SealMaster Bituminous Surface Treatment February 2020

Phone: 800-395-7325, 419-626-4375

Website: [www.sealmaster.net](http://www.sealmaster.net)

E-mail: spec@sealmaster.net

Engineering Specification: Liquid Road Bituminous Surface Treatment for Road Application Specification- Quick Spec

**LIQUID ROAD BITUMINOUS SURFACE TREATMENT FOR ROAD APPLICATION.**

Specifier’s Notes: This Bituminous Surface Treatment Specification is furnished as a guide for specifying the application of Liquid Road on Asphalt Road Surfaces. It is written in the CSI 3-Part Format.

If you need more specific information regarding a product visit [www.sealmaster.net](http://www.sealmaster.net) or contact your local SealMaster Representative at 1-800-395-7325. SealMaster Representatives are also available to answer any questions you may have regarding your specific project.

**PART 1 GENERAL**

* 1. **SECTION INCLUDES**
1. Bituminous Surface Treatment - Liquid Road Application for Roads

**1.2 REFERENCE STANDARDS**

1. American Society for Testing Materials (ASTM)
2. D 2939-03 (Sections 7,8,9,10,11,12,13,14,15,16) Standard Test Methods for Emulsified Bitumens Used as Protective Coatings
3. The following ASTM test methods: ASTM D5, ASTM D6937, ASTM D6930, ASTM D113, ASTM E70, ASTM D6378, ASTM D36, ASTM D93, ASTM D562, ASTM D4060, ASTM D552, ASTM D870, ASTM D6904, ASTM D4585, ASTM D1735, ASTM D2247, ASTM D4541, ASTM E303, ASTM E70, ASTM E274, ASTM D3359, ASTM D3910, ASTM D4799
4. Liquid Road meets ASTM D8099/D8099M-17 Standard Specification for Asphalt Emulsion Pavement Sealer and FAA Item P-623 specification for emulsified asphalt spray sealcoat.
5. South Coast Air Quality Management District
6. SCAQMD Method 304 – Determination of Volatile Organic Compounds (VOC) In Various Materials.
7. Federal Specifications for Waterborne Traffic and Airfield Marking Paints
8. TT-P-1952E Types I, II, and III
9. TT-P-1952D

**1.3 SUBMITTALS**

1. Product Data
2. Submit manufacturer’s Product Data Sheet.

**1.4 PROJECT/SITE CONDITIONS**

1. Ambient Conditions
2. Both surface and ambient temperature must be a minimum of 50°F and rising before applying cold applied crack fillers, oil spot primers, pavement sealers or traffic paints (materials). Ambient and surface temperature shall not drop below 50°F for a 24 hour period following application of materials.
3. Apply materials during dry conditions when rain is not imminent or forecast for at least 24 hours after application.
4. Pavement/Surface Conditions
5. Newly placed (paved) asphalt pavement surfaces should be allowed to cure a minimum of four (4) weeks under ideal weather conditions (70°F) before applying coatings.
6. New pavement surfaces shall be free of residual oils or chemicals associated with the placement of new asphalt pavement.
7. Aged pavement surfaces shall be cleaned and prepared as recommended in this specification under PART 3 of this specification.

**PART 2 PRODUCTS**

**2.1 MANUFACTURER**

1. SealMaster Pavement Products and Equipment. SealMaster has a nationwide network of manufacturing and distribution facilities. Phone: 800-395-7325. Website: [www.sealmaster.net](http://www.sealmaster.net). E-mail: spec@sealmaster.net.

**2.2 LIQUID ROAD PAVEMENT COATING**

1. Liquid Road is a polymer-modified, fiber-reinforced asphalt emulsion coating that is job-mixed with specifically graded aggregate and applied to asphalt pavement surfaces, providing a highly durable, slip-resistant bituminous surface treatment that greatly extends pavement service life.

Liquid Road provides a “like new” black appearance to oxidized and weathered asphalt pavement surfaces. The deep black color helps to melt snow and ice significantly faster than untreated pavements.

Liquid Road produces an even textured surface with no loose stones, making it ideal for vehicle, bicycle and pedestrian traffic.

