



Warm Mix Asphalt

WHAT IS IT?ⁱ

Warm Mix Asphalt (WMA) is the generic term for a variety of technologies that allow asphalt mixtures to be produced, transported, placed, and compacted at lower temperatures. WMA technologies typically result in temperatures 30 to 75 degrees Fahrenheit lower than traditional hot-mix asphalt (HMA). Because less energy is needed to heat the asphalt mix, in many cases, less fuel is required to produce WMA. Fuel consumption during WMA production may be reduced by 20 percent with proper production plant modifications. It is a proven technology that can:

- Improve compaction that improves pavement performance.
- Reduce fuel or energy usage.
- Improve worker comfort by reducing exposure to higher temperatures, fuel emissions, fumes, and odors.



In addition, WMA technologies allow asphalt mixtures to be hauled longer distances and can extend the paving season due to WMA's ability to maintain workability at lower temperatures. The proper use of WMA may result in reduced overall paving costs.



WMA technologies enhance mixture workability through the addition of additives (organic, chemical, water-based, or hybrids). Asphalt mixtures are primarily composed of aggregates and asphalt binder. Aggregates are hard materials such as crushed stone. Asphalt binder is a dark brown to black, sticky liquid that holds together the aggregates when mixed. Some WMA technologies work by reducing the viscosity, which increases the ability to flow or pour the asphalt binder. This allows the aggregates to be properly coated with asphalt binder at lower temperatures. WMA also improves workability during construction allowing the mixture to be properly transported, paved, and compacted at lower temperatures. Proper compaction provides increased pavement density and is necessary for pavement performance.

WARM MIX ASPHALT IN OHIO

The Ohio Department of Transportation's Office of Materials Management has established



specifications for Warm Mix Asphalt (WMA). The specifications set forth the foaming method to be used when WMA is made for Ohio, as this method only utilizes water instead of other costly additives – making it more cost effective and ecologically friendly.

Since the adoption of WMA specifications in 2008, approximately 33% of all asphalt on ODOT projects has gone down as WMA. This

technical update includes the details from sections 402.09, 401.05 and 441.09 (C) 1st paragraph (quality control) from the ODOT specifications.

For additional information regarding the Safety Edge technique, please contact Ohio LTAP [614-387-7358, 877-800-0031, or email:

ltap@dot.state.oh.us] or ODOT's Office of Materials Management [614-275-1387].

Ohio Department of Transportation Materials Section: Warm Mix Asphalt Specifications

402.09 Water Injection System for Warm Mix Asphalt. ⁱⁱ

When allowed by specification use a Department approved water injection system for the purpose of foaming the asphalt binder and lowering the mixture temperature. Only use equipment that has been proven stable and effective thru project use on non-ODOT projects. Ensure equipment for water injection meets the following requirements:

1. Injection equipment computer controls are in the plant control room and are tied to the plant computer metering.
2. Injection equipment has variable water injection control controlled by the plant operation rate and the water injection can never exceed 1.8% by weight of asphalt binder.
3. Water injection rate cannot be manually overridden by the plant operator once in the computer.
4. Injection equipment stops water flow when a control or equipment failure in the injection system occurs.
5. The water injects into the asphalt binder flow before the asphalt binder spray hits aggregate. Do not allow water to touch aggregate before the binder spray.
6. Injection equipment includes water storage and pump control tied to the injection computer controls.
7. Water storage low water alarm installed in the control room.
8. Provide a PG binder sampling valve between the last piping tee on the tank side of the line and the injection equipment to sample PG binder before water is injected.
9. Provide a PG Binder sampling valve at the injection equipment to sample binder prior to spray.



401.05 Mixing Plants. ⁱⁱⁱ

The Department will approve mixing plants before preparation of the mixtures. General requirements for asphalt concrete mixing plants are specified in Item 402.

Set the asphalt binder controls for the computerized plant at the virgin asphalt binder content of the JMF at all times unless change is authorized by the Laboratory.

Asphalt mixtures may be produced using the warm mix asphalt method according to 402.09 except as restricted by specification.

441.09 (C) Air Voids and MSG. ^{iv}

Determine the air voids of the asphalt concrete by analyzing a set of compacted specimens and a corresponding MSG determination. Use the MSG to calculate the air voids of the compacted specimens. Ensure that the cure temperature and specimen compaction temperature are the same. Use a 1-hour cure for all mix samples used in voids analysis. The Contractor may use a 2-hour cure time if voids are consistently near the low void warning band. In this case, use the 2-hour cure for all voids testing through the remainder of the project. For hot mix asphalt use the JMF lab compaction temperature. For warm mix asphalt according to 402.09 use a lab compaction temperature 30.0 °F (16.7 °C) less than the JMF lab compaction temperature for hot mix asphalt. Use a compaction temperature tolerance of +/- 5.0 °F (3.0 °C). Record on the TE-199 if the mixture produced was ran at the asphalt plant as a hot mix asphalt (HMA) or as a warm mix asphalt (WMA) produced according to 402.09 or another approved method.

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ⁱ Copied in whole from the Every Day Counts FHWA program website, available at:
<http://www.fhwa.dot.gov/everydaycounts/summit/asphalt.cfm> (Last visited 3/17/2011).

ⁱⁱ Available on line at:
<http://www.dot.state.oh.us/Divisions/ConstructionMgt/OnlineDocs/Specifications/2010CMS/400/402.htm>
(Last visited 3/22/2011).

ⁱⁱⁱ Available on line at:
<http://www.dot.state.oh.us/Divisions/ConstructionMgt/OnlineDocs/Specifications/2010CMS/400/401.htm>
(Last visited on 3/22/2011).

^{iv} Available on line at:
http://www.dot.state.oh.us/Divisions/ConstructionMgt/OnlineDocs/Specifications/2010CMS/400/441.htm#a_441_09 (Last visited 3/22/2011).