



TECHNICAL BULLETIN #10

RECYCLEX

SAMI Bitumen Technologies

12 Grand Ave
Camellia NSW 2142
PO Box 163
Granville NSW 2142
Australia
Telephone: 02 9638 0150
Facsimile: 02 9638 4983

Description

Recyclex is a recycling agent which is added to RAP during recycling and is successfully used in both the hot or cold recycling procedures. Recycling is achieved using either hot or cold techniques however the cold process offers certain advantages over hot recycling, such as lower cost, lower energy requirements, preservation of air quality coupled with excellent performance.

Recyclex is a single component system which uses two versions depending on which process is used. Recyclex 60 is used for hot recycling, and Recyclex 60E for cold recycling.

Background

Bitumen can be separated into five groups of components which have chemical similarity. These groups are:

Asphaltenes	A
Polar Compounds	PC
First Acidaffins	A1
Second Acidaffins	A2
Saturates	S

Asphaltenes (A) are solid and have the appearance of coarse graphite powder, black or dark brown in colour. The Polar Compounds (PC), First Acidaffins (A1), Second Acidaffins (A2) and Saturates (S) are called Maltenes and have the consistency and appearance of heavy liquids. Asphaltenes are soluble only in the presence of Polar Compounds. The First and Second Acidaffins act as a medium to disperse the dissolved Asphaltenes, and the Saturates develop the setting characteristics of the entire solution.

The ratio of PC:S must be 0.5 or greater to assure these components will not separate. The ratio of (PC + A1) : (S + A2) should be between 0.2 and 1.2 to ensure good aging properties.

Recyclex 60 and 60E provide selected maltenes to restore the chemical balance of aged bitumen to a stability and durability equal to or better than the original bitumen.

Design Guide

To determine the mix design for RAP four basic properties need to be known.

1. Bitumen content, (%w) determined by extraction
2. Consistency of the bitumen, measured by penetration at 25°C or Viscosity at 60°C
3. Aggregate gradation, determined by sieve analysis
4. Bitumen demand on the aggregate, determined by the calculation

Formula used is:

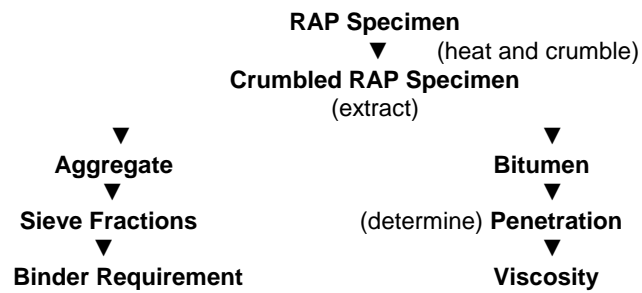
$$P = (4R + 7S + 12F) / 100 \times 1.1$$

Where P = percent of the bitumen in the mix, R = percent of rock in the aggregate (portion retained on the No.8 sieve), S = percent of sand in the aggregate (portion retained on No. 200 sieve), and F = percent of fines in the aggregate (portion passing No. 200 sieve). All percentages are by weight.

SAMI Bitumen Technologies

The total amount of binder in the final mix design (residual bitumen plus Recyclex) must not exceed that amount which would normally be used in a mix design using virgin aggregate and bitumen. Once the mix design has been determined, laboratory mixes should be made and tested using Marshall or other recognised stability test procedure, to ensure that a minimum stability requirement is met.

Flow chart showing the laboratory test procedures



The preparation in determining the binder requirement is essential to the success of the RAP recycling process. SAMI Bitumen's laboratory at Camellia is able to perform this testing regime.

NOTE: Whilst every care is taken in the preparation of this bulletin, no responsibility is accepted for the interpretation of the information contained herein, nor is any warranty expressed or implied for the suitability of the material for a particular purpose.