Paint application guidelines for acrylic water-based traffic paints. FASTRACK™
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Advantages of water-based traffic paints!

Acrylic water based traffic paints are not flammable, can be applied at ambient temperatures and offer the potential to reduce VOC (Volatile Organic Compounds) emissions related to road striping by up to 90%. Combined with their excellent road performance, this makes them a preferred road-marking solution from the points of view of worker’s safety and environmental impact. However, because they are supplied in water and are formulated to dry quickly, there is no denying that traffic paints based on FASTRACK™ water-based technology require a somewhat different approach to handling, application and clean-up compared to solvent-borne traffic paints.

The use of acrylic water-based technology brings various advantages to the community and to the people who handle the paints, including:

- Reduced Health & Safety hazards.
- Much less solvent emissions than solvent-borne paints.
- Proven excellent road performance in type I and type II marking systems.
- Long term cost-effective road-marking solution.

If you are getting set to apply water-based road marking paint for the first time, we hope that the following pages help make your project straightforward and successful. Application and clean-up of the paint is not difficult as long as housekeeping is good!

If you have used solvent-borne road marking paints in the past, the special nature of water-based paints mean a somewhat different approach is required to paint handling and equipment specification. Trouble-free handling is easy to achieve if good practice is used.

If you are an experienced user of water-based road marking paints, we are confident that reading this brochure will increase your knowledge and help ensure that your projects continue to be successful.

In these pages, you’ll find suggestions and practical, hands-on tips that can help prevent problems and assist you in using traffic paints based on FASTRACK™ water-based technology in the most efficient and effective way possible.
Storage recommendations

1. Paint cans/IBCs should be stored out of direct sunlight.

2. Paint cans/IBCs should be stored in a warehouse with temperatures between 5°C to 35°C.

3. Paint should not be used after the shelf life time given by the paint manufacturer. Drying performance and glass beads retention may decrease if shelf life is exceeded.
Paint circuit type

- Paint supply (Drum, IBC)
- Suction filter
- Paint Pump
- Filter
- Accumulator
- Spray gun
- Recycle valve
Many types of spray equipment used by contractors to apply conventional solvent-based paints may not be suitable for spraying water-based traffic paints, because the plumbing may not be compatible with fast-drying water-based paint.

That’s because acrylic water-based traffic paints are alkaline in nature and will react with brass, copper, iron, aluminium, and particularly mild and galvanized steel. These materials are all commonly found in piping, fittings, valves, filters and internal parts of spray guns such as needles, nozzles and air caps.

Over time, water-based paints can dissolve these metals until their concentration is high enough to cause the paint to thicken and ultimately gel. When this happens, the consequences can range from solidified materials on the filters to totally clogged lines, valves and more.

Any equipment surface that comes into direct contact with traffic paint based on FASTRACK™ water-based technology — such as piping, fittings, valves, filters, heat exchangers and internal parts of spray guns — must therefore be made of grade 304 or higher stainless steel.

Whilst holding tanks made of mild steel are sometimes coated with a good quality two-pack epoxy instead of retrofitting with stainless steel, such coatings may fail after only one or two years in service.

For this reason, it is suggested that applicators opt for stainless steel tanks despite the added initial expense.

In addition, some types of plastic tubing and fittings - and certain types of rubber hose - can be used, but may not last as long as stainless steel under heavy, sustained use. Unless your equipment was purchased specifically to spray water-based paints, partial or complete retrofitting may be required. To avoid major problems, always check what materials your equipment is manufactured from before loading and spraying.

Due to the particular handling characteristics of water-based paint, a greater volume of paint is required within the spray gun at any one time, in order to spray at the same rate as solvent-borne paints. Most older trucks were plumbed with ½” piping, fittings, valves and hoses, which restricts water-based paint and lowers its volume.

The solution is to change to ¾” hoses, piping, fittings and valves, which will increase the volume in the gun while keeping the same spreading rate.

Note that waterborne paints typically have a higher density than solvent-borne paint, hence about 10% less spreading rate (in microns) is needed to apply the same weight by surface area.
Spray equipment

All types of spray equipment can be used to apply water-based traffic paints (as long as surfaces coming into contact with the paint are made of stainless steel). Airless spray is commonly used because it delivers the greatest volume of paint, has the fastest application rate compared with any other equipment and produces a sharper line than conventional air spray. However, air-assisted spray equipment is less costly. Air spray is also more “forgiving” and generally results in fewer problems from tip clogging.

