**SECTION 409**

**SEAL COAT**

**409.1 Description.** This work shall consist of placing bituminous material followed by placing cover aggregate material.

**409.2 Material.**  All material shall be in accordance with [Division 1000](../Text/Div1000.xhtml#toc_marker-1), Material Details, and specifically as follows:

|  |  |
| --- | --- |
| **Item** | **Section** |
| Aggregate for Seal Coats | [1003](../Text/Sec1003.xhtml#S1003) |
| Asphalt Emulsion | 1015 |

**409.2.1** All limestone and dolomite shall be either pre-coated as specified herein or fog sealed in accordance with [Sec 413](../Text/Sec413.xhtml#S413). Pre-coating binder shall be in accordance with [Sec 1015](../Text/Sec1015.xhtml%22%20%5Cl%20%22S1015) for PG binder or emulsions.

**409.2.2** Emulsified asphalt or polymer modified emulsions shall be in accordance with [Sec 1015](../Text/Sec1015.xhtml), with the following exceptions:

|  |
| --- |
| **Asphalt Emulsion Requirements** |
| **Tests on Asphalt Bindera** | **Test Method** | **Minimum** | **Maximum** |
| Penetration @ 77°F | ASTM D 5 | 60 | 150 |
| Elastic Recovery @ 50°F, % | AASHTO T 301 | 65 | - |

 aThese tests shall be done on the asphalt residue for emulsions and cutbacks.

**409.3 Job Mix Formula.** The contractor shall submit the mix design to the laboratory for approval no less than two weeks prior to placing the seal coat.

**409.3.1** The mix design shall contain the following information:

 (a) All possible sources intended for use, grade and certified test results for the asphalt binder.

 (b) Source, type (formation, etc.), ledge number if applicable, and gradation of the aggregate.

 (c) The grade and certified test results for the aggregate.

 (d) The application rate used to pre-coat the aggregate as allowed in [Sec 1003](../Text/Sec1003.xhtml#S1003).

 (e) The percent binder application rate, gallons per square yard. The adjustment factor shall be included if specified in the contract plans.

 (f) The aggregate application rate, pounds per square yard.

**409.3.1.1**The generic binder application rates for each aggregate grade, as found in [Sec 1003](../Text/Sec1003.xhtml), shall be:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Grade** | A1 | A2 | B1 | B2 | C |
| **Generic Binder Application Rate, gal/sy** | 0.38 | 0.28 | 0.38 | 0.28 | 0.38 |

**409.3.2** A surface condition, aggregate properties and traffic volume correction may be provided in the plans. When provided, this assessment shall be used to adjust the generic binder application rate to create a target rate for each individual route. The aggregate application rates shall not vary from the mix design by more than ± 5 pounds per square yard.

**409.4 Equipment.** Equipment shall be capable to perform the following:

 (a) Heating and applying bituminous material, measuring temperature of tank contents and continuously verify application rates. The calibration of the system shall be accomplished by the contractor and approved by the engineer prior to use. The contractor shall furnish all equipment, material, labor and supervision necessary to perform this calibration. Equipment shall be calibrated subsequent to any repair that may affect calibration.

 (b) Removal of loose aggregate from applied surface.

 (c) Seating of aggregate without causing aggregate fracture.

 (d) Accurately measuring and uniformly spreading of the aggregate over the full width of the bituminous material and have ability to vary the application width depending upon road width. It shall also be able to have verifiable application rates. The calibration of the system shall be accomplished by the contractor and approved by the engineer prior to use. The contractor shall furnish all equipment, material, labor and supervision necessary to perform this calibration. Equipment shall be calibrated subsequent to any repair that may affect calibration.

**409.5 Construction Requirements.**

**409.5.1 Weather Limitations.** Bituminous material shall not be placed on any wet surface. Seal coat shall only be placed when the ambient temperature and the temperature of the pavement on which it is to be placed is above 60 F. Temperatures shall be obtained in accordance with MoDOT Test Method TM 20.

**409.5.1.1 Forecasted Weather.**No seal coat shall be placed when the forecast from the National Weather Service predicts ambient temperatures falling below 40 F within 24 hours of construction.

**409.5.2 Surface Preparation.** The surface shall be thoroughly cleaned or swept to remove all dirt, packed soil, or any other foreign material prior to spraying the bituminous material.

**409.5.3 Application of Bituminous Material.**

**409.5.3.1** Bituminous material shall be uniformly applied within the temperature range recommended by the manufacturer. Any bituminous material applied on adjacent Portland cement or asphaltic concrete pavements, curbs, bridges or any areas not specified to be sealed shall be removed by the contractor, at the contractor’s expense.

**409.5.3.2** When pre-coating is required, the cover aggregate shall be pre-coated at a minimum rate of 0.5 percent residual asphalt by weight of aggregate.

