Large Format QUICK REFERENCE GUIDE

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Films and Applications

SELF-ADHESIVE VINYL

There are two main categories of self-adhesive vinyl: cast and calendared.

Cast

Cast vinyl is made for applying to compound curves and is often used for applications like vehicle wraps. Cast film is produced by first turning the ingredients of the finished film; PVC resin, plasticizer, colorant, etc. into paint by the use of a solvent.

When matte, semi-gloss or high gloss vinyl is required then the mold film will be a mirror of that texture. The colored, clear or white vinyl film is then dried and cured at a rather high temperature to form a very flexible film.

Because of the manufacturing process, cast vinyl can take distortion, heat abuse (such as that in thermoforming a sign face) and sun energy without losing its flexibility and cracking, fading or popping away from curves or tight corners such that are encountered in vehicle wraps.

Calendered

Calendared vinyl is used for applying to flat or simple curved surfaces.

A calendered film first melts the ingredients at about half the temperature used to fuse cast film ingredients, then as it cools, the molten PVC is rolled through "calendering" rollers to achieve the final width, thickness and surface finish before being wound up for further processing.

Besides the categories of vinyl, there are also different outdoor durability, thicknesses, as well as types and color of adhesive.

Plasticizer

A plasticizer is a substance that promotes plasticity and flexibility, reducing brittleness. So without plasticizers, PVC products are hard and brittle. They would shatter if you tried to bend, squeeze, or flex them, even a little!

From the earliest days of using PVC as a commercial material, it has been mixed with a wide range of additives. These additives change durability, color, opacity, and flexibility.

As a product ages, plasticizers can migrate, or separate from a product. Higher quality plasticizers stay in a product longer and reduce problems such as cracking, splitting, poor adhesion of ink or glue, and incompatibility with the screen or digital printing process. Better plasticizers increase the longevity of films.

Monomeric vs Polymeric

Within calendered films, you may hear the terms, monomeric or polymeric plasticizers.

Monomeric films are made of short-chain plasticizers. These short chains give less stretch, and tend to migrate out of the film, making it brittle. Additionally, monomeric film have a tendency to shrink. Therefore, these films are best for indoor flat applications and have a 3–5 year outdoor durability. Lastly, monomeric films have a short- term outdoor durability that varies by manufacturer, making them more economical.

Polymeric films are made of long-chain plasticizers that bind well into the film and each other. This bond prevents the plasticizers from migrating and allows more stretch and a softer feel to the film. It generally has a longer durability and is less likely to shrink. For this reason, polymeric film is best for both indoor and outdoor applications including mild curves.

Durability

Outdoor durability can range from 1-year outdoors to 7 or 9. (Note: most manufacturers only test and rate unprinted vinyl).

SELF-ADHESIVE VINYL

One to three-year vinyl is often called short-term or promotional vinyl and is usually lower in cost and use monomeric plasticizers.

Intermediate vinyls can last three to five years outdoors and use polymeric plasticizers, while cast films from some manufacturers can last up to nine years outdoors.

Thickness

Thickness can range from 1 mil (typical cast vinyl) and up to 6 mil for some wall graphic vinyl. The average calendared vinyl is usually 3 to 3.75 mil in thickness.

Adhesives vary in composition (water-based, solvent-based, acrylic, rubberized, etc.), color (clear, gray, black), strength and removability.

Adhesive

Permanent adhesive can usually not be removed without leaving behind an adhesive residue. Use this type when you plan to never remove the graphic.

Removable adhesive by contrast, can be removed within a warrantied period (usually 6 to 12 months) with no adhesive residue. Sometimes heat must be used to remove the vinyl without residue. Removable adhesive is often used for floor graphics and window graphics, when you know that the graphic will be removed or replaced within a certain time frame.

Other types of adhesive, include low-tack, high-tack, changeable, etc.

Opacity

Vinyl can be opaque, clear, translucent or reflective.

Adhesive Color

The color of an adhesive can help cover up backgrounds when vinyl is applied over existing graphics or a colored wall. For this reason, adhesives might be tinted dark grey or black.

Other times adhesives might be untinted or translucent, allowing the vinyl color to show through.

