

10-1. __ MODIFIED BINDER SEAL COAT

Modified binder seal coat shall consist of an application of modified asphalt and hot screenings precoated with paving asphalt. Modified binder seal coat shall conform to the provisions specified for seal coat in Section 37-1, "Seal Coats," of the Standard Specifications and these special provisions.

Attention is directed to "Order of Work" and "Damage Claims" of these special provisions.

MATERIALS

Quality Control Testing

Attention is directed to Section 6-3.02, "Testing By Contractor," of the Standard Specifications. The name of an independent testing laboratory that participates in the AASHTO Proficiency Sample Program shall be submitted to the Engineer for approval at least 10 days before beginning modified binder seal coat operations. The independent testing laboratory shall conduct quality control testing on the modified binder for all specifications listed in these special provisions, within 5 business days of sampling. The results shall be submitted to the Engineer within 7 days of the receipt of the samples. Within 10 days of beginning the modified binder seal coat operation, the Contractor's independent testing laboratory shall conduct the Vialit Test Method for aggregate in Chip Seals, French Chip for the retention requirement and submit a signed copy of a test results report to the Engineer.

The report will not be considered for acceptability testing. The Vialit Test Method is available at:

<http://www.dot.ca.gov/hq/esc/ctms/index.html>

MODIFIED BINDER

Modified asphalt binder shall conform to the following requirements:

Modified Binder Specification for Hot Applied Chip Seal Applications

Property	AASHTO Test Method	Grade	
		PG 70-22 TR ^a	PG 76-22 TR ^a
Original Binder			
Flash Point, Minimum °C	T 48	230	230
Solubility, Minimum % ^b	T 44 ^b	97.5	97.5
Viscosity at 135°C, ^c Maximum, Pa·s	T 316	3.0	3.0
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	70 1.00	76 1.00
RTFO Test, Mass Loss, Maximum, %	T 240	1.00	1.00
RTFO Test Aged Binder			
Dynamic Shear, Test Temp. at 10 rad/s, °C Minimum G*/sin(delta), kPa	T 315	70 2.20	76 2.20
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum (delta), %	T 315	Note d 80	Note d 80
Elastic Recovery ^e , Test Temp., °C Minimum recovery, %	T 301	25 65	25 65
PAV ^f Aging, Temperature, °C	R 28	110	110
RTFO Test and PAV Aged Binder			
Dynamic Shear, Test Temp. at 10 rad/s, °C Maximum G*/sin(delta), kPa	T 315	31 5000	31 5000
Creep Stiffness, Test Temperature, °C Maximum S-value, MPa Minimum M-value	T 313	-12 300 0.300	-12 300 0.300

Notes:

Notes:

- a. Supplier is required to certify 10% minimum scrap tire rubber modifier in binder. (tire content might be as high as 19% depending on the agency requirements)
- b. The Department allows ASTM D 5546 instead of AASHTO T 44
- c. The engineer waives this requirements if the supplier certifies the asphalt binder can be adequately pumped and mixed at temperatures meeting applicable safety standards
- d. Test temperature is the temperature at which G*/sin(delta) is 2.2 kPa. A graph of log G*/sin(delta) plotted against temperature may be used to determine the test temperature when G*/sin(delta) is 2.2 kPa. A graph of (delta) versus temperature may be used to determine delta at the temperature when G*/sin(delta) is 2.2 kPa. The Engineer also accepts direct measurement of (delta) at the temperature when G*/sin(delta) is 2.2 kPa.
- e. Tests without a force ductility clamp may be performed.
- f. "PAV" means Pressurized Aging Vessel.

A Certificate of Compliance shall be furnished to the Engineer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall certify that the material which the certificate represents conforms to the provisions specified in these special provisions. When requested by the Engineer, the Contractor

shall also submit samples with the Certificates of Compliance. The Contractor shall provide the Engineer a Material Safety Data Sheet (MSDS) of the modified asphalt binder.