Water-based traffic paints need slightly higher pot and atomization pressures in air spray systems than conventional solvent-borne paints; however, this does not hold for airless spray systems which usually need much lower pump pressure and a smaller nozzle size.

Dow suggests using non-bleeder type guns with traffic paints based on FASTRACK™ water-based technology. Bleeder type guns are not recommended as they can cause the paint to dry more quickly within nozzles and air caps and eventually cause them to clog.

This will become more evident when “skip lines” are sprayed. Some spray guns are designed to be set up as bleeder or non-bleeder type guns (e.g. Kamber Guns).

If you are using bleeder type spray guns with fast-drying paint, you will need to do some things differently to keep tip clogging to an acceptable level. When you stop spraying, flush the gun(s) immediately and shut the air off by turning the “three way valve” to the off position. This will stop the flow of air through the gun tip.

Tips to avoid clogging of the nozzles:

- When application with airless is stopped for few minutes, turn the nozzles by 90° to avoid the paint to dry and clog the nozzles.
- Additional cleaning with humid brush into the safety guard may also help to avoid this issue.
- For low pressure application, a spray of water on the exterior nozzle should be enough.
- Using a Teflon-spray to coat parts which may come into contact with paints, avoids the adhesion of dry paint and clogging of nozzles.
Paint pumps

Transferring water-based paint from drums or totes to the striping truck should be done using “low shear” diaphragm pumps. Gear pumps and other “high shear” pumps can break down the paint and cause “seediness” which can plug filters and spray tips. During loading, minimize the amount of time the water-based paint is exposed to air because the paint dries rapidly and will skin over. For the same reason, air must be prevented from entering lines, valves, etc. (That is, an airtight system is necessary).

If possible, thoroughly stir the paint in the drums or totes before pumping into the striping truck to help ensure a good mix of resin and pigments. If the drums or totes are delivered with skins already formed on top, you may want to specify that the supplier uses plastic liners and pours a small amount of ammonia/water mixture on top to prevent skins from forming in future.

If there is skin formation, remove it before any application. Never try to re-dissolve it by mixing the skin into the paint.

Fast-drying water-based paint is generally formulated to be used as supplied. Never add solvents used in solvent-borne paint to water-based paint as it will gel immediately.

Tip

If the paint doesn’t spray very well and isn’t pulverized with a nice and large pattern, there are 2 ways to achieve good sprayability.

1. Viscosity of water-based paint is slightly higher than solvent-borne paint. So spray settings must be adapted to this particularity. Pump pressure may be increased and/or nozzle must be changed to a higher angle or size for airless. For low pressure, the viscosity change is less impacting to sprayability. Nevertheless slight high pressure into the paint tank helps as well as adjusting angle, widths and flow rates of the internal and external nozzles.

2. Viscosity of the paint may also be decreased by dilution with water and only with water. The maximum dilution is 2% on paint but take into account the opening time to the traffic will be slightly longer. This time increase will be even higher if the relative humidity is high.
Paint filters

Paint companies generally filter at around 500 µm. To the best of our knowledge the smallest tip routinely used in an airless spray would be on a pedestrian unit and that is usually 375 µm. Therefore, using small filters in terms of both aperture and capacity on road marking equipment is a recipe for down time! Some points on filter choice are:

- Filters should be on the suction side of the pump.
- Filters should be about 10% smaller than the intended tip size.
- Filters are designed to remove larger skins or flakes that have formed during storage.
- Filter bags made from nylon or synthetic should be cleaned/changed regularly.
- Additional filters can be placed between the pump and spray gun.

Paint accumulators

Paint pulsing is a common cause of line "pinching". It may occur at each stroke of the pump and is more common with higher viscosity paints. It can be overcome by fitting a one litre nitrogen-charged accumulator between the pump and the spray guns. Specialized equipment manufacturers use hoses made from flexible material that help absorb the pulse and can work as an accumulator (length 10-15 m).
Paint and glass beads spreading rates

Only use glass beads specifically surface treated for waterbased paints, preferably with a dual coating for both adhesion and floatation. This treatment of glass beads will optimize the embedment of glass beads into the waterbased paints (50-60%). Optimized embedment gives the maximum of retro-reflectivity and highest resistance to the traffic. The treatment also improves the adhesion between glass beads and paints during the entire life of the system.

