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Series 700 Additives for Printcolor pad printing inks

TECH BULLETIN

In the Printcolor range of ink products, the "700" series denotes that these are inks and additives have been developed especially for pad printing applications. The additives listed herein are designed to work with all of the Printcolor inks that begin with a 700 classification (unless otherwise noted below).

All 700 Series Additives are highly concentrated (liquid) auxiliary agents that are "universal" in their field of use and can be used to modify all 700 series pad printing inks.

It is important to note that using both the proper auxiliary additive and the correct amounts of that additive are both important steps in gaining optimum printing results. It is also critical to note that when adding auxiliary additives to the ink, this should be done accurately using a balance or gram scale. Simple guessing or adding ingredients "by eye" will not yield accurate and repeatable results. If you add too much of a particular auxiliary agent(s), you will get undesirable results. For example if you are adding the flow agent to the ink, if you use too much you will see poor flow characteristics and wetting problems. To properly prepare inks for printing, you should use the MS (mixing system) series inks and be sure to stir properly.

When adding auxiliary agents to the ink mixture, you should proceed carefully in a "step by step" manner (add > 10 % by weight at a time & mix). By doing this you will minimize the chances of creating fluctuations, "solvent shock", gelling or other undesired results.

Below is a list of the agents and a description of how to properly use each of them. If you require further information on any of these additives please contact your Deco Tech Customer Service representative at (800) 300-3326.

UNIVERSAL THINNER SERIES 700-017

This special thinner has been developed for universal use in all Printcolor 700 series pad printing inks. This formula of different solvents has been developed to allow for stoppage during production with minimum drying time whilst still maintaining good drying/ printing speeds. This 017 thinner is suitable for both open inkwell and closed cup ink systems. For most inks in the 700 series you would typically add approx. 10 to 20% by weight. If you stay within this percentage range, you will still have good rheology and drying conditions of the inks. Furthermore you can print wet-on-wet for multi-color printing applications. This formulation is excellent for long run work as is specially formulated to have a low chemical attack on the pad surface, ensuring longer pad life. If you over-thin (overdose) the ink, you will have a deterioration of all of the inks specific properties, such as a loss of proper ink transfer from cliche to pad and pad to substrate.

UNIVERSAL RETARDER SERIES 700-018

This formulation of different solvents has a slower evaporation rate than the 017 universal thinner above. To make understanding what a retarder does more simplified, you can think of this as a "slower speed thinner". The word retarder is widely used in our industry, and it simply means that this product with retard or reduce the drying speed of the ink. Using the 018 retarder will be helpful if a slower drying of the ink is required and printing is problematic (such as the ink

is becoming dry on the pad surface before you can transfer it to the part). A maximum of 10% by weight is recommended and it is best to combine or blend the retarder with the standard thinner (i.e. Series 700-017 or special thinner Series 10-0330) to achieve the correct printing consistency or evaporation rate.

The secret to pad printing is to have the ink become tacky and transfer it to the product when it is still tacky. Once you understand this simple principle, printing and trouble-shooting printing problems become second nature.

The 018 retarder is good for long run work and it too has been formulated to have a low chemical attack on the pad surface, ensuring longer pad life. If you over-thin (overdose) the ink, you may cause ink transfer problems from the pad to part substrate and also reduce the cross-linking of hardener and ink resins.

UNIVERSAL ACCELERATOR SERIES 700-019

This mixture of highly efficient solvents has a fast evaporation rate and has been developed for quick drying onto the substrate. This so-called "accelerator" is actually a higher (evaporation) speed thinner. Using the 019 series accelerator is well known for use in both rotary pad-printing applications and in high-speed closed cup pad printing machines. Just as with the 017 universal thinner, this fast speed accelerator 019 can be added to the ink at a 10 to 20% ratio by weight. Custom blends of any of the 700 series thinners can be made up to achieve the desirable printing results for your specific application.

UNIVERSAL FAST ACCELERATOR SERIES 700-020

This mixture of highly efficient solvents has a very fast evaporation rate and has been developed for quick drying onto the substrate. This very fast "accelerator" is actually a higher (evaporation) speed thinner and is actually faster evaporating than the 019. Using the 020 series fast accelerator is well known for use in both rotary pad-printing applications and in high-speed closed cup pad printing machines. Just as with the 017 universal thinner, this fast speed accelerator 020 can be added to the ink at a 10 to 15% ratio by weight. Custom blends of any of the 700 series thinners can be made up to achieve the desirable printing results for your specific application.

