Prisco®
SERVICE AND TECHNOLOGY FOR THE GRAPHIC ARTS®
TECHSOLUTIONS
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MEASURING PH & CONDUCTIVITY IN THE PRESSROOM

The ability to accurately measure pH and conductivity in the pressroom is essential to good quality printing. While these two properties are independent, each gives the printer valuable information about the water in their pressroom and the mixed fountain solution on press.

You don't need to be a chemist to understand the basics of pH, but it's vital that printers understand the importance of pH in the operation of the dampening system and in keeping the press in control. To produce good printing, it is necessary to have good ink density and proper dot gain. The chemical balance of the dampening system is a primary factor in achieving this.

The pH scale is logarithmic and runs from 0-14. A pH of 7.0 is neutral; less than 7.0 is acidic, and greater than 7.0 is basic (alkaline). It's important to remember that each whole number on the pH scale differs from the one next to it by a factor of 10 (i.e. mixed fountain solution with a pH of 4.0 has 10 times the acidity as does one with a pH of 5.0). If the pH is too low, emulsification, tinting, excessive plate wear and slow ink drying may occur. If the pH is too high, it's possible to have plate sensitivity, emulsification, halftone plugging, and scumming.

All PRISCO acid-type fountain concentrates contain a buffer system to keep recirculator pH at a nearly constant value. While the press is running, the fountain solution absorbs alkaline materials from the paper and ink that will act to increase the pH. Eventually, the pH begins to rise as the buffer system is used up. As a general rule, once the pH increases 0.5 units above that of a freshly mixed solution, it's a good idea to drain the recirculator(s) and refill them with clean, newly mixed solution.

METHODS FOR MEASURING pH

There are a number of different methods for testing pH. Let's review two common methods and note the pros and cons of each.

Pocket pH Testers

These small devices are constructed like the more sophisticated units found in laboratories and have two parts - a very thin, usually round, glass membrane called the electrode, and a porous piece of ceramic called the junction. Both have very tiny holes or channels, which can be seen with the aid of a magnifying glass.

We have found through experience that most problems with pocket testers are the result of improper care of the electrode and junction. If the tiny holes or channels become clogged from failure to rinse off contaminated fountain solution after use, the tester will no longer give an accurate pH reading and will have to be discarded.

pH Test Strips

These paper strips are impregnated with dyes that change color over a range of pH, generally 1-2 pH units wide. For this reason, pH test strips cannot measure pH more closely than 0.3 to 0.5 pH units. They may not, for instance, be able to tell you if recirculator pH has risen to the point where the solution needs to be changed, and you could be printing with a fountain solution that contains much less acidity than required.

In addition, pH test strips are difficult to read if the reservoir solution is excessively dirty or contaminated. It's also imperative to replace test strips once they have reached their expiration date (indicated on the container).

(continued)

STEPS TO ENSURE LONG LIFE FROM POCKET TYPE PH TESTING DEVICES:

1. Upon receipt of the tester, soak the measuring end for several hours in tap water to remove dried salt crystals and saturate the junction.
2. You must follow the manufacturer's directions for calibration with fresh pH buffer solutions. If you do not calibrate the tester, it will not give an accurate pH reading. We suggest that when purchasing the tester, you also purchase fresh buffer solution at the same time. Ask your PRISCO sales representative for fresh buffer solution.

If the pH tester response time becomes slow or refuses to calibrate with fresh buffer solution, rinse the measuring end with hot water, Alkaless R or an electrode cleaning solution to restore normal operation.

3. For best accuracy, calibrate the tester at two points – pH 7.0 and then at either 4.0 or 10.0, whichever is closest to the fountain solution you will be measuring. Replace your buffer solution on or before the expiration date shown on the bottle.
4. In between uses, the measuring end must be kept moist; place a small piece of moistened sponge or absorbent shop cloth inside the end cap. We have also found it helpful to wrap the tester in plastic wrap. Use tap water or pH 4.0 buffer for this step.
5. If the electrode and junction are allowed to become dry, you must re-soak and recalibrate (steps 1-3) before using again.
6. Rinse the electrode and junction after each use with tap water to remove contaminants.
7. Re-calibrate the tester once a week.

WHAT IS CONDUCTIVITY?