**409.5.4 Compaction.**All aggregate shall be uniformly seated over the entire area being sealed in a manner which minimizes aggregate loss and prevents crushing of aggregate.

**409.5.5 Dust Control.**The contractor may be required to control dust should airborne dust become a concern, or as directed by the engineer.

**409.5.6 Loose Aggregate.**Loose aggregate shall be removed from curbs, gutters, sidewalks, driveways, and other areas designated by the engineer.

**409.5.7 Traffic Control.**

**409.5.7.1**  During application of the seal coat, the contractor shall control traffic through the work zone by means of pilot vehicles traveling at a maximum speed of 35 miles per hour. The contractor shall designate a responsible person for receiving and resolving damage claims made by the public. This person shall be available by telephone during the contractor's normal business hours Monday through Friday.

**409.5.7.2**  The contractor shall provide contact information signs with their company name and phone number on a variable width by 24 inch tall sign with black lettering on an orange background. The first line shall state “CONTRACTOR” in uppercase 4 inch C highway font, the second line shall contain the contractor name in upper/lower case 4 inch B highway font and the third line shall contain the contractor’s phone number in 4 inch C highway font. Signs shall be posted near the beginning and end of the project limits as approved by the engineer.

**409.6 Quality Control.** The contractor shall control and monitor the quality of the work. A QC Plan will not be required.

**409.6.1 Sample Location.** All samples will be taken from the last stockpile location prior to incorporation.

**409.6.2 Retained Samples.** One half of the contractor’s sample for aggregate gradation and deleterious content shall be retained for the engineer.  The contractor shall retain the samples for 7 days after testing has been completed and the results accepted by the engineer.

**409.6.3 Mixture Gradation.**  The aggregate gradation shall be determined and meet the Sec 1003 requirements.

**409.6.4 Aggregate Deleterious.** The deleterious content of the material shall not exceed the limits specified in [Sec 1003](../Text/Sec1004.xhtml%22%20%5Cl%20%22S1004_2) for deleterious rock, shale, and other foreign material requirements

**409.6.5 Pre-Coating.** When pre-coated aggregate is utilized, the percent residual binder shall be tested and meet the specification requirements. If an ignition oven is used, an aggregate correction factor shall be utilized.

**409.7 Quality Assurance.**  The engineer or designated representative will be responsible for monitoring the work and quality control efforts of the contractor. Results of QA testing will be furnished to the contractor within 24 hours of obtaining the sample.

**409.7.1 Independent QA Samples.**  Unless otherwise stated, a favorable comparison shall be obtained when independent QA samples meet the same specification criteria as QC.

**409.7.2 Split QA Samples.**  No QA split samples are required.

**409.8 QC/QA Frequency Table.**

|  |  |  |
| --- | --- | --- |
| **Tested Property** | **QC Frequency** | **QA Frequency** |
| **Independent Samples** | **Split Samples** |
| Aggregate Gradation | 1 per 5000 Tons | 1 per Project | - |
| Aggregate Deleterious |
| Pre-Coating | 1 per Project | - |

**409.9 Basis of Acceptance.** Acceptance shall be made no less than 14 days from completion of the route. Seal coat will be evaluated for acceptance by the engineer based on the following criteria:

 (a) No location having bleeding of binder in excess of two square feet or a combined area of bleeding greater than 10 square feet on any 50 foot length of two lane roadway.

 (b) No continued or ongoing tracking from seal coat onto other roadways or adjacent driveways.

 (c) No transverse and longitudinal construction joints from the seal coat application that are not straight, create a bump, or produce a poor riding surface.

 (d) Longitudinal construction joints that are straight and contain no gaps.

 (e) No asymmetric appearance stemming from longitudinal grooves or ridges in the surface.

 (f) A pavement treatment having complete aggregate coverage with full adherence to the roadway.

The contractor is responsible for any damage claims that are associated with the seal coat until the route is accepted by the engineer.

**409.10 Method of Measurement.**

**409.10.1**Final measurement for aggregate in the completed seal coat will not be made except for authorized changes during construction, or where appreciable errors are found in the contract quantity.

**409.10.2**Where required, measurement of seal coat, complete in place, will be made to the nearest square yard for aggregate.

**409.10.3**Final measurement for binder will be in accordance with [Sec 1015](../Text/Sec1015.xhtml) and will be made to the nearest 10 gallons for actual quantity used. Any revision or correction will be computed and added to or deducted from the contract quantity.

**409.11 Basis of Payment.** The accepted quantities of seal coat aggregate and binder, in place, will be paid for at the contract unit price. No separate payment will be made for pre-coating aggregate, fog sealing, dust control, or for providing and installing contract information signs. If the binder application rate includes a correction factor, it is included in the plan quantities.