For some applications, there are adhesives that are optically clear. For these, there are no fibers or tint that is visible to the eye, so it's almost like it's not even there.

https://www.youtube.com/watch?v=ei7VhjR33oQ

Go to the above link to see a video showing the difference between cast and calendered vinyl.

Vinyl Applications

CAST VS CALENDARED

Cast Film Advantages

- Little to no shrinkage when heat is applied
- Durable and long-lasting
- Conformable product that can be applied over rivets, corrugations and complex curves
- Color is retained well over time

Calendered Film Advantages

- Economical – greater production yields less cost
- Thicker film allows for easy handling and installation
- Excellent on flat, simple and moderate curves
- Abrasion-resistant

Recommended Uses for Cast Vinyl

- Vehicle wraps
- Architectural wraps
- Complex curves that require stretching
- Long-term outdoor signage

Recommended Uses for Calendered Vinyl

- General Signage
- Floor Graphics
- Flat surfaces and Simple Curves
- Wall Decals

Recommended Brands of Cast Film

- 3M 180Cv3 or 480Cv3
- 3M 1050 Clear Cast Film
- Avery SuperCast
- Oracal 3951 Cast Film

Recommended Brands of Calendered Film

- 3M IJ35 and IJ40
- Avery 3000 Series
- Oracal 3615 Opaque Film
- Oracal 3165 Clear FIlm

SPECIALTY

Recommended Wall Vinyl

- Avery 2610/2611 Wall Vinyl
- Mactac Wall Noodle
- Photo Tex
- Presto Tape Presto Tex
- LexJet Print-N-Stick Fabric

Recommended Prismatic Vinyl

- 3M Prismatic 3930 Series

Recommended Metallic Film

- ORACAL 951 Premium Cast
- Avery 900 Supercast Films

OTHER VINYLS

- Heat Transfer Vinyl
- Sihl 4583 T-Printz

CLEAR

Recommended Uses for Clear Vinyl

- Window Graphics
- Glass Wall Dividers
- Meeting Rooms

Recommended Clear Film

- 3M IJ61 Clear Vinyl
- 3M IJ 8150 Clear Cast Vinyl
- Oracal 3651 Clear Cast Vinyl

REFLECTIVE

Recommended Uses for Reflective Vinyl

- Traffic Signage
- Vehicle Wraps

Recommended Reflective Vinyl Films

- Oracal 5650RA
- Avery IJ5100R

TRANSLUCENT

Recommended Uses for Translucent Vinyl

- Backlit Signage
- Taxi Toppers
- Menu Boards

Recommended Translucent Film

- 3M IJ3650
- Avery 2050
- Oracal 3850

Banners

Banner material is a flexible face vinyl substrate, usually reinforced with a scrim mesh for strength. There is front-lit banner, back- lit banner and blockout banner.

Front-Lit

Front-lit is made to be lit and printed on the front of the film.

Back-Lit

Back-lit banner is made to be printed on the front, but lit from behind, such as in large light boxes you might see at the airport.

Blockout

Blockout banner has an opaque black film sandwiched in the material to stop light bleed through.

Grommets are usually added to allow easy hanging of the finished banner, either indoors or outdoors.

Double-Sided

Double-sided pole banners can take a lot of wind and often are hung with special brackets that have spring hinges to lessen the wind load. These are often 15 to 18 oz. weight.

Mesh

Mesh Banners allow air to flow through the banner. Mesh banner is sold with and without a liner.

Most printers require a liner to prevent ink from flowing through the holes of the mesh and creating a mess on the printer.

The strength of a banner product is determined more by the scrim reinforcement than the weight of the product, so a 1000x1000 denier 13 oz banner can be stronger than a 500x500 denier 15 oz banner.

Indoor

Lower cost, indoor banner material, is usually 10-12 oz. and has a less dense scrim (250-300).

Outdoor

The average outdoor banner is a 13 oz scrim with 500 to 1000 denier.

Some banner products are also made from PET, HDPE, LDPE or Tyvek. These are all generally lower in cost and durability.

PET Banner

PET banner is made from polyester and is slightly more rigid, and will show creases if dinged or folded.