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| TABLE 1- PHYSICAL PROPERTIES OF LIQUID ROAD AS SUPPLIED WITHOUT SAND  |
|  **ASTM** |  **Test Description** |  **Result** |
| D5 | Penetration of Bituminous Materials-Base Asphalt | 12-45 Pen |
| D6937 | Density of Emulsified Asphalt | 1,000 -1300 g/l  |
| D6930 | Settlement and Storage Stability of Emulsified Asphalts | 20% max./24 hr. |
| D113 | Ductility of Bituminous Materials-Base Asphalt | 5-15 cm |
| Std. % | Percent Polymer Solids to Asphalt by wt. | 3% min. |
| E70 | PH of Aqueous Solutions with Glass Electrodes | 6-10 PH |
| D6378 | Vapor Pressure (VPX), mm Hg @ 25° C (77° F) | 22-26 mm Hg |
| D36 | Softening Point of Emulsion Residue (Ring and Ball Apparatus) | > 200° F |
| D93 | Flash Point of Liquid Emulsion | None detected |
| D562 | Viscosity using a Stormer-Type Viscometer | 60-110 KU |
| D4060 | Abrasion Resistance- Taber Abraser Dry Method | < 1% Loss |
| D522 | Mandrel Bend Test of Attached Coatings | No Cracking |
| D870 | Water Resistance of Coatings using Water Immersion | No Delamination |
| D6904 | Resistance to Wind-Driven Rain | No Delamination |
| D4585 | Water Resistance of Coatings Using Controlled Condensation | No Delamination |
| D1735 | Water Resistance of Coatings Using Water Fog Apparatus | No Delamination |
| D2247 | Water Resistance of Coatings in 100% Relative Humidity | No Delamination |
| D4541 | Adhesion Strength over Asphalt Pavement | > 200 PSI |
| D3910-6.4 | Wet Track Abrasion Test | < 5 g/ft² Loss |
| D2939-5 | Uniformity of Emulsified Bituminous Coatings | PASS |
| D2939-7 | Weight per Gallon | 9-11 lbs./gal |
| D2939-8 | Residue by Evaporation, % | 40% min. |
| D2939-13 | Drying Time- 50% humidity, 73.4 ± 3.6°F. Firm in 24 hrs.,  | PASS |
| D2939-14 | Resistance to Heat- No Blistering, sagging or slipping | PASS |
| D2939-15 | Resistance to water- No softening, delamination or re-emulsification | PASS |
| D2939-16 | Flexibilty- No Cracking or Delamination | PASS |
| D2939-26 | Resistance to Impact- No Chipping, Cracking or Delamination  | PASS |
| D2939-27 | Resistance to Impact After Accelerated Weathering | PASS |
| D2172 | Asphalt Content by Weight, % | Min. 16% |
| D4799 | QUV UV Aging-1,000 Hours | No Color Fade |
| D3359 | Measuring Adhesion by Tape- No More than a Trace of Peeling | PASS |
| SCAQMD Method 304 | Determination of Volatile Organic Compounds (VOC) in various Coatings | < 50 g/l |

