Alkóhólfrí prentun

Nýsköpunarmiðstöð Íslands

Afhverju alkóhólfrítt

Alcohol-free printing offers benefits that circumvent the disadvantages of alcohol-based printing plus helps operations.

Alcohol-free printing offers lower ink and water settings along with the ability to print a given density using an ink film that isn't diluted by alcohol. The result is better quality printing with sharper dots and less tendency for emulsification.

There are two goals when running alcohol-free. The first is to manufacture a quality product while using safe materials. The second is to choose and use the alcohol-free product that will give the optimum results.

Three possible routes:

1 The original formulations were referred to as "alcohol substitutes."
2 Today's more advanced formulations can more aptly be called "alcohol-free."
3 Treatment of fount solution using other devices

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IPA skipt út með öðrum efnum

Alcohol substitutes:

Alcohol substitutes differ from IPA in several key properties, including their effect on the viscosity, surface tension, pH, and conductivity of a dampening solution.

Alcohol-free products are not universal, and printers need to communicate closely with their suppliers to find the optimum dampening solution for their application.

They are composed of one or more chemicals from the glycol and glycol-ether families plus other additives that perform the functions of IPA. At first, a few substitutes were formulated to be combined with IPA, but today's formulations are intended to completely replace IPA in dampening solutions and to offer their own range of properties.

It's important to remember that substitutes are used in far lower concentrations than IPA. A few ounces of alcohol substitute can do the same as 10 to 20 ounces of IPA in the same gallon of press-ready solution.

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One step/two step:

In general, one-step dampening solutions are deemed the most trouble-free.

One-step and two-step alcohol free products are available for both web and sheetfed presses. According to one supplier, web printers use the one-step concentrates while sheetfed printers tend to use two-step systems.

Two-step products combine the dampening solution concentrate with a separate alcohol substitute and wetting agents. Some consider the two-step products more flexible because the first-step concentrate can be independently varied. Mistakes with two-step systems, however, are more unforgiving.

For many years, only two-step products were available for sheetfed printers, but one-step concentrates for continuously dampened sheet-fed presses have been developed within the last five years.

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Viscosity:

Many substitutes, however, have little or no effect on viscosity, so the resulting dampening solution has significantly lower viscosity than a dampening solution with IPA.

Because of the decrease in viscosity with substitutes, less dampening solution is metered by the squeeze or metering roller used in most continuous-flow contact-type dampeners. The immediate effect is that the dampener speed must be increased, which leads many press operators to erroneously conclude that they must use more water to print with a substitute.

One solution to partly offset the viscosity loss has been to cool the dampening solution, but there are negative side effects to overly chilling dampening solution.

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Surface tension:

Fast plate wetting and the ability to form thin water films are largely determined by the solution's surface tension. It is generally felt that low surface-tension dampening solution is better for printing at high speed

Pure water has a surface tension of 72 dynes/cm. In dampening solution, an alcohol concentration of 10–25% reduces the surface tension to 35–45 dynes/cm, enabling the solution to spread over the plate rapidly in a thin continuous film. Alcohol-free dampening solutions use surfactants and solvents to reduce surface tension.

Surfactants, or surface-active agents, are organic chemicals that tend to concentrate at interfaces because of their polar molecular structures. When functioning properly, they travel to the amphoteric interfaces between the dampening solution and both the air and the ink on the image areas of the plate. At high press speeds, interfaces change rapidly, so surfactants must diffuse rapidly to replenish the new interfaces.

The amount of surfactant in the dampening solution is important during the pressrun. Too much can contribute to ink emulsification.

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Printing Brightness and Gloss:

Alcohol is a diluent that attacks the ink itself. It dulls ink gloss and affects the color, requiring press operators to carry a heavier ink film on the press rollers in order to achieve acceptable color. Because alcohol substitutes do not have this diluting effect on ink when used in proper concentrations, less ink and less water are needed for acceptable color. The result is sharper dots and less tendency for dot gain.

Water/ink balance and water stability:

Ink must be able to pick up a controlled amount of dampening solution to form a water-in-ink emulsion. The amount of dampening solution emulsified in the ink can influence ink density, drying, tack, viscosity, and ink transfer properties. Over-emulsification upsets ink/water balance and results in weak and washed out images.

With alcohol substitutes, over 98% of dampening solution is water. Water that varies in conductivity and pH may make it difficult for a printer to control the dampening solution. If the conductivity of the incoming water varies less than ±50 micromhos, consistent dampening solution can be mixed. Day-today fluctuations of 200 micromhos in incoming water, however, indicate that some type of treatment is needed to keep it consistent.

