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PRINTING WITH
ANCHOR® ALCOHOL SUBSTITUTES
INTRODUCTION

Our technical staff recognizes the need to provide helpful information for pressmen and pressroom managers.

The purpose of this technical guide is to acquaint you with the Anchor® Brand of alcohol replacement substitutes [ARS], Emerald® acid fountain solutions for use with ARS, and Emerald® Premium single-package alcohol replacement fountain solutions. In addition, we provide helpful techniques for the successful use of these products.

These products are used worldwide in hundreds of pressrooms, from the smallest sheetfed shop to many of the world's largest web plants. You may have already read about running without alcohol, and you may have tried some substitutes which didn't perform to your satisfaction. The Anchor® Brand of ARS, Emerald®, and Emerald® Premium products are easy to use and require only the awareness of a few differences between their use and the use of alcohol.

We hope you find this guide to be interesting and instructive. Please refer to our other technical guides—Water, pH, and Conductivity For Printers and The Function of Fountain Solution in Lithography—for additional information on water chemistry and the lithographic process.

If you have any questions or comments, please feel free to call or contact us.

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**ALCOHOL SUBSTITUTES**

Printers with continuous dampening systems are aware of the negatives of running alcohol. The contribution to air pollution, undesirable worker exposure, flammability, cost, and a reduction in ultimate print quality are all drawbacks. Our ARS products are safe alternatives to alcohol-based products. They are alcohol-free, two-part products designed to be used with two-part fountain solutions. When used as directed, these products efficiently simulate the performance of alcohol without the undesirable side effects.

**ARS Products**

ARS-JP is a strong alcohol replacement, proven to be effective on presses equipped with continuous dampening systems. It is recommended for Dahlgren type dampening systems.

ARS-ML, proven to be effective in eliminating alcohol on a variety of sheetfed presses, will quickly achieve optimum emulsification for easy ink/water balance. It is recommended for Heidelberg Alcolor dampening systems.

ARS-WL offers a wider than usual ink/water balance window more like alcohol. It contains no HAPs solvents and is safe for all CTP plates. It is an excellent choice for UV and hybrid inks.

ARS-X contains no HAPs and is proven to be effective in eliminating alcohol on presses equipped with continuous dampening systems. It is recommended for the Crestline and Kompac dampening systems.

**Product Features**

- Non-flammable.
- Reduces VOC compared to alcohol use.
- Designed to be easy to run.
- Will not alter conductivity readings.
- Offers a wide ink/water balance more like alcohol.
- Reduces ink feedback, eliminating the need for frequent maintenance and cleaning of the dampening rollers.
- Minimizes adjustments and tends to compensate for the effects of alcohol.
- Provides variable wetting—as more is used, greater surface tension reduction will occur.

**Dosage / Directions**

Use 2 to 4 ounces per gallon, as needed, to replace alcohol and achieve the desired level of wetting power. To use, pour directly into dilute fountain solution.
**Product Features**

Please refer to our product data sheets for specific product features and to find the appropriate product for your specific needs.

- Wide latitude of operation.
- The fastest start-ups.
- Clean reverses with the sharpest dot and excellent halftone reproduction.
- Excellent non-piling performance.
- Reduces feedback on continuous dampening systems.
- Elimination of problems with alkaline papers and aqueous plates.

**Dosage / Directions**

Emerald® JR fountain solutions run best when excessive use is avoided. The majority of these two-part products have been designed to run at a starting concentration of 2 to 3 ounces per gallon. If required, this dosage can be increased to provide stronger desensitizing. It is recommended that you verify pH and conductivity of the press-ready solution by preparing a control sample using local water at the desired dosage. Record the pH and conductivity to serve as your target numbers.

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**Emerald® Products**

The Emerald® brand of fountain solutions have become a standard in the graphic arts industry. As two-part [or two-step] solutions, they are specially formulated for use with alcohol substitutes or alcohol.

Our most popular Emerald® product is the “JR” series. These are designed with built-in drying stimulators which decrease the setting and drying time of ink. They are available for a variety of water conditions and designed to meet additional specific needs.

