# BRISBANE CITY COUNCIL

# REFERENCE SPECIFICATIONS FOR ENGINEERING WORK

# S335 POLYMER MODIFIED EMULSION SURFACE TREATMENT

## AMENDMENT REGISTER

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| --- | --- | --- | --- |
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## General

### Section Content

This section describes the rejuvenation treatment of an existing sprayed bitumen seal or asphalt surface by the application of a sprayed surface treatment consisting of:

* Polymer Modified Bitumen Emulsion (PMBE) containing aggregate and/or fillers, fibres, propriety modifiers and stabilising additives.

### Standards

|  |  |  |
| --- | --- | --- |
| ASTM International Standards | ASTM E303-93 | Standard test method for measuring surface frictional properties using the British pendulum tester |
| Australian Standard | AS 1141.42 | Methods for sampling and testing aggregates – Pendulum friction test |
| Australian/New Zealand Standard, International Standards Organization | AS/NZS ISO 9001 | Quality management systems – Requirements |

### References

|  |  |  |  |
| --- | --- | --- | --- |
| Queensland Department of Transport and Main Roads |  | MUTCD | Queensland Manual or Uniform Traffic Control Devices |
| Queensland Department of Transport and Main Roads | Test Method | Q704 | Skid resistance – portable pendulum |

Refer to the following other Reference Specifications for Engineering Work:

|  |  |
| --- | --- |
| S110 | General Requirements |
| S120 | Quality |
| S310 | Supply of Dense Graded Asphalt |
| S330 | Sprayed Bituminous Surfacing: Materials |
| S336 | Polymer Modified Emulsion Micro-Surfacing Treatment |

### Definitions

Actual spray rate: The spray rate for the PMBE material achieved during the surfacing operation.

Bitumen: A bituminous material obtained by processing the residue from refining certain naturally occurring crude oils.

Bitumen emulsion: A liquid product in which a substantial amount of bitumen (to which some oil may be added) is dispersed in a finely divided condition in water and stabilised, by means of one or more emulsifying agents.

Designated spray rate: The spray rate for the PMBE that is ordered by the Superintendent.

Polymer: A predominantly organic substance comprising a very large number of chemical entities. These chemical entities may comprise identical segments (producing a homopolymer) or a combination of two or more different segments (producing a copolymer).

Polymer modified bitumen: Bitumen containing dispersed polymeric material to give enhanced bitumen performance for particular applications.

Spray run: The area of pavement selected for coverage with PMBE during one continuous operation with a sprayer.

## QUALITY

### Quality System

The supplier must maintain a Quality Assurance System with third party accreditation to *AS/NZS ISO 9001*. The supplier must notify the Contractor or Superintendent within two days of becoming aware that process control tests relevant to the work have fallen outside the specified limits.

### Inspection

Witness points

Give sufficient notice so that inspection can be made of the following stages:

* Surfaces cleaned and prepared for surfacing.
* Masking of pavement markings, fixtures and features.
* Commencement of application of surfacing.

Hold points

Do not proceed without approval of the following stages:

* Polymer Modified Bitumen Emulsion (PMBE) mix design.
* Format and wording of the notice to be given to residents and business owners whose access will be temporally restricted.
* Submission of calibration and approval to commence spreading.

### Tests

General

Methods: Use Australian Standard or Queensland Department of Transport and Main Roads (TMR) test methods.

Testing authority: Use a testing facility registered by NATA for the test required.

Process control testing

Perform sampling and testing of the type and frequency necessary to adequately control the work. Comply with the minimum requirements specified in Reference Specification S120 Quality Clause 8.1.

Compliance assessment tests

General: The Contractor or Superintendent may carry out compliance assessment testing using a testing laboratory registered with NATA for the particular test.

Test lot

A spray run or a series of spray runs applied on any calendar day on the same street. Test lots must be uniform in terms of material properties and spray application rates.

Sampling location: Sample from agreed sample sites within designated uniform test lots.

