

# WARM MIX ASPHALT (WMA)

Warm Mix Asphalt (WMA) is the generic term for a variety of technologies that allow producers of Hot Mix Asphalt (HMA) pavement material to lower temperatures at which the material is mixed and placed on the road. It is a proven a technology that can:

- Reduce paving costs.
- Extend the paving season.
- Improve asphalt compaction.
- Allow asphalt mix to be hauled longer distances.
- Improve working conditions by reducing exposure to fuel emissions, fumes, and odors.

## Lower temperatures, lower costs, more opportunities.

WMA production methods use temperatures 30 to 120 degrees Fahrenheit lower than traditional hot-mix asphalt. Because less energy is needed to heat the asphalt mix, less fuel is needed to produce WMA. Fuel consumption during WMA manufacturing is typically reduced by 20percent.

In paving projects, the greater the temperature difference between the asphalt mix and the outside temperature, the faster the mix cools. Since faster cooling effects durability, cold ambient temperatures adversely affect hot-mix asphalt. Relative to HMA, WMA cools more slowly allowing WMA to be successfully placed in lower temperatures. As a result, WMA extends the paving season. It also makes night paving more feasible.

Additionally, WMA saves time in production as well as in surfacing roads. Because WMA makes compaction easier, cost savings are achieved by reducing time and labor spent compacting the mix. Lower temperatures also permit more asphalt mix to be hauled for longer distances, reducing transportation costs.

**How does it work?** WMA technologies reduce the viscosity (the thickness) of the asphalt binder so that asphalt aggregates can be coated at lower temperatures. The key is the addition of additives (water-based, organic, chemical, or hybrids) to the asphalt mix. The additives allow the asphalt binders and asphalt aggregates to be mixed at the lower temperatures. Reducing the viscosity also makes the mixture easier to manipulate and compact at the lower temperature.

## Better performance

Proper compaction is critical to well-performing pavements. One indication of proper compaction is density. Achieving proper density is important because most asphalt paved Federally-funded highways are accepted based on their density. WMA is a

compaction tool that can help achieve proper density and improve pavement performance goals.

WMA is also versatile. It has been used successfully in a range of pavement thicknesses. It is durable enough to withstand high traffic demands. WMA has been used in all types of asphalt concrete: dense-graded, stone matrix, porous, and mastic asphalt. Multiple WMA technologies are available, so the choice can be adapted to the temperatures and materials required.

Warm-mix asphalt has been used successfully in Europe for more than 10 years. In the United States, WMA projects are now in more than 40 States.

## Good for workers, good for the environment.



Working conditions are much healthier with WMA. Both at the production plant and on the construction site, workers inhale far less smoke and dust. This reduction is particularly important in tunnels, where ventilation is reduced. Comments from workers have been highly positive. According to Brad Neitzke, a Materials Engineer for the Federal Lands Highway, a Division of FHWA, "Certainly, warm-mix improved working conditions at the paving site. The crew's first reaction was to say, "There's no smoke!"

WMA also produces fewer emissions, making it possible for paving to be done on some days when the air quality would typically put a halt to paving. A State transportation official recently attested that "On non-attainment days, when the air quality is bad, we often get shut down and are unable to pave. But with warm-mix [asphalt], because the emissions are reduced, we might be able to pave even on days when the air quality is not the best."

**Internationally recognized.** WMA is clearly an important technology for the 21st century. The World of Asphalt's "People, Plants, and Paving Training Program" focused attention to WMA, with multiple sessions at its 2010 conference. At least 14 State

Highway Agencies have adopted specifications to accommodate WMA, and more than 40 States have roads paved with WMA. This green technology is increasing the quality of our roads and our environment.