

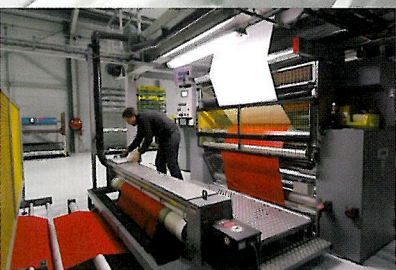


The adhesive coating of release liner.

Release liners on self-adhesive media

Importance for graphic arts applications

Release liner is an essential element in the self-adhesive media used in sign making and vehicle marking applications. It consists of a base material, in most cases paper stock, coated with a layer of silicone, which is used as the backing for the adhesive side of the film. It acts as a protective carrier for plotter vinyl and printing media.



Final laminating vinyl to adhesive coated liner.

Because the liner is discarded upon the transfer it is often considered a minor consumable. Nevertheless, it is a critical stability factor during the manufacture and transport of the jumbo liner rolls. Most importantly, it promotes stability, absence of curl and flatness in graphic arts applications. The liner ensures the reliable performance and speedy and efficient transfer of self-adhesive films onto substrates.

Terminology

The terms silicone paper, release liner and backing paper are used arbitrarily and in this context refer to the same entity. Release liners are found not only in graphic arts but also in countless other applications such as labelling, fixtures, laminating, bandages and surface protection.

The liner is the carrier for the surface film (in most cases vinyl) during the plotting or printing process. It consists of a base material, which is silicone coated on the side facing the adhesive coat on the vinyl film. The silicone regulates the adhesion of the vinyl to the liner and thus controls the film's release properties. Correct release values between the liner and adhesive material are essential for easy weeding and successful transfer.

Basis weight

Release liners are categorised according to their basis weight. The most commonly used measuring unit for the basis weight of paper is grams per square metre (g/m^2). The basis weight, also called density, indicates the weight (or mass) of a particular type or a given area unit. In the paper industry and graphic arts

the basis weight of paper is also known as "grammage". In the United States and Japan pounds (e.g. 20 lb) are more common, whereby the basis weight is expressed as weight in pounds per ream of 500 (in Japan 1000) 22,5 x 28,5 inch standard sheets. Colloquially paper weight is commonly expressed in grams only, i.e. "80 grams" actually refers to 80 g/m^2 or "20 pounds" to 20lb per basic ream of 500 sheets. In most cases a thicker liner is stiffer than a thinner liner.

Paper stock favourite

Although release liners are available in many different materials, paper stock is in fact the most widely used. The familiar Kraft paper has quite a high tensile strength. Tensile strength indicates the pulling force required to rupture a given size of material under stress. It is measured in N/mm^2 and depends on the paper quality and density. To achieve high density and tensile strength only pulp from slow growing coniferous trees is used as raw material. Slow growth promotes longer and stronger fibres in the wood, which in turn results in stronger and denser pulp.

That is why Kraft paper is made from almost 100% fibre pulp and contains very small amounts of other additives to achieve specific surface properties or to improve humidity resistance. Similarly, no fillers such as chalk are added as they would weaken the paper end product. Because waste paper contains a large amount of damaged ground up fibres the use of recycled paper would considerably reduce strength and density and is, therefore, never used. Sometimes paper is slightly bleached to enhance its aesthetic appearance. Yet again, intensive bleaching

Jumbo rolls liner.





would reduce the strength and density of the paper. Major release liner manufacturers, such as Loparex in the Netherlands or Huhtamaki in Germany, pay particular attention to 'stay-flat' properties. Their high quality products are the result of careful selection of suitable paper pulp and meticulous optimisation of their production processes.

Polyester liner

In some cases polyester is used as a liner. It has many positive qualities that improve the cutting and printing performance of the media. Its stay-flat properties and resistance to humidity and rapid temperature changes are much better than those of paper. Its surface evenness helps to produce optically clear, distortion free films for use on glass surfaces. However, because of their considerably higher cost polyester liners are only used where these properties are essential for specific applications. Silicone liners are available in different release levels, which is reflected in the higher or lower release value of the self-adhesive film when it is peeled off the liner. The correct release level is critical for the successful weeding and peeling of cut vinyl and must match the adhesion of the transfer tape. An excessively low release can be just as bad as an excessively high release.

Requirements

Essentially the liner must provide the desired release force for the adhesive used. In addition to the quality of the silicone surface, the release force depends on the type of adhesive used. The release value is the force measured by peeling a 1 inch strip at 180° off its liner. Normally it is measured in N/25mm. Each combination of silicone coating and adhesive type results in a slightly different release value. Release values are generally around 0.2 to 0.25 N/25mm. It should be noted that the release of a removable adhesive is not necessarily lower than the release of a permanent adhesive.

Coatings

In order to increase stability paper liners can also be coated with polyethylene on both sides. In such cases the paper core is sandwiched between PE layers, which act as a structural support. This results in a smoother surface, improved stiffness and lower sensitivity to the rapid temperature changes in modern inkjet printers.