SPECIAL RETARDER SERIES 10-02637

This is a specific mixture of extremely "long" (or slow evaporating) solvents that have a slow evaporation rate. This long retarder has been specially developed for pad printing in high temperature production environments and it will provide a very long openness under difficult and hot conditions. As an added benefit, this product will also provide a slow evaporation at the silicone pad and a minimum amount of shrinking. So it's possible that a transfer problem from pad to substrate can occur. For this reason, we recommend adding a maximum of 10 % by weight to the ink mixture. Due to the slow evaporation rate exhibited in this formulation, the use of a blow dryer directed onto the printing pad can also be implemented with great success. This formula is favorable for long production runs and it also provides a low chemical attack on the silicone pad surface, ensuring longer pad life.

SPECIAL "ADHESION PROMOTING" THINNER SERIES 10-0330

This special thinner was designed to improve the adhesion to polystyrene (PS) materials and related plastics like ABS, SAN, etc.. This thinner will also improve the inks adhesion to PET, PET-A, PET-E and PET-G. The drying characteristics are similar to a normal thinner and can be added to 700 series inks in 10 to 20% by weight. Note, on some injection-molded plastics, there is a possible danger of cracking and brittleness of the plastic material. In some cases combining one of the other universal thinners or retarders are successful. The 10-0330 series thinner will function like an adhesion promoter, when used on the above-mentioned plastics.

To improve the chemical resistances and water resistance (as with glass printing) of 2-component pad printing inks, it is possible to also use a hardener in conjunction with this special thinner. Parallel to the physical process of solvent evaporation, this additive also provides a chemical cross-linking between the base resin material and the hardener, so there will be an inherent "pot life" as a result. Hardeners should always be added with care and at the proper percentage range (see the ink series technical bulletin for specifics). Improper mixture and/or ratio of ink and hardener can lead to instability, which will negatively affect the adhesion, chemical, outdoor resistances, brittleness of ink and possible loss of sheen or gloss values. Hardeners should be completely mixed into the ink before addition any other additives, including the thinner(s). Furthermore the hardener-modified ink should "rest" for 15 minutes before beginning to print, in order to obtain optimum flow and wetting characteristics.

A reduction in the "pot life" will be realized when high humidity (> 70°/0) and high temperatures (> 86° F) are present. There is also a self-reaction of hardener with the presence of humidity. Therefore when storing the hardener it is important to wipe off any spilled hardener from the edge of the container, so that proper resealing of the can is achieved. The required amount of hardener is very specific and should be reviewed in the technical leaflets of the inks.

HARDENER SERIES 700-HDA

This highly reactive hardener is based upon specific aliphatic components that combine the characteristics of high chemical resistances and extremely good abrasion resistance. The hardener Series 700-HDA is for long-term outdoor use (yellowing-free) and it provides high flexibility of the cross-linked ink layers in direct relationship to the ink resins. The HDA hardener also benefits from a good gloss finish, elongation and stretch-ability due to its lack of brittleness. The amount to be added is outlined in the technical data sheets of each ink series. In comparison to the aromatic system Series 700-HDI this hardener has a longer pot life (in relation to humidity and temperature, also in proportion of reactivity of resin materials of modified pad printing ink), but it also needs a longer curing time for the cross-linking process. An overdose of hardener to the mixture will reduce the curing speed, decrease the adhesion characteristics and reduce the chemical and/or abrasion resistances. The best-suited ink lines for this HDA hardener are: Series 752, 754, 784 and 792.

HARDENER SERIES 700-HDI

This highly reactive hardener system has been developed specifically for indoor usage and it is well suited for printing on a variety of industrial and technical applications. The main properties of the HDI hardener are extremely high chemical and mechanical resistances and fast cross-

linking under normal conditions. Because of HDI's chemical composition (an aromatic based isocyanate material) it has a tendency to "yellow" when used in exterior (outdoor) conditions. The high reactivity of HDI allows for quick curing and is therefore ideal where fast printing speeds are required. The recommended cross-linking temperature is 68° F or higher.

Because of the high chemical potential of this hardener system it's important that any residue is removed from the edges of the container and the lid firmly replaced, especially in areas of high humidity and/or temperatures. There will be a self-reaction with water (water in the air = humidity) and over dosage will reduce the curing speed, decrease the adhesion characteristics and reduce the chemical and/or abrasion resistances. The best-suited ink lines for this hardener are: Series 750, 752 and sometimes 712.