Conductivity measures the ability of water and mixed fountain solution to conduct electricity. The units we use in the U.S. are “micromhos.” Dissolved salts in the pressroom water along with acids and salts in the fountain concentrate and materials absorbed by the mixed fountain solution while the press runs, all contribute to the conductivity figure in your recirculator.

As you add fountain concentrate to the water, the micromhos may increase anywhere from 200 to 900 for every ounce added, depending on the fountain solution used. As the press runs, the conductivity of the fountain solution in the recirculator may rise as materials from the paper and ink contaminate it. These contaminants may neutralize the acid in the solution but the pH will not be affected by these contaminants until the solution’s buffer is used up.

Conductivity readings are used to ensure accuracy when mixing a batch of fresh fountain solution. PRISCO makes many fountain solutions and each one has its own unique conductivity when correctly mixed.

LOOK FOR CONDUCTIVITY INCREASES

Once conductivity rises 1000 micromhos above that of fresh solution, we recommend draining the recirculator(s) and replenishing with fresh mixed fountain solution – even if print quality and water metering speeds are still satisfactory. The conductivity increase comes from contaminants (dirt) accumulating in the solution. As the press runs, the water form roller applies increasingly dirty fountain solution to the grain of the plate. Eventually, the plate becomes sensitive due to paper and ink particles displacing gum in the grain.

CONDUCTIVITY TEST EQUIPMENT

Since we believe printers should have the ability to monitor and record both pH and conductivity, Prisco supplies several reliable but inexpensive measuring devices that are suitable for measuring conductivity in the pressroom.

Pocket conductivity testers: These testers should be rinsed after use, but are not nearly as subject to contamination as pH testers and do not have to be kept moist between uses. They are accurate but have a limited range. When purchasing one, be sure its range covers the expected conductivity of the solutions you will be measuring.

Myron L conductivity meters: These meters are widely used throughout the printing industry. They are rugged and available in several models, with ranges that cover all conductivity readings that could reasonably be expected in the pressroom.

MYRON L 6P ULTRAMETER / MYRON L 512M5

MAINTENANCE TIPS

Myron L meters are the tool of choice for checking pH and conductivity by PRISCO technical represntatives. Proper maintenance of these meters is ciritical to achieve accurate readings.

1. Analog type Myron L meters (e.g. 512M5) require a general purpose battery due to their internal electronics. Digital meters such as the Ultrameter 6P require an alkaline battery.

2. Never let moisture get into the inside of an analog type meter; internal corrosion will result. Be sure the bottom is firmly snapped into place. The Ultrameter 6P type has a water-tight seal (gasket).

3. Never fill the measuring cup of an analog type meter by dipping or immersing the meter into the fountain solution reservoir; this will ruin the meter. The Ultrameter 6P type can be dipped into the reservoir.

4. All conductivity meters must be calibrated regularly to ensure accurate measurements. Analog type meters have an internal reference that must be used for their calibration. Digital instruments like the Ultrameter 6P must be calibrated using standard reference solutions (available from Prisco).

5. “Combination” type analog meters (e.g. Myron L M6/PH) can read both pH and conductivity. Their pH electrode requires the same care as any other pH electrode; it must be rinsed with tap water after use and kept moist between uses (a cap is provided for this purpose). The conductivity meter on the analog type dual purpose meter must be calibrated using the standard reference solution.

6. Once the conductivity has been determined for the mixed fountain solution that runs best on a given press, use only a calibrated meter of the same type to check future batches of the mixed solution.

OPTIMIZE YOUR PERFORMANCE

We have discussed the significance of pH and conductivity and the simple but reliable testing equipment that can be used to monitor both properties in the pressroom. The importance of controlling these variables in the printing process and their daily impact on quality and performance is undeniable.

Previous 'Tech Solutions' point out the importance of maintaining proper pH and conductivity in the pressroom. These include Image Area Problems, Reservoir Maintenance, and Higher pH Fountain Solutions. Your PRISCO sales or technical representative can provide you with copies.

Your local Prisco office is happy to answer your questions:

ATLANTA	(800) 241-6049
MIAMI	(800) 241-6049
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BELGIUM	32 (0) 56 40 41 82
TORONTO	(888) 460-4406
UNITED KINGDOM	32 (0) 56 40 41 82

Prisco®

SERVICE AND TECHNOLOGY FOR THE GRAPHIC ARTS

26 Blanchard Street, Newark, NJ 07105
(973) 589-7800
www. prisco.com