- **JR**—Deionized to soft water.
- **JRH**—Hard water.
- **JRM**—Medium water; good for CTP plates.
- **JRT**—Soft to medium water; specially formulated to run on aqueous plates.
- **JRZ**—Soft to medium water; is a low phosphate product that helps to control calcium.

Our other popular series include low VOC, PF [phosphate-free], and the original Emerald® products.

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**ANCHOR® TWO-PART SOLUTIONS**

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Our other popular series include low VOC, PF [phosphate-free], and the original Emerald® products.
**ANCHOR® SINGLE-PACKAGE SOLUTIONS**

**Emerald® Premium Products**

These single-package or one-step products are “total” solutions. They are formulated with both fountain solution and an alcohol substitute, are available for both sheetfed and web presses. Some of our popular series include:

- **MXE Series**—These are the original formulas that solved the ink feedback problem on web presses running zero alcohol and have the widest ink/water windows of any fount on the market. These are recommended for small presses using Crestline and Kompac dampening systems.

- **KDM Series**—These are low VOC solutions. KDMA has increased phosphates for fast restarts on PDI plates. KDMC is recommended for thermo CTPs and is the TEC compliant version of KDMA for presses with catalytic converters.

- **Q Series**—CPQ has a strong buffer system that is good for alkaline papers. PAQ has phosphates for faster restarts and a wider range of waters. PAQ-P is best for polyester plates. PAQ-R controls blinding and stripping often associated with running coated paper. PAQ III eliminates the blinding often associated with aqueous plate images.

- **WOG**—This is a high-dose sheetfed product for use in soft to medium-hard water. It contains extra phosphates for fast starts and restarts and is compatible with all types of plates.

**Product Features**

Please refer to our product data sheets for specific product features and to find the appropriate product for your specific needs.

- Single-package product combining fountain solution and alcohol substitute for blending ease.

- Contains the finest gum arabic.

- Contains phosphate for faster restarts.

- Excellent buffer system which retards calcium blinding and roller stripping.

- Reduces ink feedback into the dampening system.

- Replaces alcohol at 5 ounces per gallon, in most applications.

**Dosage / Directions**

The majority of our one-step fountain solution have been designed to run at 5 ounces per gallon. For optimum performance, the suggested starting concentration for some of these solutions may differ slightly depending on your needs. It is recommended that you verify pH and conductivity of the press-ready solution by preparing a control sample using local water at the desired dosage. Record the pH and conductivity to serve as your target numbers.
**WHAT TO EXPECT**

When running alcohol substitutes, you can expect some differences in key properties over running alcohol products.

**Viscosity**

An important difference between running alcohol and running ARS or Emerald® Premium products is the viscosity of the solutions. A solution of 10% alcohol in water is almost twice as viscous as the water itself, and about 30% more viscous than fountain solutions containing our alcohol substitutes. This affects the rate at which the dampening system can deliver the fountain solution.

The higher the viscosity, the faster the dampening system will send fountain solution to the plate. The lower the viscosity, the slower the delivery rate. In other words, with alcohol substitute products, your dampening system will deliver up to 30% less fountain solution to the plate as it would with alcohol.

How big a problem is this? With a few exceptions, most dampening systems only need to be run about five to ten percent faster—a dial change from 4 to 5—to provide adequate volumes of our fountain solutions to dampen the plate completely. If it is necessary to increase the dampener speed by more than 50%, try reducing the roller pressures in the dampening system.

If dial speeds cannot be lowered into an acceptable range, try increasing the diameter of the metering roller a few thousandths of an inch. This increases the surface speed of the metering roller in relation to the roller against which it rides.

**WHAT TO EXPECT**

**Emulsification**

Alcohol is such a strong ink emulsifier that pressmen try to run plates as dry as possible, since experience has shown what will happen if they do not [emulsification]. At the same time, the pressman running alcohol substitutes is confronted with a higher dial speed and will instinctively turn the water dials up just enough to clean the background. This interferes with starts and restarts due to an inadequate supply of water and prevents adequate protection of the plate.

