

Rejuvenator Seal Application Checklist

Preliminary Responsibilities

Project Review

- Is the project a good candidate for a rejuvenator seal?
- Has the friction been tested; is the expected reduction in friction acceptable?
- What is the existing surface type?
- Has an assessment been made of the surface absorption?
- Has much stone been lost?
- Does bleeding or flushing exist?
- Review project for bid/plan quantities.
- What is the relative cost?

Document Review

- Bid specifications
- Special provisions
- Agency requirements
- Emulsion specifications
- Traffic control plan
- Material safety data sheets
 - o Exercise care if coal tar oils are included in formulation

Materials Checks

Asphalt emulsion selection: type and dilution rate.

- The emulsion is from an approved source (if required).
- The emulsion is sampled and submitted for testing (if required).
- The water to be used is compatible with the emulsion.
- The emulsion temperature is within application temperature specifications.
- Sand, if required, is within specifications and dry.**

Pre-application Inspection Responsibilities

Surface Preparation

- The surface is clean and dry.
- All pavement distresses have been repaired.
- The existing surface has been inspected for drainage problems.

Equipment Inspections

Broom for Cleaning Existing Surface

- Bristles are the proper length.
- The broom can be adjusted vertically to avoid excess pressure.

Spray Distributor

- The spray bar is at the proper height.
- All nozzles are uniformly angled 15° to 30° from the spray bar.
- All nozzles are free of clogs.
- The spray pattern for uniformity and proper overlap (double or triple) has been checked.
- Application pressure has been checked.
- The distributor's application calibration has been checked.
- There is a working and calibrated thermometer on site.
- Water has been added to the emulsion in correct proportion and circulated. There is no foam.

Sand Spreader

- Each gate control and settings have been checked.
- Sand is free flowing.
- The chip spreader's calibration across the entire chipper head has been checked.
- The truck hookup hitches have been checked.

Haul Trucks

- The truck box is clean and free of debris and other materials.
- The truck hookup hitch is in working order.
- If a truck box apron or extension is required for loading the sand spreader, it is available.

All Equipment

- All equipment is free of leaks.
- All equipment is calibrated and clean.

Weather Requirements

- The minimum surface and air temperature requirements have been met (default 15 °C; 59 °F).
- Air and surface temperatures have been checked at the coolest location on the project.
- Air and surface temperatures meet agency requirements.

Note: High winds can create problems with the diluted emulsion application.

Note: High temperatures, humidity, and wind will affect how long the emulsion takes to break.

- The application of emulsion does not begin if rain is likely.

Determining Application Rates

- Agency guidelines and requirements are being followed.

- The absorption ability of the surface has been checked.
- More emulsion can be applied to dried-out and porous surfaces.
- More emulsion can be applied on roads with low traffic volumes.
- Do not apply to smooth, nonporous, low friction and asphalt-rich surfaces.
- Less emulsion must be applied on roads with high traffic volumes.
- Does the emulsion soak into the surface?
- If the texture is high, spray should be in both directions to avoid rain-shadow effects.

Method for Determining Emulsion Application Rates

- To get an idea of where the application rate range should be:
- Take a 1/2 liter can of diluted emulsion and pour it evenly over an area about 1 m² (or take a 1 pint can of the diluted emulsion and pour it evenly over an area about 1 yd²). (Note: conversions are approximate.)
- If the emulsion is not absorbed into the surface, decrease the amount and apply to a new 1 m² (or 1 yd²) area. Repeat the trials until the approximate application rate is found.
- If the surface looks like it will absorb more emulsion, increase the amount and apply over a new 1 m² (or 1 yd²) area.
- Repeat trials until the approximate application rate is found.
- Alternately, a Ring Test CT 345 (California Method Of Test For Determining The Quantity Of Asphalt Rejuvenating Agent Required For An Asphaltic Pavement. http://www.dot.ca.gov/hq/esc/ctms/CT_345.pdf) may be used.

Checking Application Rates

Emulsion Method A (RECOMMENDED FOR CALIBRATION)

- Record the weight of a .84 m² (1 yd²) pan or nonwoven geotextile material.
- Place the pan or geotextile on the road surface.
- Have the distributor apply emulsion over the pan or geotextile.
- Record the weight of the pan and emulsion or the geotextile with emulsion.
- Subtract the two weights to determine the weight of the emulsion applied.