The Contractor shall provide a Certificate of Compliance for each truckload of modified binder. The Contractor shall conduct quality control testing on the modified binder for all specifications listed in these special provisions for every **50 tons** of material placed on the project.

Certified weight slips shall be delivered to the Engineer for materials supplied.

On multilane roads, the maximum length of modified binder seal coat operations at any one location, including pilot-car-assisted traffic control shall be limited to ___ miles. The minimum space between successive seal coat operations on adjacent lanes in the same direction of travel shall be ___ miles.

Modified binder shall conform to either the PG 70-22 TR or the PG 76-22 TR specifications listed in these special provisions. The Contractor shall notify the Engineer in writing of the grade of polymer modified asphalt binders selected. No change in grade shall be made without the written approval of the Engineer.

At least 15 days before its intended use, the Contractor shall furnish the Engineer 4 one-quart cans filled with the modified binder proposed for use on the project. Laboratory test results for test parameters shown in these special provisions shall be provided with the modified binder.

SCREENINGS

Screenings shall conform to the provisions in these special provisions and in Section 37-1.02, "Materials," of the Standard Specifications, except that the third, fourth, eighth, and ninth paragraphs of Section 37-1.02 shall not apply.

Stockpiling of screenings after preheating and precoating with paving asphalt will not be permitted.

If the ambient temperature is below 65 F or the haul time exceeds 30 minutes, canvas or similar covers that completely cover each load of precoated screenings shall be used during hauling to minimize temperature drop of the precoated screenings.

Screenings shall conform to the following grading and quality requirements prior to precoating with paving asphalt:

Sieve Sizes	Percentage Passing
3/4"	—
1/2"	100
3/8"	-100
No. 4	0 – 50
No. 8	0 – 15
No. 16	0-5
No. 30	0-3
No. 200	0 – 1

Screenings shall conform to the following grading and quality requirements prior to precoating with paving asphalt:

SCREENINGS GRADING REQUIREMENTS 3/8 inch Maximum	
Sieve Sizes	Percentage Passing
3/4"	100
1/2"	95-100
3/8"	70 – 85
No. 4	0 – 15
No. 8	0 – 5
No. 200	0 – 1

Screenings shall conform to the following grading requirements prior to precoating with paving asphalt:

SCREENINGS GRADING REQUIREMENTS 1/2 inch Medium Maximum	
Sieve Sizes	Percentage Passing
3/4"	100
1/2"	85- 90
3/8"	0 – 30
No. 4	0 – 5
No. 8	--
No. 200	0 – 1

Screenings shall conform to the following quality requirements immediately prior to preheating:

SCREENINGS QUALITY REQUIREMENTS		
Test Parameters	California Test	Requirements
Los Angeles Rattler Loss (100 Revolutions)	211	10 Max.
Los Angeles Rattler Loss (500 Revolutions)	211	40 Max.
Film Stripping	302	25 Max.
Cleanness Value	227	80 Min.
Durability	229	52 Min.

Screenings for modified binder seal coat shall be preheated to between 260° F and 325° F and uniformly coated at a rate of 0.5 percent to 1.0 percent by weight of dry aggregate with any of the asphalts specified in the table "Performance Graded Asphalt Binder" in Section 92, "Asphalts," of the Standard Specifications. Screenings shall be coated at a central mixing asphalt concrete plant that has been approved in conformance with the requirements in California Test 109 and the Material Plant Quality Production (MPQP) requirements of the California Department of Transportation. For continuous Drum Plant it required to run coarse aggregate (1/2" or 3/4") for a minimum of 5 minutes to remove any fines that might be coating the drum surface prior to pre-coating of screenings. The exact rate will be determined by the Engineer.

