

## LAB & FIELD VERIFICATION OF ECR CONTENT (%)

When Engineered Crumb Rubber (ECR) is used as a mix modifier, regulatory agencies and quality engineers will want to have one or more methods for verifying rubber content in mixes. This technical note will outline options for verifying rubber content in both lab and plant-produced mixes.

For drum plants, ECR is typically added using a loss-in-weight feeder system. These systems have +/- 2% accuracy that allows for precise addition of ECR. In addition to being precise, these systems log feed data every 15 seconds (interval can be modified) for the entire project. This data is recorded on a card inside the control panel of the feed system. This panel can be locked before the start of the project and then accessed at the end of the project. The data recorded here can then be compared with the total mix production data obtained from the computer system to accurately calculate the percent (%) of ECR.

For batch plants, feed rate accuracy is not an issue, as the weight of rubber (and other materials) is measured as the ECR is fed into the plant. This feed history is recorded by the plant computer control systems.

Additionally, another practical tool for estimating rubber content in a produced mix is through a loss on ignition (LOI) test. ECR will almost completely burn up (oxidize) along with the asphalt binder, leaving behind small amounts of ash. Because ECR particles are small and relatively free of any contaminants, the residual ash content after combustion is relatively small in the 5-8% range.

The loss in weight caused by oxidation of the ECR and binder should conform with the weight

of those two constituents in the JMF, less any correction factors. Ash correction factors can be generated by heating/oxidizing rubber and binder samples to directly generate ash correction factors.

### ECR Residue in Fine Aggregate After Extraction



The solvent extraction units do a really good job of separating the binder from the aggregate and other additives. But, because ECR does not 'melt' into binder, almost all of the ECR will remain with the aggregate after the binder is dissolved and extracted in some units. Therefore, any characterization of the extracted binder will not show modification due to the presence of ECR.

Other extraction units attempt to skim rubber grains from the solvent-binder slurry before the solvent is extracted from the removed binder. This method does a better job of separating rubber, binder and aggregate, but the finer fraction of rubber will still escape the skimmer and end up in the aggregate. Both of these units will *understate* the rubber present in the produced mix. As a result, we do not recommend using these units to measure ECR percent.