Compared to clay coated standard paper liners the PE coated product is also cleaner because there is less dust during converting as the fibres are encapsulated during the PE coating process.

Uniform liner thickness and cohesion is vital to create finished vinyl films with even consistency to ensure that the cutting depth is the same throughout a design. Uneven thickness caused by the liner may lead to the plotter blade cutting into the silicone layer in some places. This will allow the adhesive to bleed into the paper stock and, in certain circumstances, lead to delamination of the liner. Excessive blade pressure could lead to the same result.

Characteristics

In addition to flat liners (with a smooth surface) major manufacturers of self-adhesive media also offer structured liners (with an embossed surface pattern), in which the liner surface carries a microscopic pattern of ridges, squares or pyramids that transfer their structure onto the adhesive. Because of the micro structure the initial contact surface between the adhesive and the substrate is much smaller, i.e. contact is limited to the tops of the ridges or pyramids resulting in reduced tack. This effect makes the film repositionable and it can easily be lifted during application before being finally applied with the help of a squeegee. The channels between the ridges or pyramids also ease the evacuation of air bubbles trapped between the film and substrate.

To make it easier to work with the liner is sometimes tinted blue or grey in order to create a visible contrast with white plotter films. In many cases the liner also carries an imprint with the manufacturer's brand name and logo.

Good cutting, weeding and peeling are heavily dependent upon the ability to cut the face stock and adhesive layer cleanly without cutting into the silicone liner surface. Having a very uniform, smooth and dense surface to cut against is essential. Careful choice of the liner is consequently no less important than the choice of the right media.

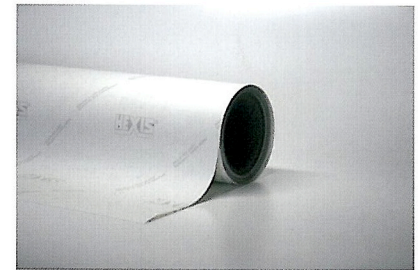
Overview

A large number of different liner types are being used, depending on the product. The summary below illustrates the most commonly used types found on self-adhesive media in sign making and vehicle marking applications:

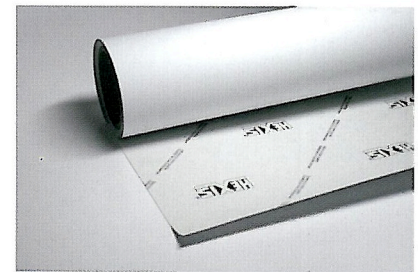
Text and images provided by Martin Kugler, International Communication Manager at Hexis S.A., France. Text edited by Ton Rombout.



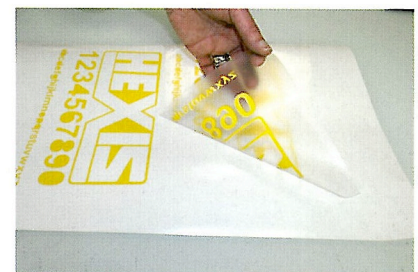
Example of Embossed PE liner.



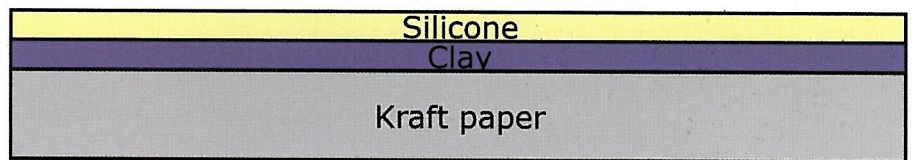
Standard paper liner.



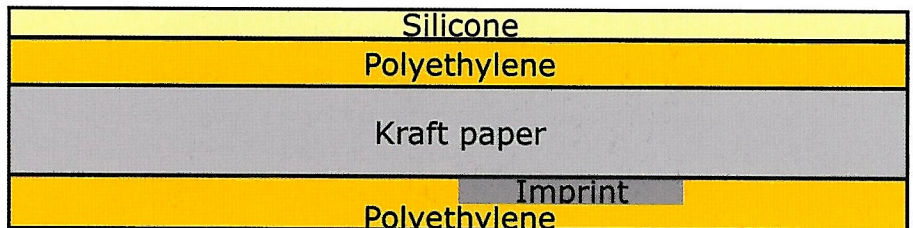
Kraft paper liner.



Quality liner for efficient weeding.



Scheme of Liner plotter film.



Scheme of Liner printing media.

Gauge	Type	Examples
80g/m ²	Kraft paper	Laminates, top coated media and inkjet paper
120g/m ²	Kraft paper	Economy films
137g/m ²	Kraft paper	High performance media
137g/m ²	Embossed Kraft paper	Repositionable films
145g/m ²	Polyethylene coated paper	Digital printing media
145g/m ²	Embossed Polyethylene coated paper	Cast digital printing vinyl
36µm	Polyester	Laminate for window films
75µm	Polyester	Clear/tinted window films