



# Laboratory Test Protocol

## ZycoTherm

### Mixing Protocol

November 2, 2012

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## 1 Quality Check before you Begin

- 1.1 Always start testing programs with ZycoTherm samples from fresh bottles. Older samples, particularly those from previously opened bottles, may have been exposed to moisture.
- 1.2 Turbidity or higher viscosity of the sample indicates exposure to atmospheric moisture. To ensure sample health, dilute 1 ml of ZycoTherm with 10 ml of potable or de-ionized water. Solutions of usable samples would remain clear or translucent without turbidity.
- 1.3 A whitish or turbid solution necessitates taking a fresh sample from an unopened bottle.
- 1.4 Store ZycoTherm between 4 and 40°C (40 and 104°F). If the product freezes, place it at room temperature to thaw. For further queries, contact a Zydex representative.



## 2 ZycoTherm Benefits: Importance of Mixing

- 2.1 ZycoTherm has a positive effect on mixing, workability and compaction of warm mix asphalt (WMA). Its superior aggregate wetting and coating properties, ensures uniform binder film thickness and better lubrication of the warm mix. This leads to improved compaction under the same load or compactive effort both in the laboratory and field.
- 2.2 Addition of ZycoTherm to the mix results in lower VMA and air voids, indicating a need to lower the optimum binder content. Thus, when using ZycoTherm-mixed binder it is recommended to redetermine the optimum binder required for the given gradation of the mix.
- 2.3 Also, the dosage of ZycoTherm is significantly lower compared with other warm mix additives.
- 2.4 Proper mixing and stirring of ZycoTherm in asphalt binder is critical in order to realize these benefits.

## 3 Dosage of ZycoTherm

Dosage of ZycoTherm can vary between 0.05 and 0.15 % by weight of the asphalt binder used. The specific gravity of ZycoTherm is 0.97. In case an accurate weighing balance is unavailable, usage of 1ml instead of 1 gram of ZycoTherm should be acceptable.

## 4 Apparatus

- 4.1 A dry and disposable 1 or 5 ml syringe to add drops of ZycoTherm in molten asphalt binder

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4.2 A mechanical stirrer capable of producing a 20 to 30 mm deep vortex in molten asphalt

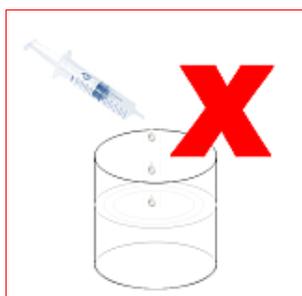
## 5 Mixing Procedure

5.1 Set the stirrer speed high enough to create a 20 to 30 mm deep vortex before mixing ZycoTherm in molten asphalt binder at 150°C (302 °F).

5.2 Add ZycoTherm to the center of the vortex at 10 drops per minute while maintaining the stirrer speed. *(Assuming a dosage of 0.1 % by weight of asphalt, adding 1 ml or 1g of ZycoTherm should take approximately 2 minutes for 1000 grams of binder)*

5.3 Continue stirring the ZycoTherm-mixed asphalt binder for 5 minutes to complete the mixing process.

**Caution:** Never add ZycoTherm in a static container of molten asphalt binder. Doing so impedes ZycoTherm’s performance. In case of unusual globule formation or unevenness of asphalt, please contact a Zydex representative.



For queries please write to us at [info@zydexindustries.com](mailto:info@zydexindustries.com) or to Zydex, Inc., 106, Kitty Hawk Drive, Morrisville, NC – 27560, USA