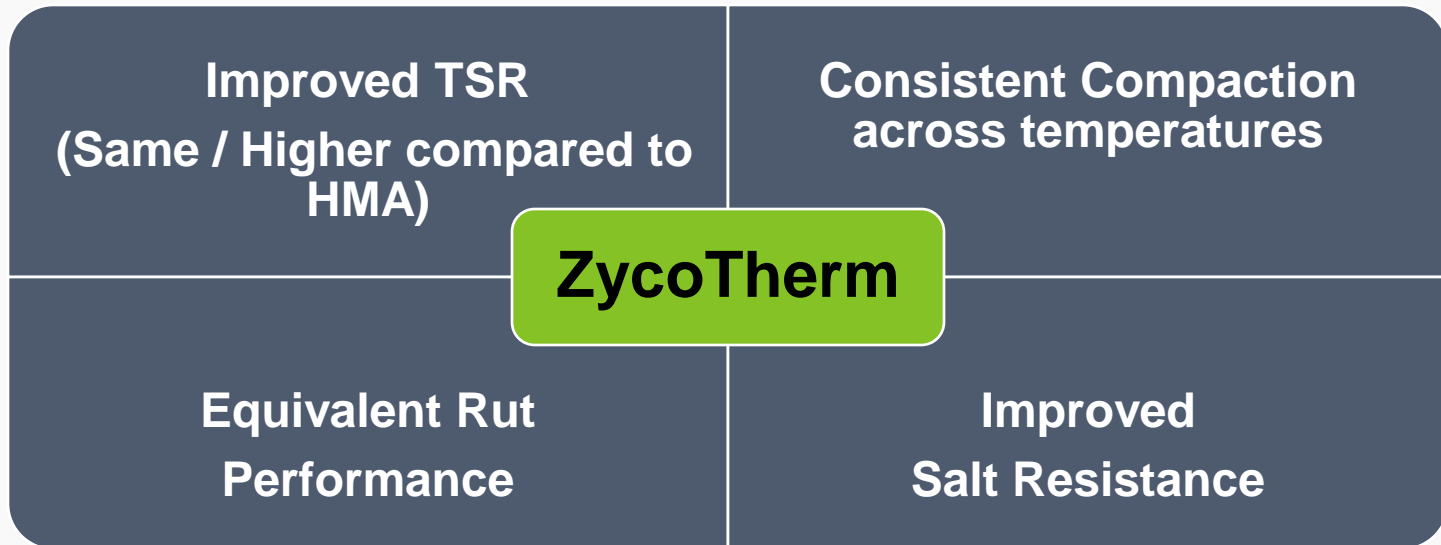
- ✓ **Odor free additive , increases moisture resistance**
- ✓ **Lowers mixing and compaction temperatures up to 36 °C**
- ✓ **Substantially enhances Salt Resistance of pavements over Hot mix technologies**
- ✓ **Resolves stripping & quick degradation of Mountain / Coastal pavements (No effective solution with Hot mix technologies)**