Emulsion Method B (RECOMMENDED FOR RANDOM CHECKS)

- Park the distributor on level ground. Measure and record the number of L (gal) of emulsion.
- Measure off a known area for a test section.
- Have the distributor apply emulsion to the test section.
- Park the distributor on level ground and remeasure the emulsion.
- Subtract the two measurements to obtain the volume of emulsion applied.
- To determine the application rate, divide the amount of emulsion applied by the test area—L/m² or gal/yd² (if using feet, length x width/9 = yd²).

Traffic Control

- The signs and devices used match the traffic control plan.
- The setup complies with local agency requirements or the Federal Manual on Uniform Traffic Control Devices (MUTCD).
- Flaggers do not hold the traffic for extended periods of time.
- Any unsafe conditions are reported to a supervisor (contractor or agency).
- The pilot car leads traffic slowly—40 kph (24 mph) or less—over the fresh seal coat.
- Signs are removed or covered when they no longer apply.
- Traffic is not returned to full speed until the friction has been tested and judged to be at an acceptable level.

Project Inspection Responsibilities

Sand Application (where used)

- Enough trucks are on hand to keep a steady supply of sand for the spreader.
- Application starts and stops with neat, straight edges.
- Application starts and stops on building paper.
- No emulsion is on top of the sand.
- Application is stopped as soon as any problems are detected.
- Application appears uniform.
- Checks are made for streaks and plug-ups.
- Sand should not be applied until the emulsion has broken or been completely absorbed into the surface. Otherwise, the sand may form a low friction slurry with the emulsion.

Emulsion Application

- Building paper is used to start and stop emulsion application for straight edges.
- Emulsion is within the required application temperature range.
- Application appears uniform.
- Checks are made for drilling and streaking.
- Nozzles are checked for plugging.
- Random application rate checks are performed.
- The distributor adjusts speed to match chip spreader speed to prevent stop-start operations.
- The distributor is stopped if any problems are observed.

Truck Operation

- Trucks are staggered across the fresh rejuvenator seal coat to avoid driving over the same area.
- Trucks travel slowly on the fresh seal.

- Stops and turns are made gradually.
- Truck operators avoid driving over exposed emulsion.

Brooming

- Brooming begins as soon as possible only if sand is applied.
- Brooming should be light and done once to remove excess only.

Opening the Rejuvenator seal to Traffic

- Traffic travels slowly—40 kph (24 mph) or less—over the fresh seal until seal is broomed and opened for normal traffic.
- Reduced speed limit signs are used when pilot cars are not used.
- After brooming, pavement markings are applied before opening pavement to normal traffic.
- All construction-related signs are removed when opening pavement to normal traffic.
- Traffic should not be returned to normal speed until it has been determined that friction is at an acceptable level.

Cleanup Responsibilities

- All loose sand from brooming is removed from the travel way.
- Excessive emulsion application or spills are removed.

Common Problems and Solutions

Excessive splattering of the emulsion:

1. Emulsion has been diluted too much.
2. Bar is incorrectly set.
3. Spray pressure is too high.

Streaking or drill marks are appearing in emulsion:

1. Emulsion is too cold.
2. Viscosity of the emulsion is too high.
3. All nozzles are not at the same angle.
4. Spray bar is too high.
5. Spray bar is too low.
6. Spray bar pressure is too high.
7. Nozzle is plugged.

Emulsion bleeding or flushing occurs:

1. Emulsion application is too high.
2. Emulsion is not allowed to cure or penetrate surface before application of sand.

Friction is too low:

1. The friction was too low before construction, or the surface not porous enough to accept emulsion.
2. The emulsion application is too high
3. The emulsion is not allowed to cure or penetrate the surface before application of sand.
4. Sand has not been properly applied.
5. Sand has not been properly swept.
6. Manufacturer's recommendations for application rates of emulsion and sand have not been followed.
7. Traffic is not properly controlled.

Note: Rejuvenator oils on the surface of uncoated aggregates or impermeable surfaces will reduce friction significantly. Sanding can help. Supplier recommendations should be strictly followed.

Sources: Information in this checklist is based on or refers to the following sources:

Application Guides. 1992.

Asphalt Emulsion Manufacturers Association.

Annapolis, MD

Asphalt Emulsion Handbook, Manual Series No. 4. 2000.

Lexington, KY: The Asphalt Institute.

Basic Asphalt Emulsion Manual, Manual Series No. 19. 1999.

Lexington, KY: The Asphalt Institute.

Manual on Uniform Traffic Control Devices, Millennium Edition. 2000.

Washington, DC:

Federal Highway Administration.