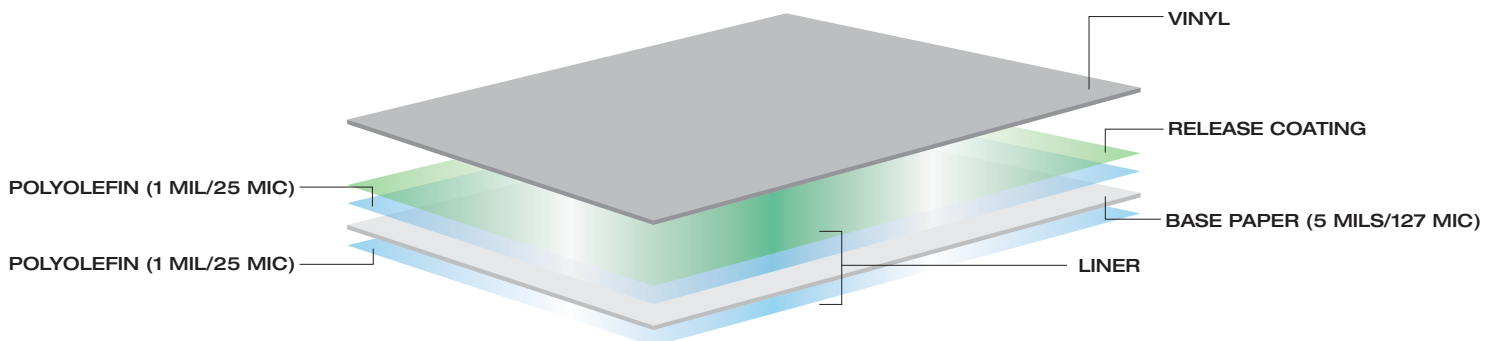


PRINTING AND USE OF SHEET MEDIA

As a worldwide source of print media, General Formulations supplies both roll and sheet media to the printing industry. The majority of digital print processes use roll media, however sheet media is required for certain printing situations. The opposite is true for screen and offset printing processes, as the majority of presses print in sheet form. Therefore, no matter what print process and chemistry you have, you can very easily be involved in the sheet printing processes. There are some common handling procedures that are required for successful printing and processing of sheet media.

First of all, let's review the structure of a common sheet layflat liner. The core of a layflat liner is paper, usually bleached white. This paper core is around 5 mils in thick with a basis weight of between 50 and 70 pounds/ream. Both sides of the paper core are coated with a polyolefin around 1 mil in thickness and bulking between 10 and 16 pounds/ream. Typical polyolefins are high, medium and low density polyethylene. Polypropylene has also been known to be used in layflat liner production. Other plastic polymers have been trialed in this application with little commercial success.



TYPICAL STRUCTURE OF A 90#/146 GSM LAYFLAT SHEET LINER. (FIG.1)

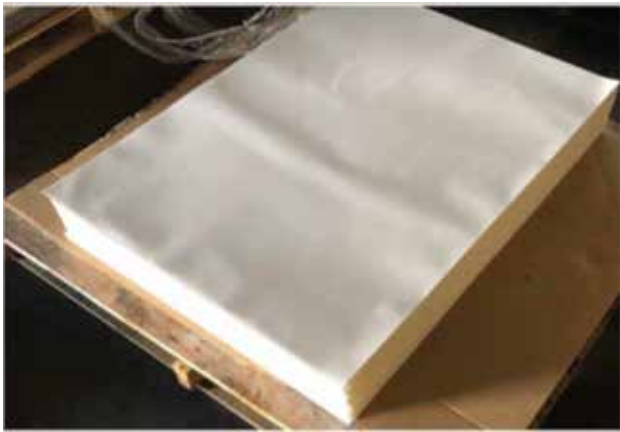
This basic paper/polyolefin lamination is also used to produce high quality photo base when photos were printed on paper and “paper” milk cartons. This technology has a long and varied use in products that require water and moisture resistance. The polyolefin layers imparts exceptional water and water vapor resistance to the paper core while adding some bulk and dimensional stability. To produce a layflat liner for pressure sensitive media printing and processing, a release coating has to be applied to one side of the paper/polyolefin lamination. This coating is usually a silicone based polymer. Release coatings can be modified to give variable levels of bond to the pressure sensitive adhesive depending on customer requirements. For most sheet media printing and processing, the release level is easy. Most layflat sheet liners are known by the term “90 Pound”. This is derived from adding the basis weight of the paper and polyolefin layers together and the result is usually around 90 pounds/ream. The 90 Pound liner has a long and successful history in sheet media manufacturing. When stressed beyond its design capabilities the media sheets could exhibit curl, film channeling and wrinkles that can make printing and processing a problem. Knowing these limitations and being able to control them will make sheet printing efficient and more profitable.

