

Section 508. CHIP SEALS

508.01 Description. This work consists of surface preparation and application of a single chip seal, double chip seal or shoulder chip seal.

508.02 Materials. Materials shall meet the following requirements.

Coarse Aggregate, 25A, 29A	902
Asphalt Emulsions, HFRS-2M, CRS-2M	904

A. **Coarse Aggregate.** All coarse aggregate applications shall meet the 29A requirements except for the first course of a double chip seal where the Contractor has the option of using the 25A gradation. In addition, for single chip seal and the second course of double chip seal, the following aggregate types shall be used based on two-way commercial ADT.

1. For roadways with two-way commercial ADT greater than 300, the coarse aggregate shall be blast furnace slag.
2. For roadways with two-way commercial ADT 300 or less and shoulders, the coarse aggregate shall be either natural aggregate or blast furnace slag.

508.03 Construction.

A. **Equipment.** Equipment shall be safe, environmentally acceptable, and capable of producing a quality product.

1. **Pressure Distributor.** The pressure distributor shall have a ground speed control device interconnected with the asphalt emulsion pump so that the specified application rate is supplied at any speed. The pressure distributor shall be capable of maintaining the asphalt emulsion at the specified temperature. The spray bar nozzles shall produce a uniform fan spray, and the shutoff shall be instantaneous, with no dripping. Each pressure distributor shall be capable of maintaining the specified application rate within ± 0.015 gallons per square yard for each load.
2. **Chip Spreader.** The chip spreader shall be self-propelled, equipped with pneumatic tires and with a screen to remove oversized material. The spreader shall be capable of uniformly spreading the cover material at the designated rate.
3. **Compacting Equipment.** Self-propelled, pneumatic-tired rollers, weighing not less than 8 tons shall be used.
4. **Pilot Car.** The pilot car shall be equipped with a "PILOT CAR - FOLLOW ME" sign that meets the MDOT Sign Standard G20-4. The sign shall be mounted in a conspicuous position on the rear of the vehicle.
5. **Miscellaneous.** All equipment including hand tools, thermometers, etc., shall be provided by the Contractor.

6. **Lights on Equipment.** All self-propelled equipment shall be equipped with at least one approved, flashing, rotating or oscillating amber light, visible to traffic in all directions. Chip spreaders shall be equipped with one such light on each side of the spreader.
- E. **Pre-Paving Meeting.** A pre-paving meeting between the Engineer and Contractor will be held on-site prior to beginning work. The following items will be discussed.
1. Work schedule.
 2. Traffic control plan.
 3. Equipment calibration and adjustments.
 4. Condition of materials and equipment, including transport units.
 5. Mix design(s) including job mix formula (JMF); coarse aggregate gradation; application rate of asphalt emulsion and coarse aggregate (by stationing and course).
 6. Contractor's quality control plan (method of yield check, etc.).
- C. **Seasonal Limitations.** The chip seal shall be placed when the pavement and atmospheric temperatures are at or above 55 °F. Placement is not permitted if there is threatening weather and temperatures are forecast to be below 32 °F within 24 hours from the time of work. Placement is not permitted when the existing pavement temperature is 130 °F or above. Seasonal limitations for placing all chip seals are as follows.
1. June 1 - August 15 for the Upper Peninsula
 2. May 15 - September 1 for the Lower Peninsula north of M-46
 3. May 15 - September 15 for the Lower Peninsula south of M-46
- D. **General Placement Operation**
1. The Contractor is responsible for all surface preparation that may effect the performance of the chip seal. All plastic pavement markings shall be removed by the Contractor using an abrasion method. Markings shall not be removed until just prior to the surfacing operation. All pavement to be treated shall be cleaned with a motorized powerbroom to remove all loose material. All depressions not reached by the power broom shall be cleaned using a hand broom. The outer edges of the pavement or shoulder to be treated must be thoroughly cleaned. For single chip seal and double chip seal, this cleaning shall include one foot of the adjacent paved shoulder.
 2. All vehicles and equipment involved in the chip sealing operation shall stay as close to each other as practical. At no time during the operation shall the asphalt emulsion distributor be more than 150 feet ahead of the chip spreader and at no time shall cover aggregate be placed on the asphalt emulsion after it breaks.

3. Longitudinal construction joints shall be located as follows.
 - a. Single chip seal - Longitudinal construction joint placed on a painted lane line or at the outside edge of shoulder.
 - b. Double chip seal - Longitudinal construction joint for the first course shall overlap the centerline 6 inches and the for second course shall be at the centerline.
 - c. Shoulder chip seal - Longitudinal construction joint placed at the edge of metal of the driving lane or at a location requiring a minimal overlap onto the driving lane.
 4. Rolling shall be performed within five minutes of the placement of the coarse aggregate and before the asphalt emulsion has set up. A minimum of two complete passes over the coarse aggregate is required. A complete pass is one trip, forward and backward, over the same path. Each pass shall overlap the previous pass by about one-half the width of the roller. A minimum of two rollers shall be used and the rollers shall proceed in a longitudinal direction at a speed not greater than 5 mph.
 5. The Contractor shall use the appropriate equipment and perform an initial sweeping of the completed chip seal to remove excess loose aggregate prior to the end of each day's work or within 24 hours with the approval of the Engineer. For single chip seal and double chip seal, this sweeping shall extend beyond the edge of pavement to help prevent migration of loose aggregate back onto the pavement. Loose aggregate shall not be swept into lawns, curbed areas or intersections.
 6. Before opening to traffic, the Contractor shall place "LOOSE GRAVEL" signs, (MDOT Sign Standard W8-7) with a 35 mph speed plaque mounted below. These signs shall be placed throughout the completed work, beginning 50 feet prior to the treated area in the direction of oncoming traffic at a maximum spacing of 0.5 mile.
 7. Prior to beginning the chip seal operation, the Contractor shall protect all utility castings and raised pavement markers using tarpaper or other approved materials. These protective coverings shall be removed prior to sweeping and opening to traffic.
 8. Traffic shall not be allowed on the new surface until it has cured sufficiently to prevent damage by vehicle tires. The Contractor shall protect the new surface from potential damage at intersections and driveways.
 9. When a work area is under one-lane flag control a pilot car shall be used to control the speed of vehicles in the open lane at a maximum speed of 35 miles per hour.
 1. The Contractor shall wait a minimum of 24 hours before applying the second course of a double chip seal.
- E. **Application Rates.** The Contractor shall apply the asphalt emulsion at a temperature between 160 °F and 190 °F, followed by a uniform application of coarse aggregate.

