



# Field Test Protocol

## NANOTAC

### **Chemically bonded Waterproofing Tack coat**

April 2, 2013

Version 1.0

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## 1 Introduction

- 1.1. Water based bitumen emulsion tack coats when applied are spotty causing high film build up to 300 to 500 micron thickness. The reduced area of load transfer (30 – 40%) causes stresses getting concentrated in the top layer, which leads to premature cracking, fatigue failures.
- 1.2. The stone, stone powder and dust are water sensitive and do not allow a perfect bond to be created between the base layer and the top layer. The water seepages from the top can lead to debonding of bitumen leading to further failure of the tack coat.

## 2 Nanotac tack coat additive

- 2.1. Nanotac from Zydex serves as an excellent reactive bonding additive
- 2.2. Nanotac is water soluble and easily mixes into asphalt emulsion ensuring trackless tack coat.
- 2.3. Nanotac solution in water is neutral and odorless.
- 2.4. Nanotac reacts with the aggregates and changes their surface to make them asphalt loving. This creates permanent affinity between the asphalt binder and the aggregate and reduces the moisture susceptibility of the tack layer.

## 3 Dosage of Nanotac

- 3.1. Nanotac additive is always to be mixed in water followed with Bitumen Emulsion as follows:
  - 3.1.1. 83.1% Water
  - 3.1.2. 0.9% Nanotac
  - 3.1.3. 16.0% bitumen emulsion (60% active solids)

## 4 Mixing and Storage

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- 4.1. Nanotac can be mixed in the above proportion in the tank at site or it can be mixed in the emulsion at the plant.
- 4.2. The mixing can be achieved by simply circulating the emulsion within the tank. Take water and add Nanotac and mix it, after it is dissolved which will be very easy, start adding bitumen emulsion.( For Anionic emulsion rapid setting type if used test its stability.) rest of the cationic and slow setting anionic are easy to work with.
- 4.3. Nanotac Mix so prepared can be stored for up to 7 days. Diluted tack will always show settling tendency but it will be stable. Recirculate and add 0.5% Nanotac to freshen up the reactive performance of the tack solution.

## 5 Spraying

- 5.1. Nanotac mixed tack can be sprayed using the same equipment that is used for conventional Tack. There is no need for any special equipment. On cold days between 0 – 10 °C use 40-45 °C temperature.
- 5.2. Spray rate recommended for new & old HMA surfaces 600 – 700 ml per sqm and for Milled surface is 1200 - 1400 ml per sqm.
- 5.3. Nanotac recommended spray rate is typically 1.5 to 2 times the conventional spray rate used for 40 to 60 % bitumen containing tacks. Nanotac formulation will spray finer, giving higher number of droplets and spreading more efficiently on the surface and help the tack to penetrate.
- 5.4. The higher spray rate ensures 40 – 90 micron film of bitumen deposited on HMA / milled surfaces. This results in complete black surface which would be chemically bonded, waterproofed and will not track within 15 – 20 min of application due to excellent bonding of the tack to the base surface and penetration and full wetting.
- 5.5. Nanotac mixed tack coat ensures a thinner tack layer and 100% surface coverage leading to seamless stress transfer & eliminating slippage issues. This reduces the cracking and eliminating fatigue related failure in the top asphalt layer.

## 6 Field Tests

- 6.1. Almost elimination of tracking and uniform black look & 100% coverage are key indicators of a well bonded tack coat.
- 6.2. To test the waterproofing properties of Nanotac allow the water in the sprayed tack coat to completely evaporate. This may take 30 – 120 min on a sunny day. After that water can be poured on the sprayed surface to see that it does not get absorbed.
- 6.3. Note that laying of HMA does not have to wait for the Tack Coat water to evaporate completely. It can begin sooner. The water in the tack coat will find its way through the voids in the HMA layer as long as tack applied is well bonded.
- 6.4. In case the lab is available to carryout pull test then a core can be cut after 15 – 20 days and sample can be subjected to pull test to confirm that the bond strength is more than 100 PSI or 0.69 MPa

## 7 Other Benefits

- 7.1. Nanotac eliminates nozzle clogging and lowers the heating temperature required
- 7.2. Nanotac quick sets in 15 min for quicker construction of busy city and highway roads

### Annexure A: Field Test Record

Record for Testing of Nanotac as a Chemically bonded waterproofing tack Coat						
Date		Test #				
Contact Information						
Laboratory / Company				Phone		
Address						
Tested by				Cell		
Email						
Basic Test Information						
Description	Value	Mix	%	Description	Value	
Emulsion Supplier		Water		Total Tack volume (Liters)		
Emulsion trade name		Nanotac				
Cationic?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Bitumen emulsion				
Spraying equipment used						
Spraying Technique Description						
Observations with respect to currently used material						
#	Observation	Excellent	Good	Average	Bad	Poor
1.	Uniform spray pattern	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.	Complete coverage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.	Setting time				Min	
4.	Relief in nozzle clogging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5.	Waterproofing effect	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.	Bonding with HMA layer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.	Any other observations					