Safer Sustainable Solutions

Paving EME2 asphalt on the M1 between Brisbane and the Gold Coast

FUTURE PROOF YOUR PAVEMENTS WITH EME2 ASPHALT

EME2 is a structural asphalt designed using performance-based laboratory tests to achieve high strength and flexibility to limit rutting and cracking under heavy traffic loading. EME2 asphalt is manufactured from locally produced hard bitumen and aggregates using conventional manufacturing and laying equipment.

EME2 asphalt was originally developed by COLAS and has been used in France since the 1980's and more recently in Australia since 2014. Local specifications have been developed to ensure that the same mix performance is achieve as the European based specifications. The use of EME2 asphalt in heavy duty asphalt pavements offers the following benefits to society and road asset owners:

Diagram 1: Comparison between the typical pavement design for dense graded and EME2 asphalt base courses

Reduction in construction costs:

a. **Reducing the asphalt thickness** up to 25% compared with conventional dense graded asphalt for the equivalent traffic loading and pavement life.

b. **Can be paved in thicker layers** of between 70 to 130mm which can lead to a reduction in the number of paver runs required.

c. **Eliminating the need to place a waterproof seal** under the wearing course because of its high impermeability to moisture ingress.

d. **Less excavation required** to construct a new pavement because of reduced pavement thickness required for the equivalent strength.

e. Can be used to strengthen an existing pavement **without having to raise existing structures or kerb and channels.**

Reduction in the carbon footprint:

a. **Providing a longer lasting pavement structure** with lower life cycle maintenance costs over dense graded asphalt with the same thickness.

b. **Reducing the demand for bitumen and aggregates** required compared with using dense graded asphalt for the same project.

c. Increasing the propensity to carry heavier axle loadings thus **reducing greenhouse gas emissions** per tonne/km of freight.

d. Rendering the **pavement less susceptible to damage** caused by increases in temperature brought about by extreme climatic events.

Property	Test	Limits
Workability	Air voids after 100 gyratory cycles	Max 6%
Moisture sensitivity	Tensile Strength Ratio	Min 80%
Rutting resistance	Wheel tracking after 60,000 passes @ 60°C	Max 2.0 mm
Strength	Flexural modulus @ 15°C	Min 14,000 MPa
Flexibility	Fatigue @ 20°C ų strain after 1 million cycles	Min 150

Table 1: EME2 performance-based mix design requirements

PERFORMANCE BASED MIX DESIGN

EME2 is designed to meet minimum performance-based laboratory testing requirements which are shown in Table 1. There are no limits specified for the aggregate grading curve or binder content. The latter will depend on the outcome of the mix design process and will vary depending on the aggregate and bitumen sources used. The binder content and gradings of the production mix is monitored against the mix design outputs and allowable tolerances. Because of the extensive testing regime a new mix design can take up to 3 months to complete.

MAKING YOUR ASPHALT PAVEMENTS MORE SUSTAINABLE

Not only will the use of EME2 reduce the construction costs of building new or rehabilitating old pavements, it will also reduce the carbon footprint by providing a stronger pavement using less materials during its life cycle. Up to 15% RAP can also be used which will help further reduce the demand for non-renewable raw materials like bitumen and aggregates. Warm mix technologies can be used to reduce the asphalt mixing temperature, reducing the consumption of energy and generation of greenhouse gasses.

WHAT MAKES EME2 DIFFERENT FROM DENSE GRADED AC20?

EME2 is produced at a higher temperature using a maximum aggregate size of 14mm, with no natural sand and a higher bitumen content between 5.6 – 5.9% which makes it:

- more workable and easier too compact,
- less sensitive to moisture damage so does not require hydrated lime,
- more impermeable to moisture ingress due to lower insitu air voids,
- more flexible, than dense graded AC20.

A special 10/20 or 15/25 hard penetration bitumen is used to ensure that the modulus and wheel tracking requirements in Table 1 are achieved.

EME2 has a smoother surface texture than AC20 so care must be taken to prevent skidding in wet weather if opening the surface to vehicular traffic before overlaying it with a wearing course. In the latter case gritting or restricting the speed limit is recommended.

For further Information

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