HARDENER SERIES 700-HDR

The highly reactive hardener HDR is based on aliphatic components that combine the characteristics of the above hardener systems (HDA and HDI). This hardener is the most modern one in the series due to it's solvent-free makeup. The safe environmental, health and usage requirements are well combined with high-quality technical characteristics. This 100 % solvent-free product is developed for long-term outdoors use without loses in the inks color brilliance or gloss sheen, and without causing yellowing or chalking effects. This unique product provides a high gloss sheen and it has good flexibility and fast curing properties. To properly cure, this unique hardener system requires a cross-linking temperature of 74° F (or better if higher), making this HDR hardener a perfect system for oven curing processes (284° F-320° F / 20-30 min).

If overdosed you will have a reduction in the curing speed, a decrease in the adhesion characteristics and a reduction in chemical and/or abrasion resistance. The best-suited inks for this hardener are: Series 752, 754, 784, 792 and sometimes 711.

HARDENER SERIES 700-GL

This special hardener was developed for pad printing on glass and ceramic items with our epoxy based inks, such as Series 750. This GL hardener provides excellent adhesion and resistances when printing on glass and ceramics. This solvent free hardener system shows a high degree of reactivity even when a minimal amount (approx. 5% by weight) is added to the epoxy-ink. Hence there is only minimal influence to the color shade and/or opacity of ink.

To optimize curing and abrasion resistance, it is best to use heat curing at 285 to 320° F for 20 to 30 minutes. By using a heat cure process, you are assured a high resistance to water. This GL hardener is not suitable for outdoor usage.

Apart from thinners, retarders, accelerators and hardeners Printcolor also offers additional additives to help solve your printing problems. So as to speak, these auxiliary additives can be referred to as the "spice" of the recipe. And just as in the kitchen, if you use too much "spice", you can create an unpalatable result. So it is important that the additions of these special additives is done carefully and are properly measured to ensure that a "tasty" result is achieved. Using these special ink additives properly, you can be assured that your printing problems will be solved.

ADHESION PROMOTER SERIES 700-PP

By adding this special PP adhesion promoting agent is useful if the inks adhesion onto untreated polypropylene materials is not good enough. An addition of approx. 10 -20% by weight to the systems Series 711, 712, 752 and 784 should improve the adhesion characteristics onto untreated polypropylene. When adding this special agent there is no stipulated loss of pot-life, but in some cases a reduction of chemical resistance may be possible.

Certain polypropylene materials offer the molder the opportunity to add a high-quantity of recycled PP material into the PP-batch. The more "regrind" that is in the formula, the more you will need to use this PP adhesion promoter. It is also important to understand that there have been many advances in the world of plastics processing and new creations or formulations of co-polymerize polypropylene materials are being developed nearly every day, yet the generic term PP is still used on these special PP materials. So be careful and realize that the term PP is a very broad term and understand that it is absolutely necessary to perform your own printing trials before starting full production printing. Please feel free to ask our technical service department for any specific tips that may be helpful to you before moving forward. Our number is (800) 300-3326.

FLOW AGENT 700-VMT

This highly concentrated silicon based additive will assist the flow characteristics and (in some cases) improve the gloss level of the ink and avoid foaming. Using the VMT additive will eliminate typical printing problems such as; bubbling, pinholes and orange-peel effect. The addition of VMT will change the ink tension and the wetting characteristics and this influence will (sometimes) improve the adhesion to the printed substrate.

The VMT flow agent should be typically added at 0.3 to 0.5% (max threshold is 1% by weight) and it should be thoroughly mixed into the inks. Overdosing may cause silicon contamination, leaving a lubricant film on the printed substrate and it may sometimes cause a deterioration of adhesion characteristics. As always testing is required prior to running full production. VMT may also cause cloudiness in clear ink systems and care should be taken with regards to inter-layer adhesion.

WETTING AGENT SERIES 700-BMT

Flow and adhesion problems can be caused by substrate contamination.
Contamination is usually defined as:

1.) Release agents from extruded plastics
2.) Silicone oils from adhesive backed protective overlays
3.) Silicone oils found on release papers or foils
4.) Oxidation on glass and metal surfaces.

To achieve good wetting and adhesion on these materials, it's possible to modify the pad printing inks with Series 700-BMT WETTING AGENT. This additive will reduce the ink-tension on the substrate surface and allow the correct printing on these troublesome and contaminated materials.