### Submissions

Mix design and application rate

Submit details of the proposed Polymer Modified Bitumen Emulsion treatment along with supporting evidence of previous satisfactory performance on pavements under Australian conditions.

Samples

On request, submit samples of PMBE (4 L) supplied under the Contract.

Work method statement

Submit the proposed Work Method Statement and testing program at least 14 days prior to the commencement of the works.

Work Method Statement shall detail all methods and equipment to be used for the works, including the following:

* Staging of the work, access and traffic control methods.
* Methods and equipment for each operation.
* Sources of materials.

Test program

Submit details of the inspection and test program covering all specified properties of the materials and details of recent test results demonstrating sustained compliance of similar work with the same properties. Submit the following test information relating to the material to be used and the application rates of the sprayed surface treatment:

* The test methods to be used to assure the quality of its product;
* The sampling frequency necessary for adequate quality control of the material and its application to the roadway surface.

Records of measurement

Requirement: Record all details of the sealing operations on approved bituminous materials spraying record sheets. Calculate actual spray rate for each spray run prior to the next spray run.

Complete a Daily Project Site Return recording plant, equipment, labour, traffic control, times of closure of road and areas of work completed including spraying records showing the actual application rate of the PMBE.

## MATERIALS

General: PMBE Surface Treatment material shall consist of a homogeneous combination of emulsified polymer modified bitumen (60% minimum bitumen content) and added aggregate.

All materials (including sand) are to be thoroughly mixed into Bitumen Emulsion prior to delivery to site. Delivery vehicles shall have devices to ensure that fine aggregates remain in suspension.

### Aggregate

Aggregate shall consist of clean, dry, tough, sound and moderately sharp grains, free of coatings or loose particle of clay, silt or other matter deleterious to bituminous surfacing. Aggregate shall have greater than 100% passing the 2.36 mm sieve with less than 1% passing the 150 micron sieve.

### Filler

Proprietary fillers, fibres, propriety modifiers and stabilising additives may be included provided the added fine aggregate content is not less than 30% by mass of the mixed emulsion.

### Bitumen

Bitumen and aggregate shall comply with the requirements of Reference Specification S330 Sprayed Bituminous Surfacing: Materials.

## MIX DESIGN

### General

Requirement: Manufacture PMBE Surface Treatment to the mix design approved by the Superintendent.

Do not dilute the PMBE Surface Treatment with water or any other substance without the approval of the Superintendent.

Notwithstanding these requirements, the Contractor shall take full responsibility for the mix design, manufacture, supply and placing of PMBE Surface Treatment.

## PLACING

### Traffic Control

Traffic

General: Traffic control shall be undertaken in accordance with the approved Traffic Management Plans and Permits.

Method: Provide for traffic while undertaking the works in accordance with the requirements of *Manual of Uniform Traffic Control Devices (Queensland), Part 3: Works on Roads.*

Public Notification

General: Notify all affected residents and business owners whose access will be temporally restricted by the proposed works. Wording of the notification to be approved by the Superintendent and be in accordance with Council requirements and distributed within approved timelines.

### Plant

General: Provide the required plant necessary for the performance of the particular operation.

Sprayer: Provide purpose built spray equipment capable of spraying PMBE with sand added. Equipment shall have continuous agitation or mixing capabilities to maintain homogeneous consistency of the mixture throughout the application process and be fitted with brush devices behind the spray bar to assure adequate distribution and penetration into the bituminous pavement. The spray bar shall be fitted with shields to prevent over-spray beyond the edge of the pavement.

Sprayer calibration: Prior to commencing spraying, demonstrate that sprayer is calibrated for the materials used.

### Preparation for Spraying

Cleaning

General: Immediately before spraying remove loose and foreign material on the existing pavement surface, including dust, debris, silt, soil, flaking paint and any other deleterious material. Keep traffic off the cleaned surface.