HDPE/LDPE

High-Density Polyethylene or Low-Density Polyethylene are usually woven banners that are lightweight and low cost. HDPE is often used for billboards.

Tyvek

Tyvek banners are made from the same material as a tear resistant FedEx shipping envelope. It's tough and water-resistant, but can stretch and distort.

1 https://www.youtube.com/watch?v=1GoD9oL6k3g

2 https://www.youtube.com/watch?v=1GoD9oL6k3g

3 https://www.youtube.com/watch?v=8jUKG8swweU

Go to the above links to see videos showing you how to install: **1** mesh, **2** scrim banners and **3** using banner ups instead of grommets.

BANNER FINISHING

Finishing and installation are important details for banners. Hems and grommets add strength to the product so that it can be hung without Mother Nature ripping it down.

Hems can be produced with banner tape (a double-stick tape) by applying to the edges and folding it over on itself.

By folding the material over and leaving a loop of material, you can create a pole pocket. This allows a cable, rope or rod to be threaded through the pocket to allow the banner to be hung.

There are also reinforced single-sided hem tapes that add a plastic reinforcement to the banner edge.

For higher-volume banner production, there are banner welders that can melt layers of banner together using radio waves (RF welders) or hot air (heat welders).

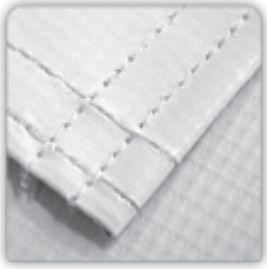
Sewing is yet another option, but one that many manufacturers discourage, as piercing the banner material with a needle repeatedly creates perforations that can make it easier to tear.

Grommets can be made from rubber, plastic or metal, (often brass).

The purpose of a grommet is to provide a reinforced hole through which something passes through. The reinforced hole ensures that one can hang a sign (or curtain) without tearing the material itself.

The most common method of applying grommets, is the hand-operated grommet press, but there are electric and hydraulic grommet presses as well for higher-volume applications.

Another popular tool for finishing banners are adhesive-based, “Banner Ups.” These are durable and flexible plastic pieces that are applied to the banner in place of grommets.



HEMMED EDGES

POLE POCKETS

GROMMETS

BANNER UPS

WEBBING

D-RINGS

Banner Applications

Front-Lit Banner

- Jetflex 13 oz Scrim Banner
- Kapco 13 oz Scrim Banner
- Arlon 13 oz Scrim Banner

Back-Lit Banner

- Ultraflex Backlit

Blockout Banner

- Herculite 12 oz Double-Sided Blockout

Mesh Banner

- Ultraflex Supreme Mesh with Liner

Pole Banner

- Herculite 18 oz Scrim
- Back-lit Banner
- Ultraflex Backlit

Other Banner

- Tyvek
- PET

Displays and Events

For many companies and organizations, event marketing at trade shows and other special events is the primary way to demonstrate their products and services.

TYPES OF DISPLAYS

Display Tables:

Tables are commonplace in event marketing. At many locations, you'll be provided with a table or asked to bring one on which to exhibit your goods and services.

Enhance your presentation with our custom-printed table covers, table runners and table skirts. Tabletop signs, posters and display boards will also add professionalism to your presentation.

Pop-Up Displays:

As their name implies, pop-up displays are collapsible, accordion-style frames that "pop" open (and close). As backdrops, they offer an excellent focal point for your exhibit.

Retractable Banner Stands:

Available in single- and double-sided forms, banner stands offer a portable and convenient way to bring a display while traveling or for sales presentations.

Soft Displays:

Fabric panels are becoming more popular because of the great look, and lower cost of dryage and shipping for an event.

TYPES OF EVENT SIGNS

Corporate and community events are another popular opportunity for signage.