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| TABLE 2- PHYSICAL PROPERTIES OF LIQUID ROAD JOB-MIXED WITH SPECIFIED AGGREGATE AND READY FOR ROAD APPLICATION (see table 3 for Aggregate Specifications)  |
| **ASTM** |  **Test Description** |  **Result** |
| D2939-8 | Residue by Evaporation, % | Min. 52% |
| E303 | Measuring Surface Frictional Properties- British Pendulum Tester | Min. 70 BPN |
| E274 | Locked Wheel Skid Testing | > 30 SN |
| D4060 | Abrasion Resistance- Taber Abraser Dry Method | < 1% Loss |
| D3910-6.4 | Wet Track Abrasion Test | < 25g/ft² Loss |
| D5  | Penetration of Bituminous Materials-Base Asphalt | 12-45 Pen |
| D113 | Ductility of Bituminous Materials-Base Asphalt | 5-15 cm |
| Std. % | Percent Polymer Solids to Asphalt by wt. | 5-15 cm |
| E70 | PH of Aqueous Solutions with Glass Electrodes | 6-10 PH |
| D6378 | Vapor Pressure (VPX), mm Hg @ 25° C (77° F) | 22-26 mm Hg |
| D36 | Softening Point of Emulsion Residue (Ring and Ball Apparatus) | > 200° F |
| D93 | Flash Point of Liquid Emulsion | None detected |
| D562 | Viscosity using a Stormer-Type Viscometer | 60-110 KU |
| D870 | Water Resistance of Coatings using Water Immersion | No Delamination |
| D6904 | Resistance to Wind-Driven Rain | No Delamination |
| D4585 | Water Resistance of Coatings Using Controlled Condensation | No Delamination |
| D1735 | Water Resistance of Coatings Using Water Fog Apparatus | No Delamination |
| D2247 | Water Resistance of Coatings in 100% Relative Humidity | No Delamination |
| D4541 | Adhesion Strength over Asphalt Pavement | > 200 PSI |
| D2939-7 | Weight per Gallon | 10-12 lbs./gal |
| D2939-13 | Drying Time- 50% humidity, 73.4 ± 3.6°F. Firm in 24 hrs. | PASS |
| D2939-14 | Resistance to Heat- No Blistering, sagging or slipping | PASS |
| D2939-15 | Resistance to water- No softening, delamination or re-emulsification | PASS |
| D2939-16 | Flexibilty- No Cracking or Delamination | PASS |
| D2939-26 | Resistance to Impact- No Chipping, Cracking or Delamination | PASS |
| D2939-27 | Resistance to Impact After Accelerated Weathering | PASS |
| D4799 | QUV UV Aging-1,000 Hours | No Color Fade |
| D3359 | Measuring Adhesion by Tape- No More than a Trace of Peeling | PASS |
| SCAQMD Method 304 | Determination of Volatile Organic Compounds (VOC) in various Coatings | < 50 g/l |

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| TABLE 3- LIQUID ROAD AGGREGATE SPECIFICATIONS FOR ROAD APPLICATION |
|  **Mesh-Sieve Size**  **(ASTM E11)** | **Typical Mean Retained****On Individual Sieves %** |
| No. 8 Mesh (2.38 mm)  |  -0- |
| No. 10 Mesh (2.00 mm) |  0-5% |
| No. 12 Mesh (1.68 mm) |  2-10% |
| No. 16 Mesh (1.19 mm) |  30-60% |
| No. 20 Mesh (.841 mm) |  20-50% |
| No. 30 Mesh (.595 mm) |  2-10% |
| No. 40 Mesh (.420 mm) |  1-5% |
| No. 50 Mesh (.297 mm) |  1-5% |
| No. 70 Mesh (.210 mm) |  1-5% |
| No. 100 Mesh (.149 mm) |  0-5% |
| Sand or Aggregate shall have a typical AFS of 11-15 Mesh |

* 1. **MATERIALS**
1. SealMaster FlexMaster Crack Sealant (Cold-applied pourable crack sealant)
2. SealMaster Pourable Crack Sealant (Cold-Applied crack sealant)
3. SealMaster CrackMaster Hot Rubberized Crack Sealant
4. SealMaster Asphalt Binder Plus
5. SealMaster Asphalt Binder
6. SealMaster Pothole Patch (Cold Patch)
7. SealMaster Liquid Thermoplastic Traffic Marking Paint (White and Yellow)
8. SealMaster Fast-Dry Traffic Paint (White and Yellow)

**PART 3 EXECUTION**

**3.1 EXAMINATION**

A. Examine pavement surface prior to performing work

1. Notify project engineer of any adverse or unacceptable conditions that would affect successful repair efforts or application of materials
2. Do not commence work until unacceptable conditions are corrected

**3.2 CRACK REPAIR**

Specifier’s Notes: Specifier should select between Option A. (Fill Cracks with Cold-Applied Sealants and/or Crack Fillers) or, Option B. (Fill Cracks with Hot Applied Rubberized Asphalt Crack Sealant) listed below. Hot Applied Rubberized Crack Sealant provides a more durable solution for crack filling. However, Cold-Applied Materials offer an acceptable and more economical approach.