Glass beads particle size range must be adapted to the wet paint thickness. Average particle size should be similar the wet film thickness to obtain a good glass beads embedment into the wet paint. Our recommendations for spreading rates are the following:

- 500 g/m² or 350 µm wet film thickness for a standard application on Type I road application and for example 350 g/m² of 125-600 µm glass beads.
- For Type II road markings, our recommendation is to apply around 600 µm wet film thickness or 800-1000 g/m² with for example 400-1200 µm glass beads at 800 g/m² spreading rate.
- These recommendations must be adapted to the roughness of the pavement.
Dow- test-road – France
Any paint circuit, even when correctly installed, will only meet the customer’s specification if it is operated within its capability. Of course, if operated outside these design parameters the customer will not get what they paid for. The role of calibration and measurement is therefore critical to ensuring happy customers. It is also important for contractors to meet the specification first time in order to avoid the embarrassment and cost of a recall. Achieving the correct wet film thickness and maintaining this throughout a day’s work requires careful calibration and measurement.

Three methods can be used.

Method 1

Application of paint on a test plate at the target application speed. The wet film thickness is then measured via a wet film gauge (see pictures below) or wheel.

Apply thickness gauge on the wet paint.

Determine the wet film thickness visually.
Method 2

Spreading rates (g/m²) can also be easily determined by a calculation of applied paint weight (g) divided by applied paint surface (m²). Apply the paint on a panel at the desired width. Then weigh the quantity of paint applied. An example is given below with an application on a Leneta chart.

For a target of 450 g/m² at 15 cm line width, 29.6 g must be obtained in the Leneta chart (43.8 cm length).

Tables with more spreading rates can be supplied on request.

Method 3

This method uses a stationary vehicle. The spray gun is activated and the paint collected in a plastic bag. The bag is weighed and a simple conversion table will establish the weight film thickness at various target vehicle speeds.

<table>
<thead>
<tr>
<th>Line width (cm)</th>
<th>10.0</th>
<th>11.0</th>
<th>12.0</th>
<th>13.0</th>
<th>14.0</th>
<th>15.0</th>
<th>16.0</th>
<th>17.0</th>
<th>18.0</th>
<th>19.0</th>
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<tr>
<td>Panel length</td>
<td>43.8 cm</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applied surface (cm²)</td>
<td>438.0</td>
<td>482.0</td>
<td>526.0</td>
<td>570.0</td>
<td>614.0</td>
<td>658.0</td>
<td>702.0</td>
<td>746.0</td>
<td>790.0</td>
<td>834.0</td>
<td>878.0</td>
</tr>
<tr>
<td>Spreading rate g/m²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>17.5</td>
<td>19.3</td>
<td>21.0</td>
<td>22.8</td>
<td>24.6</td>
<td>26.3</td>
<td>28.1</td>
<td>29.8</td>
<td>31.6</td>
<td>33.4</td>
<td>35.1</td>
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<tr>
<td>410</td>
<td>18.0</td>
<td>19.8</td>
<td>21.6</td>
<td>23.4</td>
<td>25.2</td>
<td>27.0</td>
<td>28.8</td>
<td>30.6</td>
<td>32.4</td>
<td>34.2</td>
<td>36.0</td>
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<tr>
<td>420</td>
<td>18.4</td>
<td>20.2</td>
<td>22.1</td>
<td>23.9</td>
<td>25.8</td>
<td>27.6</td>
<td>29.5</td>
<td>31.3</td>
<td>33.2</td>
<td>35.0</td>
<td>36.9</td>
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<tr>
<td>430</td>
<td>18.8</td>
<td>20.7</td>
<td>22.6</td>
<td>24.5</td>
<td>26.4</td>
<td>28.3</td>
<td>30.2</td>
<td>32.1</td>
<td>34.0</td>
<td>35.9</td>
<td>37.8</td>
</tr>
<tr>
<td>440</td>
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<td>21.2</td>
<td>23.1</td>
<td>25.1</td>
<td>27.0</td>
<td>29.0</td>
<td>30.9</td>
<td>32.8</td>
<td>34.8</td>
<td>36.7</td>
<td>38.6</td>
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<tr>
<td>450</td>
<td>19.7</td>
<td>21.7</td>
<td>23.7</td>
<td>25.7</td>
<td>27.6</td>
<td>29.6</td>
<td>31.6</td>
<td>33.6</td>
<td>35.6</td>
<td>37.5</td>
<td>39.5</td>
</tr>
<tr>
<td>460</td>
<td>20.1</td>
<td>22.2</td>
<td>24.2</td>
<td>26.2</td>
<td>28.2</td>
<td>30.3</td>
<td>32.3</td>
<td>34.3</td>
<td>36.3</td>
<td>38.4</td>
<td>40.4</td>
</tr>
<tr>
<td>470</td>
<td>20.6</td>
<td>22.7</td>
<td>24.7</td>
<td>26.8</td>
<td>28.9</td>
<td>30.9</td>
<td>33.0</td>
<td>35.1</td>
<td>37.1</td>
<td>39.2</td>
<td>41.3</td>
</tr>
<tr>
<td>480</td>
<td>21.0</td>
<td>23.1</td>
<td>25.2</td>
<td>27.4</td>
<td>29.5</td>
<td>31.6</td>
<td>33.7</td>
<td>35.8</td>
<td>37.9</td>
<td>40.0</td>
<td>42.1</td>
</tr>
<tr>
<td>490</td>
<td>21.5</td>
<td>23.6</td>
<td>25.8</td>
<td>27.9</td>
<td>30.1</td>
<td>32.2</td>
<td>34.4</td>
<td>36.6</td>
<td>38.7</td>
<td>40.9</td>
<td>43.0</td>
</tr>
<tr>
<td>500</td>
<td>21.9</td>
<td>24.1</td>
<td>26.3</td>
<td>28.5</td>
<td>30.7</td>
<td>32.9</td>
<td>35.1</td>
<td>37.3</td>
<td>39.5</td>
<td>41.7</td>
<td>43.9</td>
</tr>
</tbody>
</table>
Adjusting and calibrating glass beads

