

Surface Energy (Dyne level)



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The most important part of any printing process is insuring that the ink properly adheres to the substrate. This is particularly critical when printing on non-porous synthetic substrates, which can often be unsuitable for lithographic inks. A good way to predict whether a non-porous substrate is suitable for anchoring lithographic inks and coatings is for printers to measure the stock's surface energy or "dyne" level.

TECHNICAL INFORMATION

■ How are synthetic substrates different from paper substrates?

Due to their petro-chemical makeup, many synthetic stocks have a surface energy too low to allow lithographic inks to properly adhere once dry. In order to render these substrates litho suitable the surface must be conditioned. There are several ways this can be done, depending on the type of substrate. One method is to coat the surface of the synthetic stock, referred to as adhesion pre-treatment. However, the most common method is referred to as "flame" or "corona" treatment.

■ What is corona treatment?

Corona treatment systems consist of several components designed to apply a high voltage, high frequency electrical discharge to the surface of the synthetic film. It is generally accepted that the exposure to this high voltage "corona" oxidizes the material of the surface, which increases the surface energy. This creates a more chemically bondable surface, which is able to properly anchor offset printing inks.

■ Then why do printers have to check dyne levels?

Corona treatments are convenient and economical, but they are fugitive. Immediately from the time of corona treatment, the process of dyne level decay begins and continues. Depending on the conditions the synthetic stock has been warehoused under and how much time has passed since the original corona treatment, a substrate that was initially litho suitable may no longer have an acceptable dyne level.

■ Why does dyne level decay?

Most, if not all synthetic stocks are made from petroleum distillates. As time passes, plasticizers, or processing lubricants

that were oxidized during corona treatment will again "bloom" to the surface and lower the surface dyne to an unacceptable level.

■ What is the recommended surface dyne level for substrates to be printed with offset inks?

The higher the better. Virtually all ink manufacturers recommend a minimum dyne level of **40 dynes/cm**. However, under ideal conditions, it is possible to achieve proper ink adhesion with a dyne level as low as 38 dynes/cm. Substrates that have been adhesion pre-treated may display unacceptably low dyne levels and yet still be litho suitable. Consult with your synthetic stock provider for clarification as to pre-treatment methodology.

■ How can printers measure surface dyne levels?

Any printer seriously considering offset printing on synthetic substrates should invest in a set of dyne solutions or markers. Dyne solutions/markers are inexpensive insurance that can prevent an expensive failure when inks, made for printing on synthetic stocks, do not perform properly due to an unsuitable substrate. To check an incoming synthetic stock delivery with a dyne solution or marker literally takes a matter of minutes, and can save you untold days or weeks if you identify an insufficient surface dyne level.

■ What happens if I print on a synthetic stock that has a surface dyne level that is too low?

Offset inks made for non-porous stocks may eventually dry on an unsuitable substrate, but they will not *adhere*. Much like a dry-erase marker, the inks will very easily rub or smear. An insufficient dyne level can cause offset inks to mottle and actually bead on the surface of the substrate, although sometimes these failures do not appear for hours.

For the highest quality, worry-free printing on non-porous substrates, be sure to use Gans Plasti-Pro 4 color process and Pantone blends!