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Conductivity:

It is important that conductivity and pH levels on press be consistent and dependable. Measure conductivity and pH for every fresh batch of dampening solution and every four hours when the press is running. Readings are taken in the water pan at each printing unit and in the recirculator. Water pan readings can provide an early warning about a potential print problem.

Today's systems are so well buffered that pH is not as changeable as it once was. Thus, conductivity is much better than pH for determining the amount of dampening solution concentrate contained in your solution.

Conductivity is the measure of a material's ability to conduct electricity. Pure water, which approaches a conductivity of 0 micromhos, is a poor conductor of electricity. The conductivity of water is directly proportional to the amount of ions or dissolved matter in it. Thus, conductivity can be used as an approximate measure of water quality. Non-ionizable or partly ionizable materials such as alcohol are poor electrical conductors and usually lower the conductivity of dampening solutions.

Dampening solution conductivity should be measured before it is used on press. Unusual changes in conductivity may be caused by impurities from any source and justify re-checking the conductivity of the water and also the fresh dampening solution concentrate before assuming that the dampening solution was improperly mixed. It is normal for conductivity to increase during a pressrun since materials from ink and paper may contaminate the dampening solution.

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pH:

Measure pH when you measure conductivity. pH is a measure of the hydrogen ion concentration in water. For quality printing, it is important to maintain the optimum pH for the dampening solution you are using.

Because pH can change during the pressrun, re-check pH anytime there is a problem with tinting (ink emulsified in the dampening solution), plate blinding (the image on the plate does not take ink), scumming (ink adheres to nonimage areas on the plate), roller stripping (rollers do not hold ink), or when the ink is not drying properly on the paper. Excess water required to keep the plates clean could result in ink emulsification.

Gum arabic used in most of these solutions will not effectively desensitize plates if the pH is too high.

If the pH is too low, plates may blind, inks may emulsify in the dampening solution, rollers may strip, and ink drying times may be excessive.

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Mechanical changes to the press:

One crucial point to remember when running alcohol-free is that maintenance, tolerances, and press practices are far more important than when printing with IPA. Tolerances are tighter and any problems or bad practices masked by using IPA will come to the fore. In fact, one suggestion for printers who want to make the transition to running alcohol-free is to decrease alcohol use to about 8%. If this level causes problems, the alcohol is covering up something that needs to be taken care of before a substitute can be run successfully.

The key to successful alcohol-free printing is the durometer and nip relationship of the dampening system rollers. Primary consideration should be given to the metering roller, which requires a somewhat lower durometer than when running alcohol. Metering rollers are normally supplied with a durometer of 25–30 and sometimes will harden further after being run on press. It is recommended that the durometer (Shore A) of the metering roller be reduced to 18–22 when running alcohol substitutes. Softer rollers tend to be more water-receptive. Their softness increases the width of the nip between the metering roller and the chrome roller without increasing the pressure, giving press operators more adjusting latitude.

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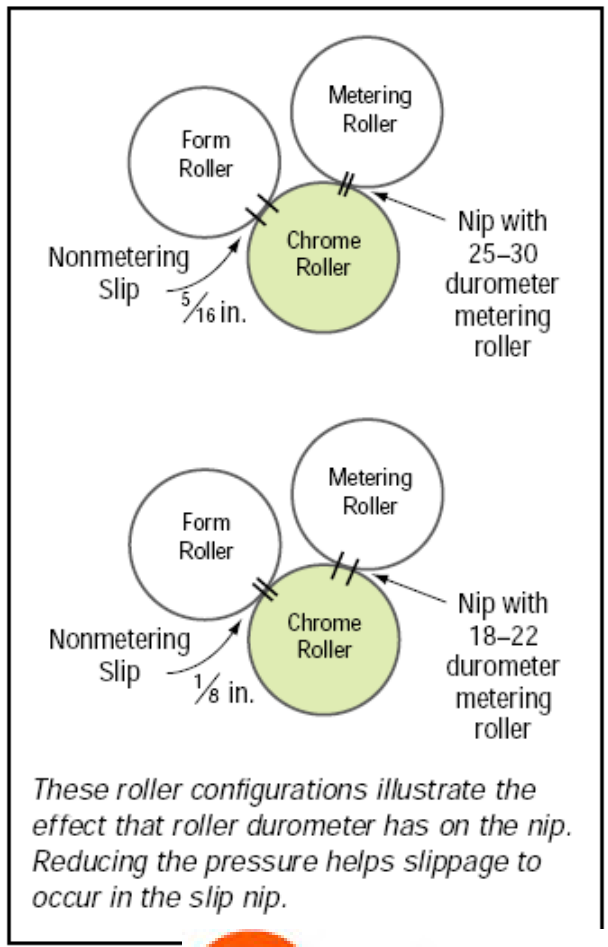
Another adjustment with alcohol substitutes is the need to reduce the nip stripe between the chrome roller and the dampening form roller. When running alcohol, this nip stripe will normally be 5⁄16 to 3⁄8 in. (8–10 mm) wide, depending on the diameter of the rollers. With alcohol substitutes, however, it may have to be reduced to as little as 1⁄8 to 3⁄16 in. (3–5 mm) to regain the thinned water film created by the increased nip between the metering and chrome rollers, and to induce slippage between the chrome and the form roller.



