



## State Aid for Local Transportation

April 2016

### WARM MIX ASPHALT – WMA GUIDANCE

In recent years the use of Warm Mix Asphalt (WMA) has rapidly increased across the United States. This is also true for Minnesota. MnDOT and State Aid for Local Transportation support the use of WMA on projects. WMA has been used successfully on both MnDOT and local projects across the state for the past several years.

WMA incorporates a number of technologies which allow asphalt mixes to be produced and placed at lower temperatures than conventional hot mix asphalt (HMA). Conventional HMA is typically produced at temperatures between 280°F and 320°F, while true WMA is typically produced at temperatures between 220°F and 240°F. Any asphalt mixes produced at temperatures of 30°F or lower than typical HMA mixing temperatures, as defined by the supplier is considered WMA. WMA processes reduce the viscosity of the asphalt to provide complete coating of aggregates at lower temperatures and also act as compaction aids when placing the mix. Lower mixing temperatures allow producers to get closer to a fumes-free asphalt mix, lower plant and field air emissions, reduce energy consumption and less radiated heat exposure to workers, equipment and the environment. Production of WMA reduces energy consumption at the plant.

Almost all plants in Minnesota are equipped with water injection foaming systems which produce WMA mixes down to temperatures of about 270°F. When chemical WMA additives (surfactants) are used, mix production temperatures can drop to about 220°F. Evotherm and CECABASETM RT are the two common WMA chemical additives currently used in Minnesota.

Studies show WMA improves mixture durability by reducing production aging of the asphalt because it is not heated to the higher temperatures of conventional HMA. The mixture can be hauled longer distances without the worry of losing mix temperature. WMA allows faster construction of pavements because it is mixed and placed at a lower temperature. As a result, less time is required to cool the mix before the next lift is placed or the finished pavement can be opened to traffic. It is also common to replace the PG 58H-34 binder with 58S-28 binder when using chemical WMA additives because of the lower production temperatures and reduced production aging. Pavement performance is not affected by doing this.

The current MnDOT bituminous specification (2360) allows the use of WMA on all projects. it is considered an acceptable alternative to HMA in Minnesota. When using WMA, the local testing laboratory needs to be aware of its use so that they can adjust their laboratory compaction temperatures. Additionally, the MnDOT Bituminous Office (651-366-5577, [john.garrity@state.mn.us](mailto:john.garrity@state.mn.us)) requests to be notified of any projects utilizing WMA as they are tracking them. If you have any questions regarding this subject please contact:

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## **Frequently Asked Questions about Warm Mix Asphalt (WMA)**

Warm Mix Asphalt (WMA) is a relatively new technology in the United States and in Minnesota. The list of questions below WMA attempts to answer some of the most common questions about this technology.

### **What is Warm Mix Asphalt?**

Warm Mix Asphalt (WMA) is the generic term for any technology (chemical additive or water foaming technique) added to an asphalt mixture that allows the mixing and compaction temperature to be reduced by a minimum of 30°F. It allows the mix to remain workable at lower temperatures which in turn has potential environmental, operational, and performance benefits over traditional hot mix asphalt (HMA).

### **The contractor has approached us (local agencies) about substituting WMA for HMA. Should we use WMA on our project?**

MnDOT and SALT support the use of WMA as an alternate to HMA on all projects. If you have long haul conditions between the plant and your project or expect to be paving in cooler weather, WMA would be a good choice.

### **Can I use different PG asphalt when switching to WMA from HMA?**

Yes. If the WMA is produced at a significantly lower temperature (<250°F) than HMA, aging of the asphalt caused by heating is minimized. It is common practice to replace PG 58H-34 with PG 58S-28 without affecting pavement performance.

### **Should we pay an additional cost for warm mix?**

The use of WMA may add some cost per ton of mix produced. However, as WMA becomes more commonly used, the price differential should be reduced. Agency bids for WMA using 58 -28 versus HMA using 58 -34 have come in slightly lower in cost. Agencies should not pay any additional cost if WMA is proposed after the project has already been let.

### **Are there any pavement performance issues with WMA?**

The oldest WMA projects in the US are about 12 years old. Premature rutting and moisture damage are items of concern. WMA projects being observed have shown none of these distresses to date.

### **With the increased use of RAP and/or shingles, are we getting complete blending between the recycled and virgin binders?**

A recently completed national study showed through laboratory testing that WMA including 25% RAP did achieve adequate blending. However, at high percentages of RAP or RAS and at low production temperatures blending is still a concern.

### **Are there any different procedures required for QC/QA testing?**

Aside from using lower lab compaction temperatures (recommended by the Contractor or WMA supplier), there should be no differences in laboratory test procedures between WMA and HMA.

### **How do I perform a WMA mix design?**

For mixtures with binder absorption less than 1%, WMA technology may simply be "dropped in" to an approved HMA mix design.

### **Can modified binders be used with WMA?**

WMA has been successfully produced using modified binders (polymers, PPA, etc.).