1. Cold Applied Crack Filling Materials and Methods
2. Clean cracks of all dirt, debris and vegetation prior applying crack filling.
3. For cracks up to ½” apply SealMaster FlexMaster or SealMaster Pourable Crack Sealant. FlexMaster or Pourable Crack Sealant may be applied directly from container, pour pot, crack banding equipment or mechanized pumping equipment. Allow to dry before sealcoating.
4. Contractor or other Entity Responsible for performing work shall refer to Manufacturer’s Product Data Sheet for more detailed application instructions for FlexMaster and Pourable Crack Sealant.
5. Hot Applied Crack Sealant/Filling Materials and Methods
6. Cracks must be free from dust, dirt, vegetation and moisture. Clean cracks with mechanical wire brush followed by a compressed air heat lance to remove loose debris and moisture.
7. For all cracks up to 1” wide apply SealMaster CrackMaster 6690 Type 1 Hot Rubberized Crack Sealant
8. SealMaster CrackMaster Rubberized Crack Sealant shall be melted in a conventional oil-jacketed unit equipped with an agitator.
9. Apply heated CrackMaster Rubberized sealant using a pump and wand system, a crack banding unit or a pour pot.
10. Contractor or other Entity Responsible for performing work shall refer to Manufacturer’s Product Data Sheet for more detailed application instructions for CrackMaster 6690 Type 1 Crack Sealant.

**3.3 ALLIGATORED PAVEMENT REPAIR**

Specifier’s Notes: Alligator cracks are interconnected cracks forming a series of small blocks resembling an alligator’s skin or chicken wire. Specifier should select between Option A- (Infrared Patch Repair Method) or Option B- (Removal of distressed pavement material and replacement with 4 inches of Hot Mix Asphalt). With regards to longevity of pavement repair, these options represent a better (A), best (B) approach.

1. Repair Alligator Cracks with Infrared Heater Method
2. Remove all dirt, dust and vegetation on alligatored area.
3. Heat alligatored pavement area to a temperature between 290°F and 325°F to soften pavement. Scarify heated softened asphalt with an asphalt rake to a depth of 2-3 inches. Add SealMaster Asphalt Binder Plus at a rate of .20 gallon per square yard while pavement material is still soft and workable. Mix Asphalt Binder Plus into heated softened asphalt with the asphalt rake. Level smooth with rake and compact area with either a plate compactor or asphalt roller. Note- A small amount of fresh Hot Mix blacktop may be added to heated material if needed to assure a smooth, flush finish to adjoining pavement surface.
4. Contractor or other Entity Responsible for performing work shall refer to Manufacturer’s Product Data Sheet for more detailed application instructions for SealMaster Asphalt Binder Plus.
5. Repair Alligator Cracks with Full-Depth Hot Mix Asphalt
6. Saw cut and remove the alligatored pavement to the depth necessary to reach firm support (firm base materials).
7. Prime bottom of patch area and vertical sides of saw cut with SealMaster Asphalt Binder Plus.
8. Fill patch area with fresh hot mix asphalt.
9. Compact fresh hot mix with hand tamper, vibratory-plate compactor or asphalt roller. Finished patchwork shall be flush and level with adjoining pavement.
10. Contractor or other Entity Responsible for performing work shall refer to Manufacturer’s Product Data Sheet for more detailed application instructions for SealMaster Asphalt Binder Plus.

**3.4 POTHOLE REPAIR**

 Specifier’s Notes: Specifier should select between Option A. (Fill Potholes with SealMaster Pothole Patch (Cold Patch)) or, Option B. (Fill Potholes with Hot Mix Asphalt). Hot Mix Asphalt provides a more durable solution for patching. However, SealMaster PatchMaster Pothole Patch offers an acceptable and more economical approach to filling potholes.