THE BEST WMA SOLUTION

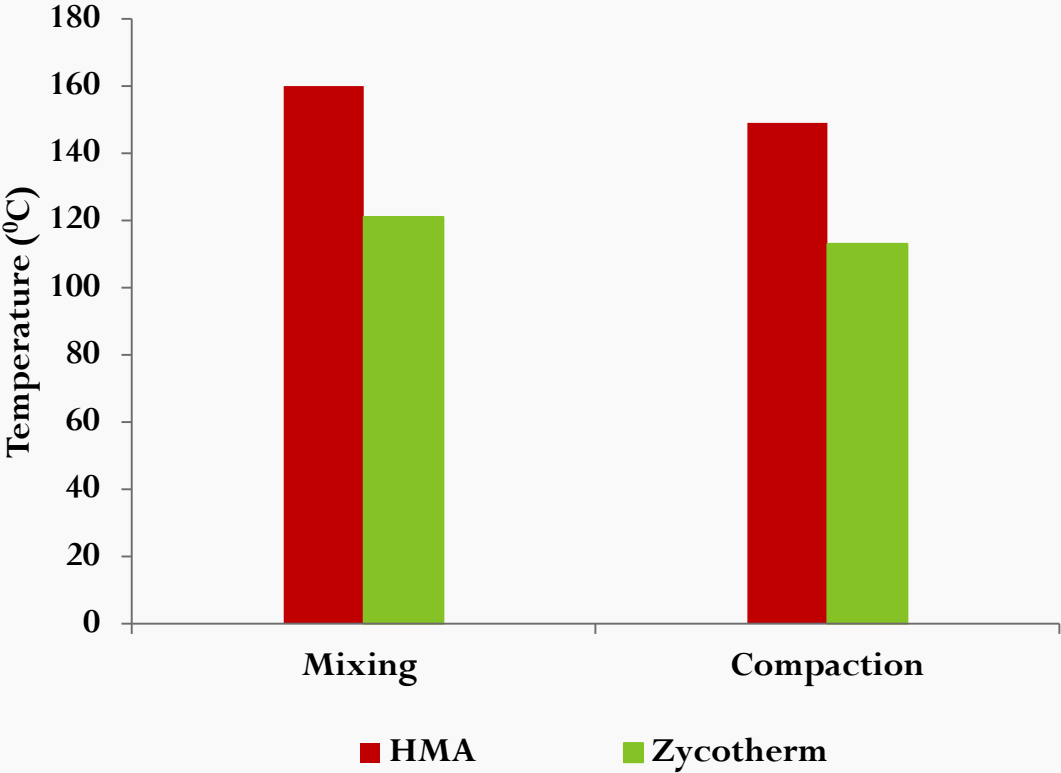


TESTING & RESULTS



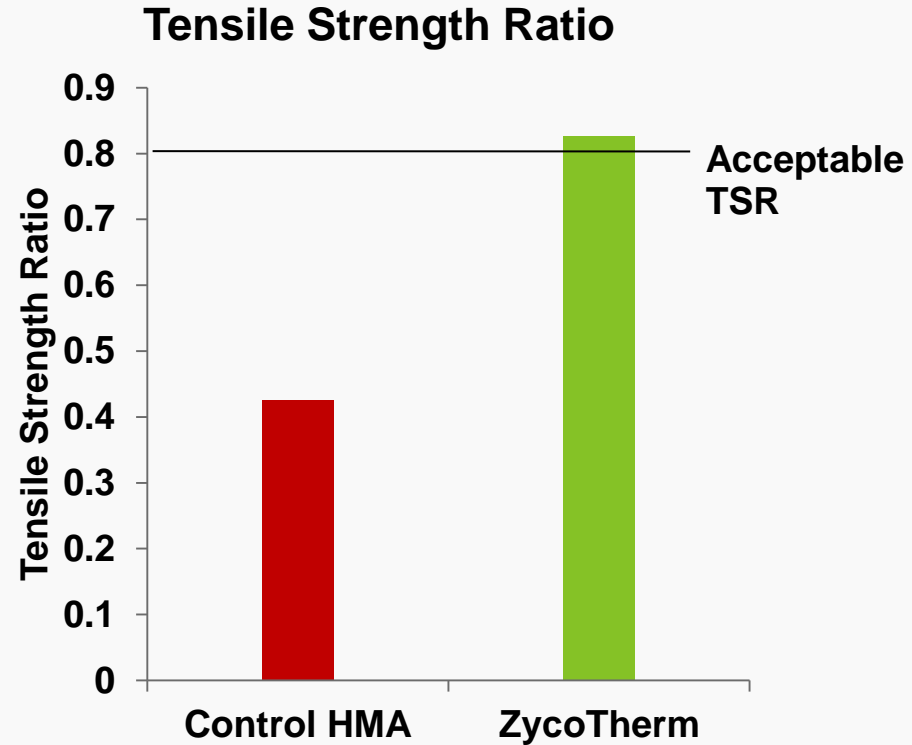
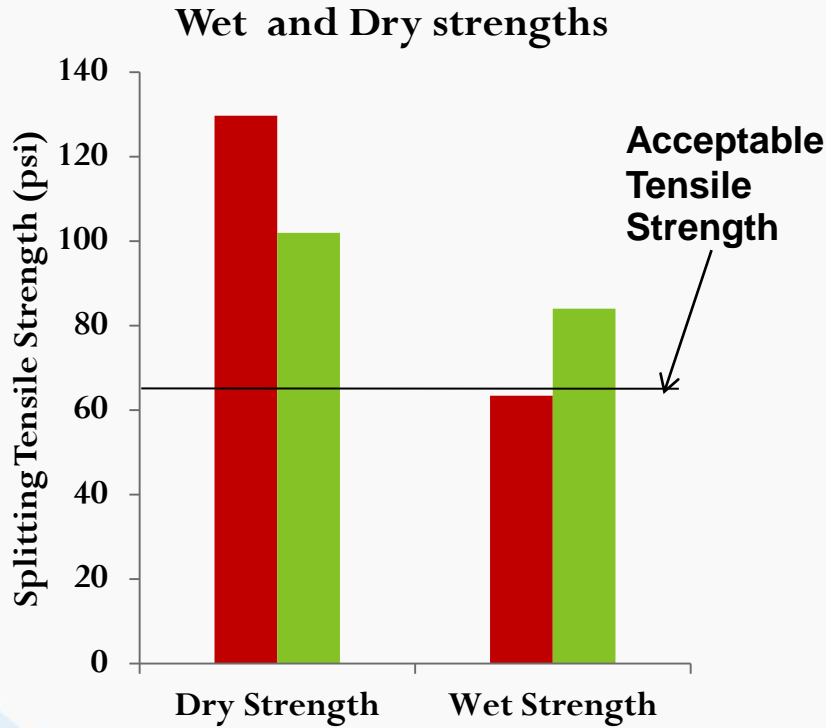
Superpavemix 9.5 mm NMA5 designed using PG 67-22 binder and moisture susceptible crushed Granites, tested as per AASHTO T323-07 & AASHTO R35-09