EQUIPMENT

The equipment used by the Contractor for modified binder seal coat operations shall conform to the following:

- A. Self-propelled power brooms that clean the existing pavement and remove loose screenings without dislodging screenings set in the asphalt-rubber binder. Gutter brooms or steel-tined brooms shall not be used;
- B. Pneumatic tired rollers conforming to the provisions in Section 39-3.03, "Spreading and Compacting Equipment," of the Standard Specifications, except that the rollers shall have an air pressure of 100 pounds per square inch and maintained so that the air pressure will not vary more than ± 5 pounds per square inch in each tire or the tires shall be foam filled. A sufficient number of rollers shall be used so that one complete coverage will be provided in one pass;
- C. A self-propelled screenings spreader, equipped with a screenings hopper in the rear and belt conveyors to carry the screenings to the front of a spreading hopper. The screenings spreader shall be capable of providing a uniform screening spread rate over the entire width of the traffic lane in one application;
- D. For PG70-22TR or PG76-22TR A self-propelled distributor truck shall be used for applying modified binder. The distributor truck shall be equipped with a heating unit, a pump or pumps that spray the modified binder within ± 0.03 -gallon per square yard of the specified rate and a fully circulating spray bar that applies the binder without a streaked or otherwise irregular pattern. The distributor truck shall be equipped with a tachometer, pressure gages, volume measuring devices, and thermometer.
- E. Tailgate discharge trucks for hauling screenings shall be equipped with a device to lock onto the hitch at the rear of the screenings spreader. Haul trucks shall be compatible with the screenings spreader so that the dump bed will not push down on the spreader when fully raised or have too short a bed which results in screenings spilling while dumping into the receiving hopper.

PREPARATION FOR SEAL COAT

Surfaces to receive modified binder seal coat shall be prepared in conformance with the provisions specified for preparing surfaces to receive asphaltic emulsion as specified in Section 37-1.04, "Preparation for Seal Coat," of the Standard Specifications. All pavement markers shall be removed prior to placement of seal coat.

APPLYING MODIFIED BINDER

Modified binder shall be applied in conformance with the provisions specified for applying asphaltic emulsion in Section 37-1.05, "Applying Asphaltic Emulsion," of the Standard Specifications, except the second, third, fourth, and fifth paragraphs shall not apply.

For 5/16" gradation, the Modified binder shall be applied at a rate from 0.25-gallon to 0.35-gallon per square yard. The exact rate will be determined by the Engineer. The binder shall be applied at a minimum temperature of 325° F.

For 3/8" gradation, the Modified binder shall be applied at a rate from 0.35-gallon to 0.45-gallon per square yard. The exact rate will be determined by the Engineer. The binder shall be applied at a minimum temperature of 325° F.

For 1/2" gradation, the Modified binder shall be applied at a rate from 0.38-gallon to 0.55-gallon per square yard. The exact rate will be determined by the Engineer. The binder shall be applied at a minimum temperature of 325° F.

Modified binder shall not be applied when weather conditions are unsuitable or when the pavement is damp or wet. The pavement surface temperature shall be a minimum of 55° F

where modified binder is to be applied. The atmospheric temperature shall be a minimum of 60° F and a maximum of 105° F. Modified binder shall not be applied until sufficient screenings are available to immediately cover the binder being applied.

Distributor bar height, distribution speed, and shielding materials shall be utilized to reduce the effects of wind upon spray distribution as directed by the Engineer. The Engineer will delay or reschedule work when high, gusting or dirty winds prevent or adversely affect binder or screening application operations. Necessary equipment shall be in position and ready to commence placement operations before starting.

The Contractor shall comply with Federal, State, and Local environmental laws, rules, regulations, and ordinances including, but not limited to, air quality requirements.

The modified binder application shall not be spread in excess of that which can be covered with screenings within 2 minutes.

When placing modified binder seal coat at intersections, left turn lanes, gore points, and other irregular areas, modified binder application shall not be in excess of that which can be covered with screenings within 15 minutes.

