



PRODUCTS & SERVICES

CAPABILITIES STATEMENT



WE OPEN THE WAY

RETREAD YOUR ROADS WITH CRUMB RUBBER MODIFIED SPRAY SEALS FOR LONGER LIFE.

Rubber derived from end-of-life tyres can be used to improve the performance of your sprayed seals. Rather than dispose of old tyres in landfill, reuse the rubber that contains polymers to modify bitumen for constructing a new spray seal.

Crumb rubber modified binders (CRMB) have been used in spray sealing since the 1970's in VIC and NSW but in recent years its use has become more widespread. It offers the following benefits to society and road asset owners:

- Helps keep old tyres out of landfills and reduces the risk of landfill fires and mosquito borne diseases
- Recycling crumb rubber from old tyres reduces the demand for importing new polymers
- Up to 18% crumb rubber can be used to modify bitumen which reduces the demand for new bitumen to be used in spray sealing
- The carbon black in the rubber acts as an antioxidant making the binder more durable providing a longer lasting seal with lower life cycle maintenance costs
- Allows the new seal to be opened to traffic after rolling and sweeping thereby minimising stone loss and traffic disruptions.

The polymers in the rubber will increase:

- the elastic properties in the bitumen making the seal more flexible and less prone to cracking in cold weather
- the viscosity of the bitumen making it less prone to bleeding in hot weather under traffic

CRUMB RUBBER PARTICLES

The rubber is normally extracted from old truck tyres and mechanically ground into small particles so that it can be blended with hot bitumen. Size 30 mesh crumb rubber particles must meet the grading envelope shown in Table 1. The metal and fibres from the tyres must be removed.

Sieve size (mm)	% mass passing
1.18	100
0.6	60 min
0.3	30 max

Table 1: Typical grading envelope for size 30 mesh crumb rubber particles

CRUMB RUBBER BITUMEN BLENDING

The blending can be done in a factory or in the field near the construction site. The latter largely depends on the distance of the work site from the blending location. The base bitumen must be super-heated before the crumb rubber particles are added so that the rubber can react with the aromatic components in the bitumen. Once the crumb rubber particles have been added, the binder must be allowed to react for up to 1 hour. Once the crumb rubber particles have partly digested in the bitumen, the binder is ready to be sprayed. The crumb rubber particles will continue to digest if maintained at high temperatures. This will result in the softening point, torsional recovery and viscosity properties changing over time.



Mobile CRMB blending plant in operation in the Pilbara region

HANDLING OF CRUMB RUBBER MODIFIED BINDERS

Unlike polymer modified binders, the partly digested crumb rubber particles remain in suspension in the hot binder. Therefore it is necessary to keep the CRMB agitated to prevent the undigested rubber particles from falling out of suspension during storage and handling. This is best done by circulating or stirring the CRMB during storage and transport.

Rubber %	Grade	Use	Polymer factor*
5-10%	S5R & S9R	High Stress Seals (HSS)	1.1
13-15%	S15R	Extreme Stress Seals (XSS) and Stress Absorbing Membranes (SAM) on pavements with low crack activity	Up to 1.3
18%	S18R	Stress Absorbing Membrane Interlayers (SAMI) under asphalt layers on pavements with high crack activity	Up to 1.4

Table 2: Selection and use of different grades of CRMB's

*When spraying crumb rubber modified binders the application rate can be increase over and above C170 bitumen by these factors



LV S15R being sprayed by the OB Vario synchronised sprayer and spreader

SELECTION AND USE OF CRUMB RUBBER MODIFIED BINDERS

CRMB's are ideal to use for constructing single sized 10 and 14mm reseals because the binder application rate can be increased to improve the stone retention without increasing the risk of bleeding or flushing under heavy traffic in hot weather. This will also render sprayed seals which are less prone to oxidation and cracking thus providing more durable and longer lasting seals. Various percentages of crumb rubber can be added to C170 bitumen for spray sealing applications which are shown in Table 2.

CONSTRUCTION OF CRUMB RUBBER MODIFIED SPRAY SEALS

Due to the higher viscosity of CRMB's, they need to be heated up to 200°C to be able to spray them without adding cutters. The pavement temperature should be a minimum of 25°C and rising before spraying the hot CRMB without using cutters. Conventional sprayers can be used with AN18 or larger nozzles to achieve a uniform binder spray pattern across the pavement. The aggregate must be precoated which helps with the adhesion and rolled immediately after placing. Once the rolling is completed the new seal can be broomed and opened to traffic.

NEW DEVELOPMENTS CRUMB RUBBER MODIFIED BINDER

SAMI have developed new technologies which have allowed Colas and VSA to successfully transport and spray over millions of litres of CRMB across Australia:

- a low viscosity S15R which can be sprayed without having to add cutters to prevent the binder from tram lining
- long haul S18R which can be transported long distances with minimal crumb rubber separation occurring in the road tankers



KEY:

- Spray Sealing
- PMB + Emulsion
- Import Terminals
- Quarry
- Asphalt



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