Method: Use suitable power blowers or road brooms, or use hand methods where inaccessible to power equipment.

Crack sealing

Where crack sealing is required, the extent and method to be utilised will be negotiated by the Superintendent.

### Application Rate

General: The application rate is dependent on the pavement condition, porosity, surface texture and age of the asphalt or spray sealed surface. As the surface condition and texture of the existing surfacing is variable, the designated application rates for particular areas of pavement surface shall be agreed between the Contractor and the Superintendent. Unless agreed otherwise, a nominal application rate of 1.0 L/m2 shall apply. Where directed, undertake trial applications to determine the appropriate designated application rate.

Where an application rate of, or greater than, 1.20 L/m2 is ordered, the PMBE shall be applied in two coats (allowing for curing time between coats) with a minimum application rate for any coat being 0.5 L/m2.

### Spraying Operations

Protection

Protect adjacent surfaces during spraying. Protect all raised pavement markers, hydrant and valve covers and other structures by suitable means to avoid splashing or spraying them with PMBE. Mask existing paint markings and other features as required to prevent PMBE from covering these areas (if not masked, paint markings shall be reinstated at the Contractor’s own cost, unless prior approval of the Superintendent is obtained).

Immediately following the drying of the PMBE, remove the protective coverings and dispose off site.

Clean PMBE materials from adjacent surfaces and structures or, if this is not possible, replace and make good the surface or structure.

Protect freshly sprayed surfaces from contamination.

In the event of rain occurring before the PMBE has dried, take all steps necessary to prevent the PMBE from contaminating the surrounding area and associated drainage systems. Any pools of PMBE/water created by the rain shall be removed and disposed in an approved manner compliant with Environmental Legislation.

Reinstate any PMBE washed off the pavement surface due to rain. PMBE application rates and the extent of reinstatement shall be determined by a joint inspection conducted by the Superintendent and the Contractor.

Restrictions

Pavement surface temperature: Do not commence spraying until the ambient temperature is above 15°C and is likely to remain at least at that temperature during all spraying operations.

Weather conditions: Spraying shall proceed only when the pavement surface is dry. Do not spray during rain or if rain is forecast by the Bureau of Meteorology within the following 12 hours. Spraying shall not proceed during periods of strong winds.

Do not proceed with the application unless there is sufficient time for the material to cure before opening to traffic within the specified approved period of road closure.

Minimum period between bituminous treatments: New asphalt surfaces must be at least 28 days old before placing the polymer modified emulsion surface treatment.

Method of application

Apply PMBE by means of the mechanically operated spray bar of a bitumen sprayer. In areas not accessible to the mechanical sprayer, spray using hand spray equipment attached to the mechanical sprayer and spread by squeegee.

Hand brooming may be carried out in localised areas where the machine mounted brooms are not effective or where ponding occurs to ensure an even application and prevent local pooling.

Spraying

General: Completely and uniformly cover the surface to be treated. Prevent the spray overlapping previously treated areas, except that where part width spraying is used, lap the longitudinal joint between adjacent runs by 50 mm. The application is to be uniform both longitudinally and transversely over the whole area.

### Defective Surfacing

Actual rate of application <95% of designated spray rate: Make up the deficiency with a second spray run.

Actual rate of application >110% of designated spray rate: Carry out Portable pendulum skid resistance tests (British Pendulum) tests on wet surfaces in accordance with *ASTM E303-93* or Department of Transport and Main Roads test method *Q704*. Skid resistance measurements to be recorded and presented as a BPN. Subject to Skid Resistance Test results, the surfacing may remain, but will be paid for at the designated application rate.

## CURING

### Time Limitations

General: Select materials and processes to ensure adequate curing occurs so that the direct access to properties is not restricted for more than 4 hours at any one time.

### Traffic on Pavement

Take all necessary precautions to protect the work from damage until such time the PMBE has fully broken and has developed sufficient strength to prevent being picked up by vehicular and pedestrian traffic.