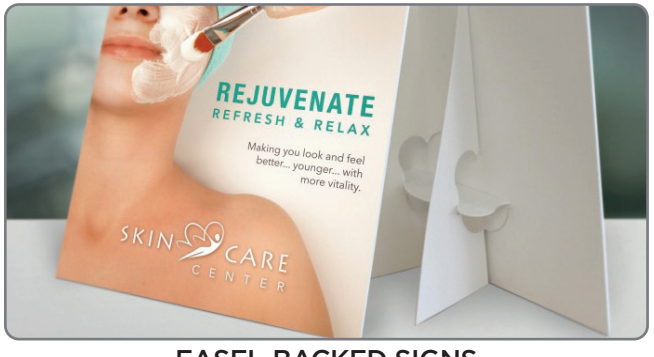
- Stage Backdrops
- Wayfinding Signage
- Window, Wall and Floor Graphics
- Sidewalk and Pavement Graphics
- Dimensional Logos
- Banners
- Banner Stands
- Advertising Specialties
- Tents

TABLE THROWS

TABLE TOP GRAPHICS

RETRACTABLE BANNER STANDS

POP-UP BACKWALL AND COUNTER



EASEL-BACKED SIGNS

TABLE TOPPERS

Displays and Events Applications

Table Throws

- Ultraflex UltraPoplin PES S240
- Ultraflex VorTex Soft T230

Retractable Banner Stands

- Sihl 3608 DuraSOL Display Film
- Ultraflex DSS Pro 14 oz. Blockout
- Magic POS PRO 200+

Rollup Backwall Displays

- Ultraflex Baclkit

Soft Signage

- Ultraflex UltraPoplin PES S240
- Ultrafls VorTex Soft T230

Labels & Decals

Labels and decals are mostly the same when it comes to materials used (an adhesive-backed substrate), but differ in intended purpose.

While a label is usually informational, for instance a wine label or the label for a bottle of salsa, a decal is usually more design oriented.

Depending on requirements, labels and decals can be made from a variety of materials: paper, vinyl, textile, foils, etc.

Technically speaking, a label doesn't even require adhesive. Many labels you see on water bottles and soft drink bottles are shrink wrap plastic (that's how they get it to conform to the bottle so well).

Labels and decals can come in virtually an unlimited number of shapes and sizes. To custom cut shapes other than simple squares and rectangles, a contour-cutting plotter is often used.

LABELS

DECAL

Floors and Sidewalks

Most floor graphics are simply self-adhesive vinyl with a removable adhesive, covered with a non-slip laminate for safety.

They can cover an entire floor or be contour cut into decals (for grocery store aisles, etc).

In addition, there are specialty materials specifically formulated for asphalt and concrete graphics.

Special care should be taken when printing on some of these sidewalk materials, as they have very rough, course surfaces that can abraid or damage printheads if a headstrike occurs.

Utilizing floor graphics vinyl material is a cost effective advertising and promotion method.

Vinyl media does not take up valuable space because it adheres to the floor, but it does have an incredibly impact on attendees and prospective customers.

The vibrant colors and images catch the attention of anyone passing by. Removable vinyl can be applied to vinyl flooring, tile, even carpet.

Also, vinyl floor media is easy to move around or remove altogether when the media is no longer needed.

Some examples for floor graphics include:

- Hotel Lobbies
- Retail Store Aisles
- Shopping Centers
- Catwalks
- Trade Show Booths
- Reception Areas
- Corporate Lobbies
- Conference Rooms
- Performing Arts Centers
- Theaters

AlumiGraphics is a product for sidewalk graphics.

Available in a smooth and grip version, it's a versatile product that is easy to install or remove without heat.

AlumiGraphics can also be applied to brick or tile for a durable outdoor wall graphic.

Floor & Sidewalk Applications

Floor Graphics Vinyls

- 3M Controltac Print Film 40C
- 3M Envision Print Film 48C
- GF Concept 210 Floor Film
- GF Concept 212 Carpet Film
- Oracal 1663 Floor Graphics Vinyl
- Mactac JT5828HTO Matte White
- Avery MPI 2120 Matte Vinyl
- Avery MPI 2923 Matte Vinyl

Sidewalk and Pavement

- 3M 3662 Sidewalk Film
- AlumiGraphics Grip
- Mactac Street Rap
- Asphalt Art
- Ultraflex Aquaflex
  (for use underwater in pools)