1. Fill Potholes with SealMaster PatchMaster Pothole Patch
2. Remove loose material, debris and standing water from pothole prior to application.
3. Apply PatchMaster directly from bag into pothole.
4. Compact PatchMaster with a hand-tamper, vibratory-plate compactor or asphalt roller. Finished patchwork shall be flush and level with adjoining pavement.
5. Contractor or Entity responsible for performing work shall refer to Manufacturer’s Product Data Sheet for more detailed application instructions for SealMaster PatchMaster pothole patch.

B. Fill Potholes with Hot Mix Asphalt

1. Remove loose material, debris and standing water from pothole prior to application.
2. Apply Hot Mix Asphalt directly into pothole. Compact Hot Mix with a hand-tamper, vibratory-plate compactor or asphalt roller. Finished patchwork shall be flush and level with adjoining pavement.

**3.5 LIQUID ROAD APPLICATION**

 A. Traffic Control

1. Implement Traffic Control Program to allow for safety of workers, pedestrians, and vehicle traffic.

 B. Surface Protection

1. Use tar paper to mask off end of streets and intersections to provide crisp start and finish lines when applying Liquid Road.
2. Use tar paper or suitable material to mask off manhole covers and sewer grates
3. Protect curbs, gutters and sidewalks from material spatter or over-coating.

 C. Surface Cleaning

1. Surface must be clean and free from dirt, debris and loose material. Street sweepers, power blowers, mechanical sweeping devices and push brooms are acceptable cleaning methods.
2. Tack Coating (Optional)
3. Tack Coating (priming surface) with diluted SealMaster Asphalt Binder, SS1h or CSS1h asphalt emulsion is beneficial on extremely oxidized and weathered road surfaces.
4. Dilute 1 part SealMaster Asphalt Binder, SS1h or CSS1h with 4 parts of water.
5. Apply one thin coat of diluted asphalt emulsion at a rate of .05 to .10 gallon per square yard.
6. Allow tack coat to dry thoroughly before applying Liquid Road.
7. Equipment Requirements
8. Equipment used to apply Liquid Road shall have continuous agitation or mixing capabilities to maintain homogeneous consistency of pavement sealer mixture throughout the application process. Truck mounted tanks or self-propelled squeegee equipment with mixing capability shall have at least 2 squeegee or brush devices (one behind the other) or combination of squeegee and brush device to assure adequate distribution and penetration of sealer into pavement surface. Hand squeegees and brushes shall be acceptable in areas where practicality prohibits the use of mechanized equipment.
9. Liquid Road Mixing Procedure
10. Liquid Road shall be mixed in accordance with the following mix design (based on 100 gallons of Liquid Road for ease of calculation):
* Liquid road………………………………………… 100 gallons
* Sand (11-15 mesh AFS gradation)…………….. 400 lbs.

(See Table 3 under section 2.3 A. - Liquid Road Aggregate specifications)

Note: If required, a small amount of water may be added to facilitate application of mixed material.

1. Application Procedure
2. Apply first squeegee/brush coat at a rate of 20-25 square feet (2.22-2.77 square yards). Allow first coat to dry thoroughly before applying second coat.
3. Apply second squeegee/brush coat at a rate of 20-25 square feet (2.22-2.77 square yards).
4. Allow second coat to dry completely before opening to vehicle traffic

**3.9 TRAFFIC MARKINGS/LINE STRIPING**

Specifier’s Notes: Specifier should select between Option A- (SealMaster Fast Dry Traffic Paint-White or Yellow), or Option B- (SealMaster Liquid Thermoplastic Traffic Paint- White or Yellow). These options represent a better (A), or best (B) approach to material selection. SealMaster Fast-Dry Traffic Paint meets Federal Specification TT-P-1952D and TT-P-1952E Type I and II. SealMaster Liquid Thermoplastic Traffic Paint meets Federal Specification TT-P-1952E Type III.

1. Applying SealMaster Traffic Paint
2. Refer to SealMaster technical data sheets for proper mixing and application of Traffic Paints.
3. SealMaster Fast-Dry Traffic meets the requirements of Federal Specification TT-P-1952D, TT-P-1952E Type I and II
4. SealMaster Liquid Thermoplastic Traffic Paint meets the requirements of TT-P-1952E Type III

**END OF SECTION**