If the specified target rate is not the optimum application rate due to the gradation of the coarse aggregate or due to existing pavement surface conditions, the Contractor shall notify the Engineer, immediately. The Contractor shall then document the new JMF rate(s) by stationing.

1. Asphalt emulsion. The asphalt emulsion application rate shall be within the range of 0.37 - 0.41 gallons per square yard. The JMF target rate for the asphalt emulsion shall be 0.39 gallons per square yard.
2. Coarse Aggregate. The coarse aggregate application rate shall be within the range of 20-24 pounds per square yard. The JMF target rate for the coarse aggregate shall be 22 pounds per square yard.

- F. **Quality Control.** The following minimum measures shall be taken by the Contractor to maintain quality control and uniformity.

If the Contractor's test results exceed any of the identified quality control tolerances, placement shall stop and the Engineer shall be notified immediately. The Contractor shall identify the cause and document, in detail, the corrective action necessary to bring the operation into compliance. The Engineer must give approval prior to resumption of work.

1. Asphalt Emulsion. The asphalt emulsion application rate as determined by a 1,000-foot yield check, shall not exceed a tolerance of ± 0.01 gallons per square yard from the established JMF application rate and 0.0075 gallons per square yard average for a day's production.
2. Coarse Aggregate. The coarse aggregate application rate as determined by weighting with a one square yard tarp, shall not exceed a tolerance of ± 1.0 pounds per square yard from the established JMF application rate. The Contractor's certified aggregate technician shall collect a sample from the project aggregate stockpile once per 500 tons or a minimum of once per day's production, and perform a sieve analysis. This analysis shall meet the requirements of section 902 and be within the quality control tolerances of Table 508-1 from the established JMF.

Table 508-1: Chip Seal Aggregate Quality Control Tolerances

Sieve Size	Tolerance
3/8"	$\pm 5.0\%$
# 4	$\pm 5.0\%$
# 8	$\pm 3.0\%$

- G. **Documentation.**

1. The Contractor shall provide the Engineer a daily report with the following information.
 - a. Control section, project number, county, route, Engineer

- b. Date, air temperature, pavement temperature, humidity
 - c. Asphalt emulsion temperature
 - d. Beginning and ending stations (placement and brooming)
 - e. JMF: gradation and application rates per course (coarse aggregate and asphalt emulsion)
 - f. Yield checks on asphalt emulsion (three per day, per course, minimum and average.)
 - g. Yield checks on coarse aggregate (three per day, per course, minimum and average.)
 - h. Aggregate gradation and moisture content (one per day per type, minimum)
 - i. Length, width, total square yards
 - j. Quantity of all traffic control devices used including loose gravel signs with 35 mph speed plaques
 - k. Contractor's signature
2. Other required project documentation shall include:
- a. Aggregate certification or Shipment of Tested Stock Report (Form 1900)
 - b. Asphalt emulsion: Per current acceptance procedures
 - c. Bill of lading or delivery tickets for coarse aggregates and asphalt emulsion.

H. **Delayed Acceptance.** A minimum of 30 days after the placement of the single chip seal, double chip seal or shoulder chip seal, the Engineer in the company of the Contractor shall inspect the work for any surface flushing, surface patterns, or loss of stone retention. If any of these deficiencies are noted, the Contractor shall complete all corrective work within seven working days after the inspection or before an agreed upon date. The Contractor shall furnish materials, equipment, and labor to make the corrections to the satisfaction of the Engineer at no additional cost to the contract.

508.04 Measurement and Payment.

Contact Item (Pay Item)	Pay Unit
Seal, Single Chip	Square Yard
Seal, Double Chip	Square Yard
Seal, Shoulder Chip	Square Yard

- A. **Seal, Single Chip** includes placement of a single application of asphalt emulsion and coarse aggregate to a pavement and the accompanying shoulders as specified in the plans. Payment includes all material sampling and testing, surface preparation, brooming, and documentation.
- B. **Seal, Double Chip** includes placement of a double application of asphalt emulsion and coarse aggregate to a pavement and the accompanying shoulders as specified in the plans. Payment includes all material sampling and testing, surface preparation, brooming, and documentation.
- C. **Seal, Shoulder Chip** includes placement of a single application of asphalt emulsion and coarse aggregate to shoulders as shown on the plans. Payment includes material sampling and testing, surface preparation, brooming, and documentation.
- D. No adjustment in the unit price for chip seal will be made when the approved application rates for asphalt emulsion and coarse aggregate are within the ranges identified in subsection 508.03.E. An adjustment to the unit price may be made for an approved revision to the application rates of asphalt emulsion and coarse aggregate outside of the specified ranges. The unit price adjustment will be limited to the material costs outside the specified ranges.

The Contractor shall provide asphalt emulsion and coarse aggregate unit prices at the pre-construction meeting.