WHY ARE “90 POUND” LAYFLAT LINERS USED FOR DIGITAL MEDIA SHEET PRINTING AND PROCESSING?

The economics of paper/polyolefin layflat release liners is superior to that of a totally plastic liner of equal thickness and basis weight while having nearly similar performance attributes as a sheet media liner. However, there are differences that must be considered for successful use of paper/polyolefin layflat release liners.

All paper products have some water content and paper fibers can absorb or release water in order to stay at equilibrium with the environment. If paper fibers absorb moisture, the paper fibers will swell in volume. When paper fibers lose moisture the fiber will constrict in volume. A sheet of paper liner contains millions of paper fibers, so any change in fiber volume can be measurable over the length of a sheet. If paper dimensions change during the printing process, color registration will be off by the time all colors are printed. If a paper liner is used in a pressure sensitive media lamination with plastic face stocks, the change in liner dimension can result in edge curl, channeling, tunneling and film delamination as the liner expands or contracts. The purpose of the polyolefin coating is to seal the paper fibers from contact with environmental moisture reducing water content change in the paper fibers therefore keeping the overall size of the sheet stable. One thing to note however, is in the diagram of a typical “90 Pound” layflat liner (fig. 1) it shows the edges of the liner have exposed paper fibers after cutting to the desired sheet size. Therefore, these edges can be a source of moisture absorption and loss.

CONDITIONING AND HANDLING OF SHEET PRINT MEDIA



SHEETS OF PRESSURE SENSITIVE POLYESTER MEDIA EXPOSED TO HIGH ENVIRONMENTAL HUMIDITY. (FIG.2)



SHEETS OF MEDIA CONDITIONED AND LAYING FLAT DURING PRINTING. (FIG.3)

Layflat liners are designed to be flat under normal environmental conditions of 65° to 75° F. at a relative humidity of 50%. An increase in temperature alone will tend to dry out paper resulting in dimensional shrink of the paper fibers. In normal environmental conditions, as temperature increases higher humidity usually follows and as temperature decreases environmental humidity usually decreases. It is therefore important to maintain a stable environment for sheet media, with the goal being to have sheets that layflat and achieve acceptable printing and processing. The following general guidelines help maintain sheet media layflat before printing and processing.

- Store sheets at a temperature range of 60° to 80° F. with a relative humidity of 45 to 55%.
- Keep sheets wrapped in packaging materials.
- Store on a flat surface (but not a concrete floor).

-
- Acclimate sheets to the pressroom environment prior to printing, die-cutting or sheeting.
(Acclimation may require 8 to 48 hours depending on the amount of sheets in a box or stack)
 - Rotate inventory. First in/First printed.
 - Beware of shelf life of the sheets.

These guidelines will help maintain sheet layflat and smoothness prior to printing. If the job requires multiple passes through an ink drying oven, pay attention to the oven temperature. High temperature and/or extended dwell time in the oven will dry out the paper fibers along the edges of the sheet. The result will be shrinkage of the liner with down-curl induced to the sheet. Edge down-curl could result in jamming of sheets in the press if another print pass is required. If edge curl is observed after printing, the sheets must be acclimated at normal temperature and relative humidity before further processing.

Another general trend in regard to edge curl, channeling or tunneling of sheet media is the face stock of the media. Polyester film (PET) is very resistant to moisture absorption or loss, unlike paper fibers. It is also very temperature resistant as compared to paper fibers. When laminated to a 90 Pound liner in sheet form, maintaining environmental stability is critical in sheet layflat when using polyester film media. Face stocks such as flexible vinyl are more conformable than polyester and can compensate some for liner expansion and contraction without edge lift or channeling. However, extremes in temperature and/or humidity can induce edge curl or channeling with flexible vinyl face stocks. Allow stock to acclimate at normal environmental conditions before printing or processing.

90 Pound liner has been the standard liner to produce sheet media for decades. This liner has proven to have excellent performance over its history. However, occasional extremes in environmental conditions in regard to atmospheric temperature and/or moisture content can result in sheet curl that makes printing and processing difficult. Controlling and stabilizing environmental conditions in the shop will reduce any occurrence of moisture variance within the paper fibers. The result will be consistent printing and processing of every job that runs through the shop. For additional information regarding General Formulations sheet media, contact your General Formulations Customer Service representative at 800 253-3664 or on the website at www.generalformulations.com. Your customer service representative is available under Contact Us/Customer Service Team.