When joining edges against areas with screenings, the joint shall be swept clean of excess screenings prior to the adjacent application of modified binder. Transverse joints of this type shall be constructed by placing roofing paper across and over the end of the previous modified binder seal coat application. Once the spraying has progressed beyond the paper, the paper shall be removed immediately.

The longitudinal joint between adjacent applications of screenings shall coincide with the line between designated traffic lanes. Longitudinal joints shall be overlapped for complete coverage. The overlap shall not exceed 4 inches, except with the approval of the Engineer the overlap may be up to 8 inches.

At longitudinal joints with screenings, the edge shall be broomed back and blended to eliminate differences in elevation. The joints shall be free from ridges and depressions and shall have a uniform appearance consistent with the adjacent sealed surface. Defects shall be corrected at the Contractor's expense.

Joints between areas of modified binder without screenings shall be made by overlapping modified binder distributions. The excess material shall be properly dispersed by spreading with a squeegee or rake over a larger area of freshly applied modified binder.

The application of asphalt-rubber binder to areas not accessible with the distributor bar on the distributor truck shall be accomplished by a squeegee, rake, or other means approved by the Engineer.

SPREADING SCREENINGS

Screenings for modified binder seal coat shall be spread in conformance with the provisions specified for spreading screenings on asphaltic emulsion in Section 37-1.06, "Spreading Screenings," of the Standard Specifications, except the first, fifth, sixth, and seventh paragraphs shall not apply.

For 5/16" gradation, the Screenings for modified binder seal coat shall be spread immediately following the application of the binder, within the range of 16 pounds to 24 pounds per square yard. The exact rate will be determined by the Engineer. The completed spread rate shall be within 10 percent of the rate determined by the Engineer. The completed surface shall be free of gaps, ridges, depressions or other irregularities caused by the application of the modified binder seal coat.

For 3/8" gradation, Screenings for modified binder seal coat shall be spread immediately following the application of the binder, within the range of 18 pounds to 28 pounds per square yard. The exact rate will be determined by the Engineer. The completed spread rate shall be within 10 percent of the rate determined by the Engineer. The completed surface shall be free of gaps, ridges, depressions or other irregularities caused by the application of the modified binder seal coat.

For 1/2" gradation, Screenings for modified binder seal coat shall be spread immediately following the application of the binder, within the range of 22 pounds to 34 pounds per square yard. The exact rate will be determined by the Engineer. . The completed spread rate shall be within 10 percent of the rate determined by the Engineer. The completed surface shall be free of gaps, ridges, depressions or other irregularities caused by the application of the modified binder seal coat.

Screenings shall be spread when the temperature of the precoated screenings is not less than 225° F and not more than 325° F after applying modified binder.

The Contractor shall prevent any vehicle, including construction equipment, from driving on the asphalt-rubber binder prior to application of screenings.

The screenings spreader shall not be more than 50 feet behind the modified binder distribution truck unless otherwise ordered by the Engineer. Trucks hauling screenings shall be kept clear of the freshly placed screenings until ready to dump screenings in the spreader equipment, except one staggered truck will be allow to follow the seal coat operations..

FINISHING

Modified binder seal coat shall be finished in conformance with the provisions for finishing screenings spread on asphaltic emulsion in these special provisions and in Section 37-1.07, "Finishing," of the Standard Specifications, except that the second, third, seventh, eighth, and ninth paragraphs of Section 37-1.07 shall not apply.

Initial rolling of the modified binder seal coat shall consist of a minimum of one complete coverage with one or more pneumatic-tired rollers and shall begin within 90 seconds following the placement of the screenings.

The distance between the rollers and the screenings spreader shall not exceed 200 feet at any time during the spreading of the screenings operations.