Two methods can be used.

Method 1

On a panel similar to that used to determine paint spreading rates by weighing (method 2, on the right), apply a full system (paint and glass beads) on a Leneta chart. Weigh the panel and subtract the paint weight - then calculate the spreading rate of glass beads in g/m². Tables with more spreading rates can be obtained on request.

Method 2

Glass beads can also be measured very easily using the volume method, which is reasonably accurate. You’ll need the following equipment:

- A plastic bag or tray of at least three litres in capacity.
- A plastic measuring cylinder with a three litres capacity, graduated in milliliters.
- A stopwatch.

The test procedure is as follows:

- Turn off the road marking paint supply valves and operate the glass beads dispenser for exactly 10 seconds, collecting the glass beads in the plastic bag or tray.
- Pour the glass beads from the bag or tray into the measuring cylinder. Level, but do not compact the glass beads in the cylinder. Record the volume of glass beads collected.
- Compare the volume of beads collected with the specified volume at the right line width and speed, shown in the following table (target 340 g/m² on 125-600 µm particle size).
- If the glass bead application rate is outside specification limits, adjust the dispenser and re-measure until you obtain the right application rate.
- Tables for different spreading rates can be obtained on request.
<table>
<thead>
<tr>
<th>Line width (mm)</th>
<th>Application speed (km/hr)</th>
<th>Volume in ml of glass beads dispensed in 10 sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>6</td>
<td>300, 380, 450, 560, 760</td>
</tr>
<tr>
<td>100</td>
<td>7</td>
<td>350, 440, 530, 660, 880</td>
</tr>
<tr>
<td>120</td>
<td>8</td>
<td>400, 500, 610, 760, 1000</td>
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<tr>
<td>150</td>
<td>9</td>
<td>450, 560, 690, 860, 1120</td>
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<td>200</td>
<td>10</td>
<td>500, 620, 770, 960, 1240</td>
</tr>
<tr>
<td></td>
<td>11</td>
<td>550, 680, 850, 1060, 1360</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>600, 740, 930, 1160, 1480</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>650, 800, 1010, 1260, 1600</td>
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<td>700, 860, 1090, 1360, 1720</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>750, 920, 1170, 1460, 1840</td>
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<td></td>
<td>16</td>
<td>800, 980, 1250, 1560, 1960</td>
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<td></td>
<td>17</td>
<td>850, 1040, 1330, 1660, 2080</td>
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<td>900, 1100, 1410, 1760, 2200</td>
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<td>950, 1160, 1490, 1860, 2320</td>
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<td>24</td>
<td>1200, 1460, 1890, 2360, 2920</td>
</tr>
<tr>
<td></td>
<td>25</td>
<td>1250, 1520, 1970, 2460, 3040</td>
</tr>
</tbody>
</table>
Climatic conditions

Waterborne paints based on FASTRACK™ technology dry much faster than conventional waterborne paints especially at high humidity. However they remain more sensitive to climatic conditions than solventborne paints. Key parameters that will affect drying time are low air and ground temperatures, high relative humidity, dew and rains.