Floor Graphics Overlaminates

- 3M 3645 8-mil Lustre Overlam
- 3M 8509 3-mil Lustre Overlam
- 3M 3647 19-mil Cast Matte Overlam (use with 3M 3662)
- GF Concept 211 Traffic Graphic Overlam
- GF Concept 213 Traffic Graphic Overlam
- GF Concept 217 Traffic Graphic Overlam
- Oracal Oraguard 250AS Skid-Resistant PVC Overlam
- Oracal Oraguard 255AS Skid-Resistant PVC Overlam
- Mactac JT5828HTO Matte White
- SEAL Print Shield Floor Guard
- Avery DOL 600 Floor Marking Overlam

Wall Graphics

Wall Graphics can be for indoor our outdoor usage.

Indoor wall graphics can be as simple as a logo or words printed or cut from vinyl and applied to the wall; or as complex as a floor to ceiling full-color wall mural.

There are a huge variety of indoor wall graphic materials.

You can certainly use adhesive-backed vinyl products, but these might damage delicate drywall when removed.

Other options are adhesive-backed fabrics, pre-pasted wallpapers, and textured vinyl wall coverings that are applied with wallpaper paste.

Adhesive-backed fabrics may cost a little more, but can be much easier to install and may even be able to be removed and reused.

Pre-pasted wallpapers are convenient, because they print just like paper, but have a water-activated adhesive that allows it to be installed just like off the shelf wallpaper from your favorite home improvement center. They also include synthetic materials to give them added strength and durability.

Textured vinyl wall coverings are typically the most durable, but have a course canvas-backing that requires a manual application of wallpaper paste to apply to a wall.

These products can come in a huge variety of textures from sandstone to faux leather.

Outdoor wall graphics are most always adhesive vinyl so that they can stand up to Mother Nature. There are even some that are made specifically to cover the texture of concrete blocks and bricks. 3M was among the first to market with this type of product.

3M IJ8624 Textured Surface Vinyl should always be used with the matching laminate, 8524.

PhotoTex is a popular choice for an adhesive-backed textile. It has a unique siliconized adhesive that allows the adhesive to release from itself, even if wadded up into a ball. The fabric face of the product allows air bubbles to bleed out through the face and not get trapped like it would with vinyl.

One challenge with the product is that contour cutting often results in frayed edges.

Among the textured wallcovering products, few has much variety as Dreamscapes with 32 products. From simple textures, to metallized and prismatic products, Dreamscapes has a wallcovering for most any decor challenge.

https://www.dreamscapewalls.com/ texture-gallery/

EXAMPLE OF PHOTO TEX

Wall Graphics and decals can overlap, as most categories can.

One popular name in wall graphic decals is FatHead. They are successful because they have licensed images from many sports teams, movies, bands and actors.

This style of decal is easily created in-house by using the right adhesive-backed vinyl products.

FatHead type products use a thick 6 mil vinyl that has more body and is easier for novice users to apply. You don't need releases from famous people to be successful however, you can make decals from your customer's own snapshots: so they can show off their favorite grandchild or adored pet.

Wall Graphics Applications

Self-Adhesive Vinyl

- Avery 2610/2611 Wall Vinyl 6 mil
- Mactac Wall Noodle 6 mil
- Oracal 3628 3 mil
- Catalina 4, 6 & 8 mil white and 4 mil clear

Self-Adhesive Textile

- Photo Tex
- SEAL Fresco AdTex
- Ultraflex FabriTac

Concrete and Brick

- 3M IJ 8624
- AlumiGraphics Smooth
- Mactac RoughRap
- Arlon DPF 8000 High Tack Vinyl

Pre-Pasted Wallpaper

- HP PVC-Free Durable Smooth Wallpaper Type II (ASTM F793) Wall Covering
- RTape Pre-Pasted Virtuwall Wallcovering (also available in non-pasted)

Textured-Vinyl Wallcoverings

- Avery MPI 2631 & 2636 Textured Wall Vinyl
- Mactac DecoFresco Wall Vinyl
- Dreamscapes (32 options including Copper, Silver and Gold Metallics)
- Ultraflex (4 embossed textures) Bali Hai, Matte, Stardust and Suede

AN EXAMPLE OF FATHEAD®

Window & Glass Graphics

Windows are similar to wall graphics, but because they are clear, the products applied to windows are typically also clear to allow light to show through.