A minimum of 3 complete coverages with pneumatic tired rollers, after the initial coverage must be made on the modified binder seal coat. Coverages shall conform to the provisions in Section 39-3.04, "Transporting, Spreading, and Compacting," of the Standard Specifications. When permitted by the Engineer, the final roller coverage may be made with one steel wheel roller weighing 8 tons minimum and 10 tons maximum. If a steel wheel roller is used, the roller shall be operated in the static mode only.

Sweeping shall be a multi-step operation following final rolling of the screenings. Loose screenings shall be removed from the roadway surface and abutting adjacent areas. Loose screenings shall be disposed of at least 150 feet from the nearest waterway.

Initial sweeping shall be completed before controlled traffic is permitted on the modified binder seal coat. Removal of excess screenings shall be completed before uncontrolled traffic is permitted on the completed asphalt-rubber seal coat. Final sweeping shall be done and loose screenings shall be removed without dislodging the screenings set in the asphalt-rubber binder prior to acceptance.

FLUSH COAT

Flush coat shall consist of an application of a fog seal coat followed by a sand cover to the surface of the modified binder seal coat. Flush coat shall conform to the provisions in Section 37-1, "Seal Coats," of the Standard Specifications and these special provisions.

Flush coat shall be applied to the modified binder seal coat immediately after initial brooming of the hot-applied seal coat and removal of excess screenings and prior to opening the lane to uncontrolled (not controlled with pilot cars) public traffic.

Fog Seal Coat or Slurry Seal

Asphaltic emulsion (fog seal coat) shall be Grade SS1h or CSS1h or CQS1 as directed by the Engineer.

The asphaltic emulsion (fog seal coat) shall be applied at a residual asphalt rate of 0.02-gallon to 0.03-gallon per square yard. The exact rate of application will be determined by the Engineer.

Attention is directed to Section 7-1.11, "Preservation Of Property," of the Standard Specifications and "Existing Highway Facilities" of these special provisions regarding protecting the highway facilities from the fog seal coat.

During flush coat operations, the surface upon which the flush coat is being applied shall be closed to public traffic. Care shall be taken to avoid tracking fog seal coat material onto existing pavement surfaces beyond the limits of construction.

Sand Cover

Sand cover shall be applied immediately following application of the fog seal coat.

Sand for the sand cover shall conform to the provisions for fine aggregate grading in Section 90-3.03, "Fine Aggregate Grading," of the Standard Specifications and these special provisions. Sand shall not contain clay and shall not contain organic material.

Sand shall be spread by means of a self-propelled chip spreader equipped with a mechanical device that will spread the sand at a uniform rate over the full width of a traffic lane in a single application. Sand shall be spread at a rate of 2 pounds to 4 pounds per square yard. The exact spread rate will be determined by the Engineer.

MEASUREMENT AND PAYMENT

Screenings for modified binder seal coat will be measured by the ton after preheating and precoating with paving asphalt in the same manner specified for hot mix asphalt in Section 39-5.01, "Measurement," of the Standard Specifications. Paving asphalt used for precoating screenings will be paid for as screenings (hot-applied). Modified binder for modified binder seal coat will be measured by the ton in the same manner specified for asphalt in Section 92-1.04, "Measurement," of the Standard Specifications.

The contract price paid per ton for modified binder shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying modified binder, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per ton for screenings (hot-applied) shall include full compensation for furnishing all labor, materials (including paving asphalt for precoating screenings), tools, equipment, and incidentals and for doing all the work involved in spreading the screenings, complete in place, including preheating and precoating screenings, removal of pavement markers, furnishing, placing, maintaining, and removing C6 (Loose Gravel) and W6 (35 MPH) signs and temporary supports or barricades for the signs, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Sand cover will be measured and paid for in the same manner specified for screenings in Section 37-1.08, "Measurement," and Section 37-1.09, "Payment," of the Standard Specifications.

No adjustment in compensation will be made for any increase or decrease in the quantities of asphaltic emulsion (fog seal coat) and sand cover required or slurry seal, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the items of asphaltic emulsion (fog seal coat) and sand cover.