

SmartMIX™

Next-Generation Technology for Rubberized Asphalt



PROCESS DESCRIPTION AND USAGE GUIDE

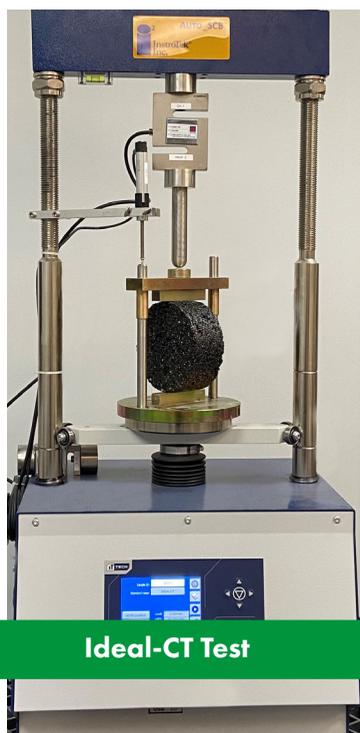
About SmartMIX™

This material uses a Reacted Rubber Particle Technology which is a process similar to the “wet process” for Asphalt Rubber and Performance Graded rubberized asphalt binders with regard to reaction/mixing temperatures and time. With SmartMIX, a finer grind (20 minus or smaller) rubber is reacted with asphalt extender oils using a time and temperature treatment to create a fully reacted rubber particle. The reacted rubber particles are coated with a flow agent so that the material can be packaged in bulk bags and delivered directly to the mix plant for ease in handling.

SmartMIX™ works very well in Balanced Mix Designs, and is effective in reducing cracking and rutting. The oil in SmartMIX™ along with the carbon black and ultra violet inhibitors already in the tire rubber provide for a longer lasting darkened color in the mix, providing superior contrast with pavement markings.

The added flexibility and durability in the asphalt mix that comes with SmartMIX™ makes the pavement last longer, delaying maintenance and extending the pavement life cycle.

Note - Due to the reacted oil content in the SmartMIX™ process, the rubber does not modify binders with respect to standard binder property tests such as viscosity, softening point, resilience, penetration or PG tests. End product mix tests are used to demonstrate the added value of SmartMIX™.



Ideal-CT Test

How it is Used

With the SmartMIX™ process the rubber is pre-swelled and pre-reacted so that it can be introduced into the asphalt mixture, immediately, no additional reaction time is needed. Also, because the rubber is pre-reacted, SmartMIX™ does not absorb any of the valuable maltenes from the binder; therefore, extra binder is not needed with the exception of the film coating on the rubber additive when it is in the mix. The SmartMIX™ will demonstrate a lower viscosity than standard wet processed rubber mixes with improved aging properties and greater workability. A slight change is recommended to standard dense graded mixes, of 1% or less to the number 8 fine aggregate or an 1% increase in the number 4 to make sure the room is made for the additional fine material. Some mix producers have not needed to make any changes to standard dense graded mix designs. The use of manufactured sand is recommended instead of natural sand.

Typical Use

SmartMIX™ is typically introduced into the mix through the RAP collar and is added at about 10-12 pounds per ton of mix, or about 10% by weight of the binder for Superpave or Dense Graded mixes. If more performance and reflective crack resistance is needed, a high dosage of SmartMIX™ is required. A dosage such as 20% SmartMIX™ by weight of the binder work best in gap grade or open grade mixtures. For dense graded mixes with RAP contents above 15%, a 12 pound dosage is recommended.

The material is engineered to provide elevated performance similar to polymer or rubber modified binders, but with the convenience of adding the rubber directly to the mix through the RAP collar. SmartMIX™ can provide a cost effective alternative to achieve modified mix requirements. Performance engineering designs or Balanced Mix Designs that include a rutting test, such as Hamburg, and and cracking tests such as an Overlay Tester, Semi-circular bend (SCB), IDEAL-CT or, I-FIT, are recommended. The testing data should be comparable to other rubber or polymer mixes that are commonly used by the owner/agency.

Photo Courtesy:
Blankenship Asphalt Tech and Training

PRE-SWELLED RUBBER SPECIAL PROVISION FOR USE WITH HOT MIX ASPHALTIC CONCRETE CONSTRUCTION SPECIFICATIONS

A pre-swelled recycled tire rubber modifier will be used as a portion of the asphalt mix design in order to provide improved mix characteristics such as reduced cracking, increased fatigue resistance, reduced load deformation and reduced moisture damage. A portion of the fine aggregate, equal to the amount of rubber may be removed for best results in dense graded mixes. Comparative mix tests may be required by the engineer for a pre-swelled rubberized mix with a standard non-modified mix of similar design to demonstrate the effect of rubber modification. The recycled tire rubber will comply with an ASTM 20 minus specification and be dry, free of visible debris or other contaminants prior to the treatment, processing and swelling. The recycled tire rubber will be treated in a way to improve the workability of the rubber modified asphalt during handling, placement and compaction. Rubber will be added to the asphalt mix at a rate equal to 10%, +/- 2% of the weight of the liquid binder included in the specified mix design. The rubber content shall be determined by the engineer.



Pre-Swelled Rubber Supply System



Pre-Swelled Rubber Supply System

When pre-swelled rubber is required as a mixture ingredient:

- A.** Use a separate feed system to store and proportion by weight the required quantity into the mixture with uniform distribution.
- B.** Control the feeder system with a proportioning device that meets these Specifications:
 - Is accurate to within ± 10 percent of the amount required.
 - Automatically adjusts the feed rate to maintain the material within this tolerance at all times
 - Has a convenient and accurate means of calibration
 - Provide in-process monitoring, consisting of either a digital display of output or a printout of feed rate, in pounds (kg) per minute, to verify feed rate
 - Interlocks with the aggregate feed or weigh system to maintain the correct proportions for all rates of production and batch sizes
- C.** Provide flow indicators or sensing devices for the rubber system and interlock them with the plant controls to interrupt the mixture production if rubber introduction fails or if the output rate is not within the tolerances given above.
- D.** Introduce the rubber as follows:
 - When a batch type plant is used, add the rubber to the aggregate in the weigh hopper. Increase the batch dry mixing time by 8 to 12 seconds from the time the aggregate is completely emptied into the mixer to ensure the rubber is uniformly distributed prior to the injection of asphalt cement into the mixer.
 - When a continuous or drier-drum type plant is used, add the rubber to the mixture through the Reclaimed Asphalt Pavement collar and uniformly disperse prior to the injection of asphalt cement. Ensure the rubber will not become entrained in the exhaust system of the drier or plant.



For questions about SmartMIX, please contact our technical support representative:

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