Alcohol substitute products are non-emulsifiers, so it is not necessary to run plates as dry as possible. In fact, we recommend that plates be at least as wet as when running alcohol. This will result in better ink/water balance, instead of constantly being in danger of running too dry.

The best way to determine whether a plate is getting the fountain solution it needs is to look at it while the press is running. If it looks dry, it is dry. If it looks wet and shiny, it is too wet. We recommend that plates be run with just a light sheen of moisture. If a plate is run too dry, it will transfer ink across the background to the blanket faster. This will lead to piling or "picture framing" on the blanket.
WHAT TO EXPECT

Ink Feed

Another important difference between alcohol and our products relates to emulsification and ink feed. The idea of alcohol as a "wetting agent" is widely accepted, but is an oversimplification of what alcohol does. When running alcohol, the fountain solution wets not only the plate background, but the image area of the plate and the ink. This reduces the efficiency of transfer of ink to the plate. When running without alcohol, only the background of the plate is aggressively dampened. The image area of the plate and the ink remain fairly dry. This allows a much more efficient transfer of ink from the rollers to the plate, thus reducing the amount of ink needed in the rollers to get the same ink density on the paper.

The press has specific controls for the replacement rate of ink [the ink ratchet and keys], but there is no control for how much ink is in the rollers. This is determined arbitrarily by the pressman when the press is inked up. If the ink system is overcharged with ink, ink/water balance can still be achieved. However, this balance will not be as stable as one based on an ink volume more in line with demand.

Trying to maintain a large volume of ink will create a situation where the amount of ink in the rollers increases during the press run, increasing the demand for water. The larger the volume of ink in the rollers, the higher the demand for water will be. If the press starts to demand more water as the press run progresses, gradually cut back on the ink feed rate, and the demand for water will diminish quickly.

WHAT TO EXPECT

For the first week or so of running without alcohol, we recommend starting the run with low densities, bringing the job up to color as the make-ready progresses. This way, you will quickly become accustomed to the new ink requirements.

Too Dry?

Pressmen often instinctively run the plates as dry as possible. Long before the plate got dry enough to cause any other problems, it would scum from lack of moisture. It is possible to run the plate too dry when using Emerald® Premium or ARS products; in fact, it is the most common source of trouble.

It is recommended that you take a frequent look at the plates during the first few press runs to be sure that the plate doesn't look dry, but has a light sheen of moisture on the surface. If run too dry, you may see ink on the blanket outside the sheet or web area, faster blanket piling, feedback into the dampening system, contamination of the circulator, narrow ink and water balance, or slow restarts.

If the plate isn't scumming, how can it be too dry? The answer is that Emerald® Premium and ARS products are so effective at desensitizing they will tend to keep the background clean with a very thin film of water. Remember that with alcohol, the solution is more viscous and the film delivered to the plate is thicker. The plate needs to be protected physically by a layer of water thick enough to keep ink out of the grain of the plate.
WHAT TO EXPECT

Foam?

Because alcohol is a good bulk defoamer when used in large quantities [5% or more], many pressmen have foam problems when it is eliminated. Foam is created from the mixture of air and water by the circulating pump when the fountain solution is returned from the tray to the tank, not by the pressure used to do this. The pump will mix the air and water together very effectively, regardless of the pressure used. If foam is a big problem, you may be able to disconnect the return lines from the pumps and rely on gravity to return the fountain solution to the tanks. This will prevent the formation of foam.

Emerald® Premium and ARS products have excellent defoaming capabilities, but have little reserve defoaming power to overcome foaming pressures from other sources. Many commonly used presswashes and plate cleaners contain strong foaming ingredients. If these materials are allowed to get into the fountain solution and the circulator aerates the solution much, foaming will occur.

To eliminate foaming, once it occurs, you need to identify which products are causing the foaming and either change to a non-foaming alternative, or take precautions to prevent any of these materials from entering the dampening system. A good way to identify a foam source is to place some of the suspect material in a tall container with water and shake well. If a big head of foam forms and does not dissipate quickly, this is certainly something you would like to keep out of your fountain solution.

