

APPENDIX A

GUIDELINES FOR USING WATER-BORNE TRAFFIC PAINT

Missouri Department of Transportation
Traffic Engineering

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1. OPERATIONS

Special care must be taken when using water borne (sometimes referred to as water based) paint in your equipment.

1.1 Handling Paint

During loading procedures, special care must be exercised to prevent air from entering the material system. A water source should be at the loading facility to flush the area with water before loading and then flush any spillage after loading.

Do **not** exceed the manufacturer's maximum paint temperature of 160° F. Thermostats on the bulk storage tanks should heat the paint from 40° F to 50° F with a safety device to prevent paint from being heated beyond this temperature range.

Brass and copper will cause a chemical reaction with the heated water borne paint. All heat exchangers and ball valves must be stainless steel.

1.2 Daily Maintenance

Do not run the tanks dry. An empty tank allows air into the system causing a "tree ring effect" and, after this happens several times, the system will need to be completely torn down and cleaned. After each daily use, remove gun shrouds and fan atomizing assemblies from paint guns, and clean with water and a soft brush. Clean the fluid tip of the guns with a wet rag or brush.

For overnight storage, completely fill the paint tanks with paint. To prevent paint surface drying (skins), it might be necessary to pour some water (1 pint) on top of the paint after the truck has been parked. You should check for skins on paint in tanks before starting each day. Do **not** add more than this small amount of water. More water will change the paint formulation and affect drying time and durability.

It is important not to inject water into heat exchangers except during cleaning. Leave exchangers full of paint. It is necessary to turn off glycol to the heat exchanger prior to daily shutdown to allow paint to cool in the exchanger.

1.3 Weekly Maintenance

For weekend storage, flush water through the heated hoses and out of the paint guns. Clean strainer at discharge of heat exchangers.

1.4 Periodic Cleaning

Remove paint strainer at discharge of paint tank, clean and replace, and fill strainer with paint to remove trapped air after flushing entire system with water. Also, clean heat exchanger at this time. This should be done every two weeks of operation, or more often if needed.

1.5 End of Season Cleaning

Flush complete paint system thoroughly with water. If needed, use a mixture of 75 percent water and 25 percent methanol. Remove all drain plugs to prevent settling of solvent and paint in low spots.

Remove ends of heat exchanger and inspect to determine if additional cleaning is necessary.

Over a period of several months of normal operation, paint will gradually settle in the heat exchangers. It may harden or remain a putty-like condition which will plug the tubes and interfere with normal paint flow.

The heat exchanger cover can be easily removed and the ends unbolted. Be sure to remove the exchanger ends by pulling them directly away from the body. Do not slide them. Some heat exchangers have small reinforcing pins and the tube sheet dividers which are designed to help hold the gasket in place and these can be bent or broken. The tubes should be individually routed clean.

The exchanger should be pressure tested (100 psi) for damaged tubes. Any tubes that leak air should be silver soldered shut at both ends. The heater is then blown out, washed in water and reassembled using new gaskets.

It might be necessary to scrape off the paint build-up on the tanks and agitators.

If possible, the bulk storage tanks should be emptied with no winter carry-over of paint. The entire system should be flushed with a 75 / 25 percent solution of water and methanol and the entire paint residue scraped off, if necessary.

2. GENERAL INFORMATION

2.1 Hazardous Waste

Water borne traffic paints currently used by the Missouri Department of Transportation do not contain lead, chromium, cadmium or barium and are, therefore, not considered hazardous waste material.

2.2 Flammability

Water borne paints used by the Missouri Department of Transportation are not flammable. Therefore, sprinklers are not required for inside storage, nor do we need warning plaques on the striper.

2.3 Storage

The shelf life of currently approved material is nine months.

Water borne paint consists of acrylic vehicle suspended in a water emulsion. As a result, the materials must be stored where they will not freeze (40° F maintained). If the paint freezes, it is not usable or recoverable and must be disposed of properly.

If water borne paints go out of condition, it is not recoverable. When the paint looks like cottage cheese, it is out of condition.

2.4 Cleaning Solvents

When wet, water borne paints can be cleaned with plain water; therefore, the main cleanup solvent is clean water.

When the paint is too dry for water to work, general household cleaners such as "Fantastic" can be used. When this does not work, a solution of 75 percent water and 25 percent methanol is required to remove the paint.

2.5 Application Temperatures and Dry Times

Water borne traffic paints cure by a two stage process. In the first stage, the water evaporates and the acrylic emulsion coalesces. This evaporation is dependent on temperature and humidity. Low temperature and high humidity gives longer dry times. In the second stage, the acrylic polymer cross-links to provide a durable film. This reaction is dependent on the temperature. 50° F is the recommended minimum

application temperature. Below 50° F, the polymer will cross-link (down to 35° F) but the durability of the film will be severely reduced, i.e. 2 to 3 months instead of 9 to 12 months.

Dry times are dependent on temperature and humidity. Under conditions of 75° F, sunny and light wind, this material will dry to no-track in less than two minutes. If faster dry time are needed, reduce the film thickness from 15 to 13 mils and increase the bead rates from 6 to 8 or 10 pounds per gallon of paint applied. **Do not** increase material temperatures in an attempt to get faster dry times. Thick applications retard dry times.

If materials are applied below 50° F, extended dry times might be a problem.

2.6 Weather

Water borne traffic paints are sensitive to wet pavements and rain. Best results are obtained when pavements are dry (24 hours since measurable rain) and no rain occurs for four hours after application.

As we cannot control the weather, here are some reasonable rules of thumb:

1. Do not stripe on visibly wet pavements even though it has not rained recently.
2. Lines need an hour to dry before any rain. If it looks threatening, don't chance it. You may have to repaint.
3. If it does rain a significant amount, wait until the next day before trying again.

2.7 Application Rates

Application rates for water borne traffic paints are the same as those for solvent based paints. These are 14 to 16 mils (excluding beads) and 8 pounds of small beads or 10 pounds of large beads per gallon. Thick paint applications adversely effect drying time.

2.8 Material Temperatures

For best results, water borne paints may be heated to 100° F \pm 10° F. Viscosity is very dependent on material temperatures as is ease of spraying. **Do not exceed 160° F anywhere in the paint system.** Excess temperatures will jell the paint with disastrous results; you might have to replace the heat exchangers.

2.9 Existing Markings

Water borne paints have not exhibited problems when applied over old markings. To date, old markings include alkyd paint and thermoplastic. Water borne paints appear to be good for use on PCC pavements. They perform very well on new asphalt pavements.