- Always check weather forecast. Do not start application if heavy rain is expected within 2 hours.
- As for other road-markings, do not paint on wet surfaces.
- Do not apply below 10 °C or over 40°C air temperature.
- Air humidity has a strong influence on drying time. When applying above 80% air humidity, we strongly recommend the use of beads containing FASTRACK™ QS-2 to accelerate drying.

As an indication, these are recommended minimum times to open traffic after application of a 300 microns FASTRACK™ waterborne paint with glass beads depending on air humidity and temperature.

<table>
<thead>
<tr>
<th>Relative humidity</th>
<th>&lt;10°C</th>
<th>10-20°C</th>
<th>20-40°C</th>
<th>&gt;40°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-50%</td>
<td>10-20 min</td>
<td>5-15 min</td>
<td></td>
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</tr>
<tr>
<td>50-80%</td>
<td>15-30 min</td>
<td>10-25 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80-90%</td>
<td>30-60 min</td>
<td>20-45 min</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

FASTRACK™ QS-2 is recommended
**FASTRACK™ QS-2 drying accelerator**

FASTRACK™ QS-2 Drying Aid absorbs water from the wet film and causes a very rapid decrease in pH, which accelerates the quick-set mechanism of the FASTRACK™ Polymer in the paint. The paint very quickly becomes resistant to wheel roll-overs and to the rain that may fall soon after application. As a result, it is possible to achieve good performance of waterbased paints even when air humidity is very high.

FASTRACK™ QS-2 technology is available from glass bead manufacturers.

**Pavement**

Waterborne paint can be applied on different road surfaces as well as on old markings. The quality and cleanliness of the substrate will influence paint adhesion and therefore the durability of the road-marking system.

- Ideally clean application area with water blasting few days before the paint application.
- If possible install an air blower before of the paint gun to remove dust or aggregates.
- For fresh concrete, wait for minimum 1 month of curing before applying waterborne paint due to the high alkalinity of the substrate.
Traffic paints made using FASTRACK™ emulsions are designed to dry extremely quickly. However, these paints will clean up very easily with just plain water when in their liquid state. For that reason, clearing and cleaning tanks, lines and spray guns is not problematic.

**Daily clean-up**

Use only clean water for paint flushing or equipment washing. Air caps and nozzles must be removed and cleaned carefully with water using a nylon brush (such as a toothbrush).

Suction and circuit filters must be checked carefully too.

Never allow the paint to “dry through” in the lines, or on the guns and tips. Air caps, nozzles and the fluid tip of the gun should be removed daily and cleaned with ammonia/water and a soft wire brush.

**Tip**

*Stop striping before you run out of paint, so that you leave the lines full of paint – this will help prevent air from entering the system.*

It’s a good idea to flush the guns immediately if you stop spraying paints made with FASTRACK™ emulsions even if it’s just for a few minutes.

Tanks should be left filled with paint at the end of the day. To help preventing surface skinning, it may be necessary to pour a small amount of ammonia/water on top of the paint after the truck has been parked. Always check for skins in the tanks before starting up each day. When sitting overnight, the system should be closed. Make sure the pump pressure is off if it is an airless system. If the system has not been in use for a long time, flush with ammoniated water.

If the paint dries through, cleaning with MEK or acetone will soften the paint enough to remove it from the equipment.
End of season clean-up

The entire system should be thoroughly drained and then flushed with water (remove all drain plugs and any piping in low spots). Lines, guns, tips, nozzles and air caps should be removed and cleaned. Replace all O-rings seals in the guns at the start-up of the next striping season.

When changing from solventborne paint to waterbased paint, the following cleaning procedure is recommended:

1. Clean all the spray equipment with the solvent used in the last paint applied until obtaining a clear spray. Do not forget the recycling circuit.
2. Clean carefully all the equipment with acetone (for example 5 liters for a small machine). Do not forget the recycling circuit.
3. Clean with water all the equipment until no odor of acetone is present into the water spray (for example 10 liters for a small machine).
4. Check all the filters and clean them if necessary.
5. Clean the head of the spray gun with acetone and water. Attach particular attention to the nozzles.
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