Roller Settings/ Tips

Because alcohol does a good job of wetting the ink, the ink form rollers behave a little like extra dampening rollers, helping to wet the plate. This interferes with the ink rollers doing their job of inking the plate. When Emerald® Premium or ARS products are used, the ink in the ink system will remain dry. This means you will dampen with the dampening system and ink with the ink system. Many pressmen have remarked, "When I add alcohol, this mark, or that streak, or this toning, goes away!" However, if they were to lift the ink rollers and briefly print with only the dampening system, the problem would reappear.

Many systems have an adjustment that allows more water to be fed at the ends of the system than at the middle. This is referred to as the "skew control."

It works by swinging one of the rollers [usually the metering roller] out of square with the chrome roller. This relieves the pressure at the ends, allowing more water through. When the skew control is set at zero, there is actually less water put through at the ends than in the middle. When Emerald® Premium or ARS products are run, the solution’s lower viscosity usually requires more skew than with alcohol.
**Dampening Systems / TIPS**

Most continuous dampening systems fall into one of three categories: 1) three-roller integrated system, 2) three-roller segregated system, and 3) four-roller system. Each has advantages and disadvantages. One thing they have in common is that without alcohol, it is probably best to run with minimum metering pressure to ensure an adequate transfer of fountain solution through the metering nip.

**Three-Roller Integrated System**

This system runs very well without alcohol, as long as the form roller is driven by the ink vibrator instead of the plate. Simply put, this means having the form roller tighter to the ink vibrator than it is to the plate. This will prevent streaking and toning at the lead edge of the plate by ensuring that the form roller speed is constant, rather than changing as the plate cylinder comes in and out of contact with the plate.

**Three-Roller Segregated System**

A three-roller segregated system often contains four rollers; but, with or without bridge rollers, they share the same characteristics.

This system relies on gear drive for their form roller speed, so the pressure settings of the form roller are not critical. It is important that the pressure between the form roller and the chrome roller is not so tight as to interfere with the transfer of water from the metering rollers to the form. The efficiency of this system is largely dependent on the gear ratio used by the manufacturer to drive the form roller.
Dampening Systems / TIPS

Four-Roller System

These come in two layouts with one variation. In this system it is important that the form roller is tighter to the vibrator than it is to the plate. This is to ensure that the form roller speed remains constant.

If the form is gear-driven by the vibrator, then the settings are less critical. This system has the reputation for "feeding back" or allowing ink to accumulate on the metering or slip roller. Emerald® Premium or ARS products will prevent the plates from running at an inadequate level of dampness. This will ensure that there is a proper flow of water through the dampening system to keep the flow of ink and water "one way."

Reverse Slip-Nip System

This is a variation of the four-roller system. The advantage of the reverse nip at the slip contact is that a reservoir of liquid builds up, increasing the systems throughput.

These systems may be the easiest to run without alcohol.
We have presented a lot of information covering a wide range of topics related to running without alcohol. However, the two main points are as follows:

1. When running without alcohol, the main concern is to avoid running too much water and prevent emulsification. Without alcohol, the opposite situation exists—you must be sure to run enough water.

2. Also, you must be sure to carry less ink in the ink rollers. If the rollers are charged with the same volume of ink necessary to print with alcohol, it will lead to problems with ink/water balance, trapping, drying and the build-up of ink where it is not wanted.

Eliminating alcohol-based materials and replacing them with more compatible materials can be a great source of frustration. When inks, plates, paper, etc. were evaluated in the past, it was assumed that they were evaluated solely on their merits—they either worked or they didn’t. This approach did not take into consideration that these products were never judged on their individual properties, but on how well they fit into the existing alcohol-based printing system. Many materials in pressrooms would never have been purchased if alcohol had not been in use.

It is our hope that this booklet will assist you in running alcohol substitutes or even help you to make the switch from alcohol to alcohol-free solutions.