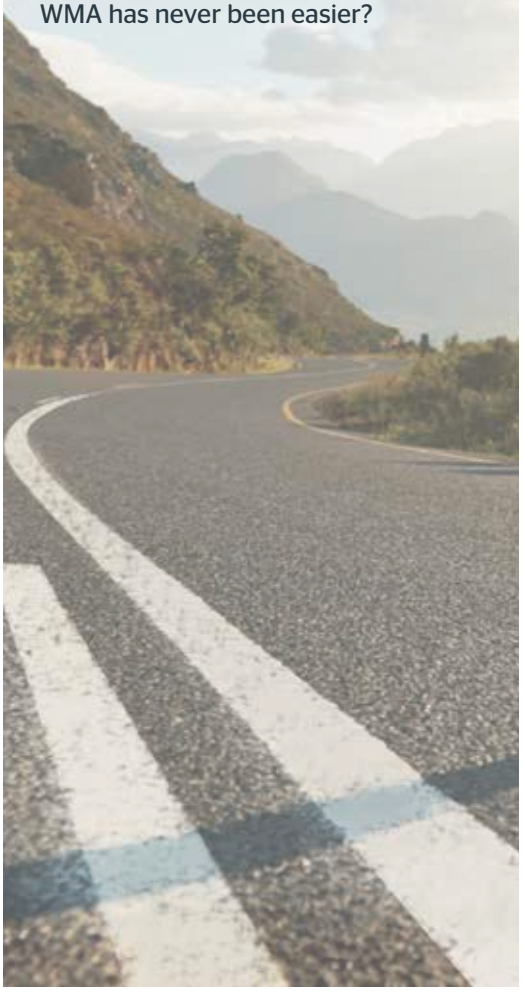
Getting Started with Evotherm®.

EVOTHERM
WARM MIX ASPHALT TECHNOLOGY

Getting started with Evotherm is easy. You can pave at temperatures 60 to 90 F lower than conventional HMA. Evotherm is designed to allow the production and compaction of high-quality asphalt pavements at much lower temperatures.

Over 300,000 miles of Evotherm have been paved around the world on all types of asphalt pavements. Ingevity's technical service engineers work with plant and field lay-down crews, assisting with everything from mix design to rolling patterns. Have we mentioned that getting started with WMA has never been easier?



At the Mix Plant

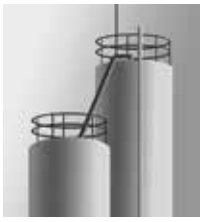
1. Warm up the mix plant to normal production temperatures. This ensures that the plant's material handling equipment is at appropriate operating temperatures.
2. Begin WMA production and gradually lower the mix temperature to within 10 F of the WMA target temperature.
3. Monitor conveyor and mixing motors for power demand. If indicators of power demand rise above acceptable levels, take appropriate action. Eg. Raise the mix temperature or divert material.
4. Visually monitor coating of the aggregate at the bottom of the drag slat conveyor or at the pug mill discharge. If visual evaluation shows less than 95 percent coating, slightly increase the mix temperature to achieve more than 95 percent coating.
5. Monitor baghouse temperatures and maintain above the dew point (typically over 180 F).

Working with Evotherm	Unmodified Asphalt	Polymer Modified Asphalt
Dosage rate (by wt% total asphalt binder)	0.25–0.50%	0.30–0.75%
Mixing temperature range	>220 F (>104 C)	>235 F (>118 C)
Initial (breakdown) compaction range	>210 F (>99 C)	>220 F (>104 C)
Finish rolling compaction range	>140 F (>60 C)	>150 F (>66 C)

Delivery Options

At the Asphalt Terminal

Evotherm can be premixed at the asphalt terminal by a liquid asphalt supplier and delivered ready-to-use.



At the Mix Plant

Bulk Evotherm can be delivered directly to the asphalt mix plant. An existing tank (eg. one used for antistrip) can store bulk Evotherm. Ingevity can also provide isotainers or vendor-managed inventory.

Just Getting Started

Evotherm is available in intermediate bulk-storage units. Add a port to the asphalt cement line or weigh hopper to start making WMA.

In the Quality Control Lab

One hallmark of Evotherm is its ease of use in the quality control lab. Ingevity can supply sample quantities of Evotherm that can be dropped into standard job mix formulations (JMFs).

Dosage

Minimum production and compaction temperatures can be determined in the lab by producing and compacting mixes using the JMF over a range of temperatures. This approach identifies a range of production and compaction temperatures where a given Evotherm dosage gives 100 percent coating to a mix having target air voids at N-design. The range of production and compaction temperatures provides a starting point in field operation at the mix plant.

Evotherm dosage typically ranges from 0.25 to 0.75 percent by weight of total binder. Emphasis is placed on total binder because the Evotherm dosage is calculated based on the total binder in the mix; that is the sum of virgin binder plus binder derived from recycled materials, such as reclaimed asphalt pavement (RAP) or recycled asphalt shingles (RAS).

Visit evotherm.com to use Ingevity's Evotherm dosing calculator for conventional asphalt mixes.

The below equation can be used to calculate the amount of Evotherm required for mixes that include RAP.

For Example

Consider a mix with a target Evotherm chemical additive dosage of 0.5 percent by weight total binder. The total binder content of the mix is 5 percent but 0.8 percent of the binder comes from RAP added to the mix.

Working with recycled materials.

$$\frac{(\%\ \text{Target Evotherm Dosage}) \times (\%\ \text{Total Asphalt Binder})}{(\%\ \text{Total Asphalt Binder} - \%\ \text{Binder from Recycled})} = \%\ \text{Adjusted Evotherm Dosage}$$

In this example:

$$\frac{(0.5) \times (5)}{(5 - 0.8)} = 0.595 \approx 0.6\%\ \text{Adjusted Evotherm Dosage Rate}$$

Mechanical Performance Testing

The following AASHTO R-30-compliant procedure is recommended when conditioning materials for performance testing:

1. Loose Evotherm mix is placed in a pan to an even thickness 1 to 2 inches deep.
2. The loose mix is conditioned in a forced-draft oven for 4 hours +/- 5 minutes at the field compaction temperature.
3. The conditioned mix is placed in a compaction mold, heated to the field compaction temperature, and subjected to the specified N-design gyration (or blows per side if using a Marshall design).

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