



RESPONSIBLE USE OF RE-REFINED ENGINE OIL BOTTOMS (REOB) IN ASPHALT BINDERS

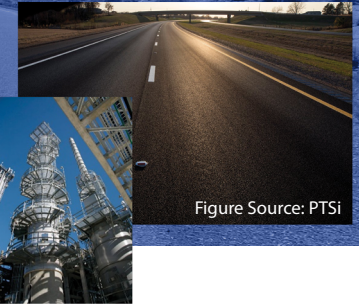


Figure Source: PTSi

WHAT IS REOB?

Residue from the re-refining of waste engine oils, referred to as re-refined engine oil bottoms (REOB) or vacuum tower asphalt extender, has been used as a fluxing agent in asphalt binder blending for more than 40 years. This practice, called “fluxing,” involves blending softer oils, or “fluxes” with a harder asphalt binder to produce intermediate asphalt binder grades for paving.

WHY USE REOB?

The introduction of Superpave performance grade (PG) asphalt binders has led to enhanced usage of REOB as a fluxing agent. This demand is particularly evident in colder climates as softer asphalt binder grades reduce low temperature cracking. Additionally, the trend to use higher levels of reclaimed asphalt pavement (RAP) and reclaimed asphalt shingles (RAS) has further increased demand for softer asphalt binder grades, further driving interest in fluxing agents such as REOB.

CURRENT STATE OF USE

Though REOB has been used as a blend component in asphalt binder production for several years, some State Departments of Transportation (DOTs) have expressed concern with pavement durability and may restrict its use. In a 2022 review, five State DOTs were found to allow or limit REOB usage, with maximum limits ranging from 5.0 to 8.0 percent. Meanwhile, 31 State DOTs were found to have no usage restrictions on REOB, whereas 14 prohibit its usage.

COMMON CONCERNS

The common concerns regarding the use of REOB are:

- What are the potential adverse effects of REOB on asphalt binders?
- How can the presence of REOB in an asphalt binder be detected?

- How can the amount of REOB used in an asphalt binder be measured?

IMPACT OF REOB ON ASPHALT BINDER

Research conclusions and industry experiences suggest that low dosages of REOB in asphalt binders are innocuous, while higher dosages may be detrimental to the performance of asphalt mixtures. Typical dosage rates, reported by REOB manufacturers, range from four to eight percent to reduce both high- and low-binder PG (AASHTO M 320) as much as one full grade.

State DOTs considering REOB usage in asphalt binders and asphalt mixtures are encouraged to investigate specific materials of interest to establish practical usage limits.

DETECTION AND QUANTIFICATION OF REOB

Instrumental methods are available to efficiently determine the presence and concentration of REOB in asphalt binders. A commonly accepted instrumental analysis method, known as a calibration or standard curve method, can be used to determine the concentration of a substance in an unknown sample by comparing the unknown to a set of standard samples of known concentration. Using this method, several instruments, such as X-ray fluorescence (XRF), are available to detect and quantify chemical elements specific to REOB in asphalt binders.

SUMMARY

Studies indicate that REOB may improve the low temperature PG of an asphalt binder; however, this performance is dependent on the REOB source and dosage in the asphalt binder.

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View cooperative agreement materials:

<https://www.fhwa.dot.gov/pavement/asphalt/coopmaterials/>



Read more about the use of PPA as an asphalt modifier in *Responsible Use of Re-Refined Engine Oil Bottoms (REOB) in Asphalt Binders*, Publication Number FHWA-HIF-23-043, Federal Highway Administration, Washington, DC, August 2023.

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