This high concentrated, liquid additive should be added at (max of 0.5 to 2%) and thoroughly mixed into the inks. Over dosage will cause deterioration of flow and drying properties, and possibly the loss of adhesion characteristics and over-printability.

ANTI-STATIC AGENT SERIES 700-AMT

It is commonplace to find built up static charges in certain plastic materials when printing. This will be seen directly in the printing results by yielding; uneven ink deposit, splashing of ink film (often called "spider webs"), poor ink transfer from pad to substrate and other such defects. Also in addition to poor ink transfer the "feathering" along the edges of the print are seen and this problem is often compounded when using photo-polymer plates or clichés. Primarily this static problem is due to the fact that many plastic substrates are good collectors of energy. This energy cannot flow-off and discharge by contact of different plastics. In pad printing, the primary collectors of this energy are the silicone pad, the polymer cliché (polymerized acrylate), the pad printing ink (solution of plastic resins in solvents) and the printed substrate (plastic material). Additionally static problems come from low humidity (< 60%) and high temperature (> 86° F). To help alleviate these printing problems an addition of antistatic agent AMT is helpful. The amount recommended is approx. 0.5 to 1% by weight (with a maximum threshold of 2% by weight).

Parallel to the modifying the ink mixture you can also use an anti-static spray. This additive called Static-Go, will reduces the surface tension of the spray-treated plastic surface and minimizes the formation of static energy.

SUMMARY

All of the above mentioned additives give you an efficient assortment of additives that should help to make your life in pad printing a little bit easier. As always, it is advisable to run tests before going into production with any modification to your existing printing process. And naturally the technical staff at Deco Tech is always available for specific questions and problem solving.

In addition to these additives detailed above, Printcolor also offers two different cleaners for pad printing applications. The main properties of these cleaners are the very low hazardous potential and the ability to use a re-circulating cleaning tank. The cleaning solvents herein have been developed for cleaning all machines parts such as: clichés, cups, spatulas, doctor blades, etc.. It is also important to note that you should always clean the silicone-printing pad with tape and never with cleaning solvents!! All solvent-based cleaning agents will destroy the chemical matrix of the print pads.

To regenerate or reactivate an old silicone pad, it is a good idea to use a silicone activator and series 10-03775 silicone pad activator is available from Printcolor.

UNIVERSAL CLEANER SERIES 700-URT

This solvent mixture is specially formulated for easy cleanup of both 1 and 2 component pad printing inks and it will not leave a chemical film or residue on the machine parts. URT cleaner is also free of acid or alkaline materials and it contains no chlorinated or fluorinated components

and is not regarded as poisonous according to present health and safety legislation. The flash point is higher than 70 ° F. All hazardous, environmental and transport values are pointed out in the material safety data sheet.

BIODEGRADABLE CLEANER SERIES 700-BRT

This is a mixture of solvents, which according to present laws on dangerous substances does not have to be marked as hazardous, but it is a highly effective cleaner for all 1 and 2 component pad printing inks. The evaporation rate is lower than URT cleaner, so the need of time for a dry surface is longer and can be sped up through extraction and elevated temperature. With the biodegradable nature of the Printcolor BRT cleaner it is an ecologically and practical alternative to most cleaning agents found on the market. It is well suited for the needs of most pad printing operations.

Furthermore this cleaner has also been used in a special circumstance as an ink thinner in a 2 component pad printing ink. Specifically the field of use is for printing onto hot material substrates that are > 176° F. Nearly unlimited openness of cliché image is combined with a moderate evaporation rate on the pad and fast tack-free curing on the heated substrate.

It’s important not to use the cleaning agents for cleaning your skin and clothes. These cleaners will of course clean your hands, but the aggressive nature of them will dry out your skin rapidly and can have adverse effects on your skin and body. Please see the MSDS sheets for specific details about safe handling of these products.

PRECAUTIONARY MEASURES

Read all material safety data sheets prior to processing or using any Printcolor product.

The material safety data sheets, according to OSHA format, contain indication of hazardous ingredients, TLV-level and instructions for precautions when processing, handling and storing as well as first aid procedures. The information given in the MSDS refers to processing as described in this technical leaflets. The statements in our leaflets have been made to the best of our knowledge and are given without any obligation. They serve to advise our business associates, but it is absolutely necessary to make your own printing tests under local conditions, with regard to the intended purpose prior to starting the printing job. In case of doubt please contact our technical advisors. The application, use and processing of the products delivered by us are beyond our control. This is subject to our responsibility and there is no liability or guarantee on our part.