These roller configurations illustrate the effect that roller durometer has on the nip. Reducing the pressure helps slippage to occur in the slip nip.

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Another crucial adjustment is the speed of the metering roller. Higher dampening roller speeds are frequently needed to meter substitute-based dampening solutions (which can lead to slinging and an insufficient control margin at high speeds).

The skew or crowning of the metering roller is another consideration. Crowning, a feature on some presses, refers to a metering roller designed with a larger diameter in the center than on the ends to even the distribution of dampening solution across the plate.

Some alcohol substitutes work best with the metering roller skewed, while others require positioning the metering roller parallel to the chrome roller. This reduces pressure in the center of the roller.

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Problems that may be encountered:

Chemical incompatibility: Always tell your supplier what other chemistries you might use on press. Plate cleaners or drying stimulators might have more effect on an alcoholfree solution than one dependent on alcohols.

Metering roller sensitivity – ink contamination: solutions – etching with undiluted dampening solution or phosphoric acid and gum. Some claim blanket wash contamination may be to blame.

Banding: hard durometer rollers – shift to softer rollers

Concentration problems: Alcohol substitutes slowly evaporate from the system, resulting in concentration changes – solution: system should be drained once a week

Overcooling: Do not overcool, can lead to ink tack, picking and piling problems. 10-13°C is optimum.

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Problems that may be encountered:

Organic growth: System should be cleaned once a week, fungus inhibitors may be used, 1-5% bleach in water may be used for flushing recirculators and pans, then flush thoroughly with water.

Roller stripping: May occur between changes of different alcohol substitutes. Clean rollers by copperizing (steel rollers) or clean with warm water (nylon or Teflon rollers). Supplier may suggest roller washes.

Foaming: Antifoaming agents can be used sparingly with alcohol substitutes.

Plugging of halftone shadows: Can occur if alcohol substitute is too low, may also be incompatible ink.

Deposits on the metering roller: Deposits may be from paper (calcium) or salts or gum from dampening solution at high pH. Metering roller has to be cleaned using appropriate cleaning solution for desensitizing.

Picking due to low ink film thickness: Some substitutes require ink film thicknesses reduced to 0,15 mil instead of 0,2-0,3 mil (sheetfed). This may create greater stress on sheet, but some alcohol substitutes cause less picking at these lower film thicknesses..

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Successful Alcohol-Free Printing

1. Give a sample of your water to your dampening solution manufacturer for analysis. This sample will provide information for selecting the correct dampening solution and alcohol substitute chemistry.
2. Discuss your printing operation with your chemical supplier. Be specific about press models, dampening systems, inks, roller washes, blanket washes, and types of paper to make sure that they are totally compatible.
3. Check dampening roller pressure settings and durometer readings. This should include inking and dampening form rollers. Make sure plate- to-blanket pressure is also set properly.
4. Follow the manufacturer's mixing instructions. If the instructions recommend mixing between 3 and 8 oz/gal of water, start with the minimum of 3 oz. Take a pH/conductivity readings.
5. Run this mixture of dampening solution and monitor its printability. For example, how does the plate roll up? How does the press start up after feeder trips? Does the plate run clean and open without feeding excess amounts of dampening solution? Communicate this information back to the dampening solution manufacturer.

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Successful Alcohol-Free Printing

6. Check your dampening solution regularly. Paper coating, ink bleed, and blanket and roller cleaners can contaminate dampening solution. Take temperature, pH, and conductivity readings after every three hours of press operation. Record these readings in the press logbook. Keep the solution at the mixture that you have found works best.
7. Observe the changes in pH and conductivity, as the pressrun continues. When they reach a point where printing problems begin, such as plugging or scumming, the dampening solution is probably contaminated. Record your finding in the press logbook and mix a fresh batch or solution.
8. Drain and clean your dampening system weekly.
9. Have the refrigeration system on your water circulation systems checked and serviced by a qualified technician regularly (after 1,000 hours of operation).

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