

## Technical Data

# Effect of MR on Asphalt Moisture Damage Resistance

### Importance to Roads

Most modern asphalt tests are focussed on the early-life performance and characteristics of the mix. However, to provide a cost effective pavement material, asphalt must also be durable. One of the factors that durable asphalt mixes must resist is damage due to moisture, which is commonly known as ‘asphalt stripping’.

Asphalt stripping occurs when water enters the voids in the mix and either cohesively or adhesively separates the bituminous binder from the aggregate particles, usually under load related water pressure. The mix then disintegrates, resulting in unbound aggregate and semi-emulsified bitumen in water.

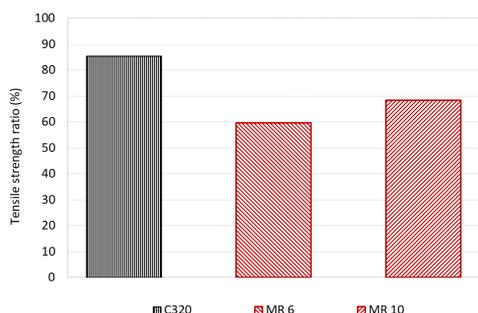
### Methods of Evaluation

The primary test methods for asphalt resistance to moisture damage are ratios between otherwise identical wet and dry, or conditioned and unconditioned, sample properties. The German wheel tracker tests dry and submerged samples. The common Lottman test uses the ratio of indirect tensile strength between unconditioned samples of asphalt and samples exposed to one or more freeze-thaw cycles. The result is a tensile strength ratio (TSR) with a value above 80% considered to indicate good resistance to moisture damage.

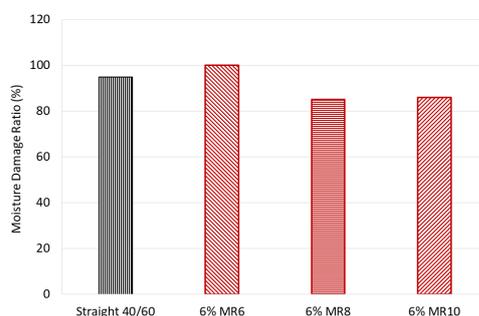
### Effect of MacRebur

MacRebur products should not affect the moisture resistance of asphalt mixes, meaning they will not adversely affect this element of asphalt durability.

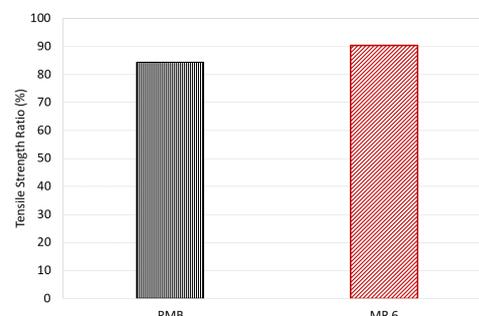
Testing of an Australian, dense graded asphalt showed a decrease in TSR for asphalt modified with MR 6 and MR 10, compared to C320 (like 50-70 penetration grade).



In contrast, testing in the UK showed only slight differences for MR 6, MR 8 and MR 10, compared to 40-60 bitumen, in a commonly used SMA 10 mix.



Similar testing of a dense graded asphalt from Switzerland showed marginally higher TSR for MR 6 than for a common PMB.



Because of the conflicting results and the known high variability of the TSR test, the results were combined and statistically analysed. A paired T-test for the difference of mean TSR ratios indicated that the differences were not statistically significant (p-value 0.15). Consequently, it was concluded the MacRebur products do not significantly affect the moisture damage resistance of common asphalt mixes.