LOW MIXING & COMPACTION TEMPERATURES



Mixing and Compaction temperatures lower upto 36 °C

HIGHER TENSILE STRENGTH RATIOS, AASHTO T283



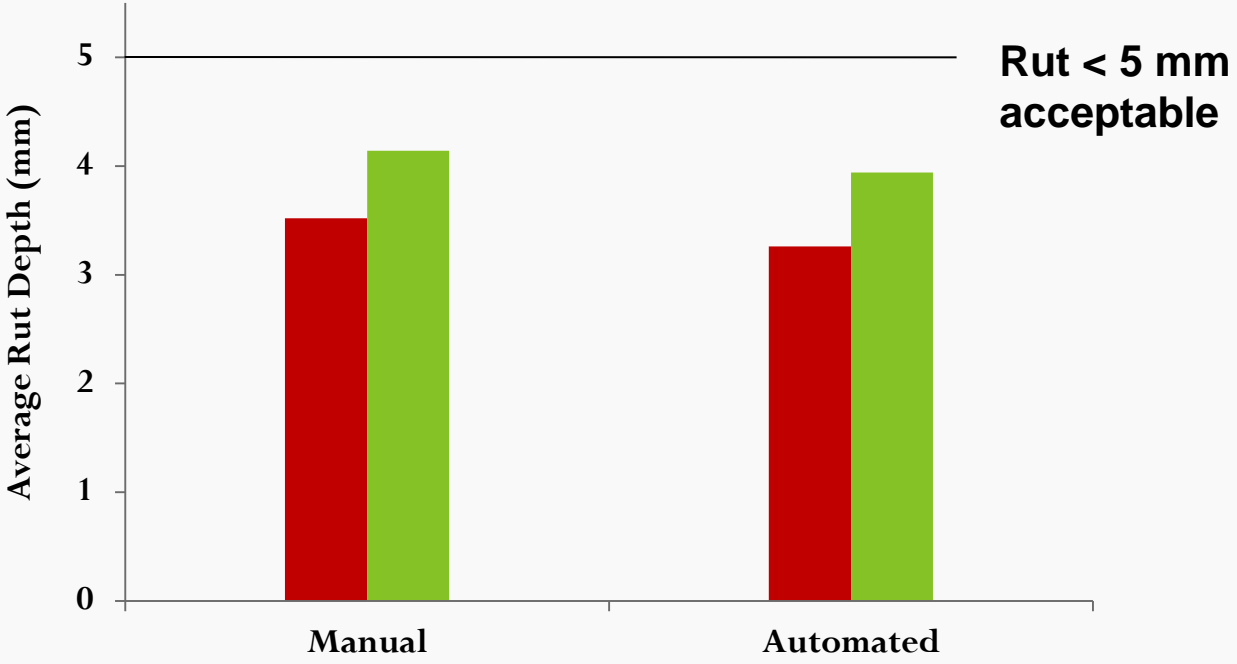
■ * HMA at 135 °C

■ *Zycotherm at 120 °C

*Conditioning for 2hrs



IMPROVED RUT RESISTANCE, AASHTO T340-10



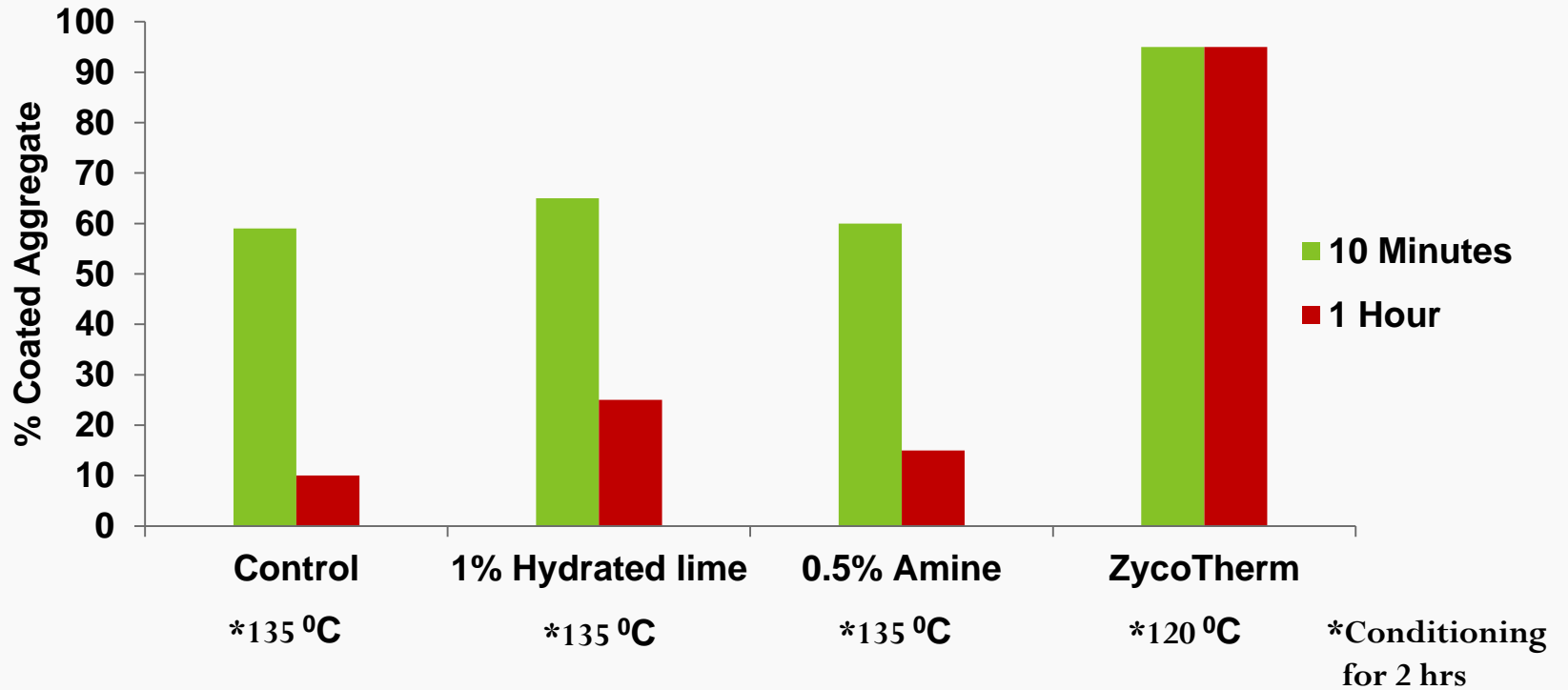
■ * HMA at 135 °C

■ *Zycotherm at 120 °C

*Conditioning for 2hrs



HIGHLY RESISTANT TO SALT ACTION, ASTM D3625 4% SALT WATER BOIL TEST



- ✓ Retains 95% coating as against 15 – 25 % in lime / amines
- ✓ Excellent anti-strip performance

SYNOPSIS ZYCOTHERM BENEFITS

Lower Temperatures

Mixing & Compaction temperatures lower by 36 °C



Improves Moisture Resistance

TSR increased from 0.46 to 0.82



Maintains Rut Resistance (No Significant Drop)

Satisfactory Rut Resistance (< 5mm)



Increases Salt Resistance

Excellent anti-strip, retains 95% coating



DOSAGE AND APPLICATION

- ✓ **Effective at 0.1% for most of the asphalt binders and at 0.125% for Polymer & CRMB binders**
- ✓ **Very Low odor additive, easily blends at the terminal**
- ✓ **Reduces asphalt binder odor by 70-80 % and nearly eliminates white smoke**
- ✓ **Stable for 15 – 30 days**
- ✓ **Non flammable**



Thank you