As with wall graphics, there are a large variety of products for windows and glass.

Static clings are products that do not have any actual adhesive, instead they adhere to glass with a static charge.

Adhesive-backed products, come in low-tack easily removable products, up to permanent adhesives that are intended to be used for years.

Some products are specially made to allow the graphic to be viewed from the front, but still allow people to see outside from the back.

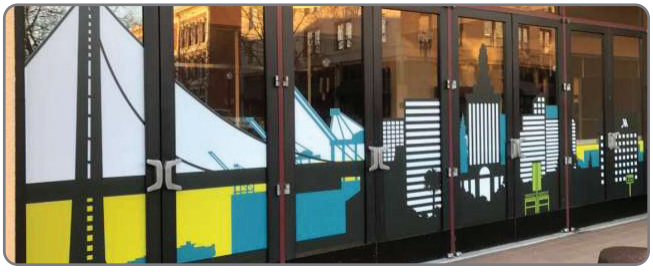
These one-way vision or window perf vinyls are often used on store fronts or the windows of a vehicle wrap.

Then we have architectural films that can give glass the appearance of being sandblasted. This can be a simple overall appearance in the case of frosted vinyl, or as subtle and delicate as rice paper, and a variety of other patterns.

Printers capable of printing white ink will have a huge advantage in printing on clear materials, as they can create effects by just printing white, or they can backup their color inks with white to increase opacity, or even layer white ink between layers of colored inks to create prints visible from both sides of a window or pane of glass.

Conference room glass walls can be covered for decoration and/or privacy.

Because of the high adhesion of vinyl to glass surfaces, many products adhered to glass will use a wet install method, where a soapy water solution is sprayed on both the window and graphic to inhibit adhesion until the installer applies a squeegee to affix the graphic in place. This allows the graphic to float and slide before it is permanently adhered.



Window & Glass Graphics Applications

Recommended Static Cling Vinyl

- 3M IJ61 Clear Vinyl
- Solvex Static Cling

Recommended Adhesive-Backed Polyester

- SEAL UltraClear PET

Recommended Frosted Vinyl

- 3M Architectural Wraps
- Mactac BeeFree Frosted Vinyl

Recommended Low-Tack Films

- Oracal 3268 Low-Tack Vinyl

Recommended Window Perf Film

- 3M IJ67 Perforated
- Avery MPI 2528 Perforated Vinyl
- Oracal 3675 Perforated Vinyl

Recommended Architectural Vinyl

- 3M DI-NOC

Fabric Classes & Terminology

There are three major classes of fabric: non-woven, knit and woven.

Non-Woven

Non-woven is a fabric-like material made from long fibers, bonded together by chemical, mechanical, heat or solvent treatment.

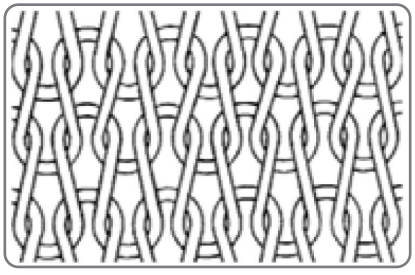
The term is used in the textile manufacturing industry to denote fabrics, such as felt, which are neither woven nor knitted.

Non-woven materials typically lack strength unless densified or reinforced by a backing. In recent years, non-wovens have become an alternative to polyurethane foam.

Knit Fabric

Knit fabric is a cloth formed by employing a continuous yarn or set of yarns to form a series of interlocking loops.

Knit fabrics can generally be stretched to a greater degree than woven types.



EXAMPLE OF KNITTED FABRIC

The two basic types of knits are weft or filling knits — including plain, rib, purl, pattern, and double knits — and the warp knits — including tricot, raschel, and milanese.

In knitting, a wale is a column of loops running lengthwise, corresponding to the warp of woven fabric; a course is a crosswise row of loops, corresponding to the filling.

Woven Fabric

Woven fabric is a cloth formed by weaving. It only stretches diagonally on the bias directions, unless the threads are elastic. Woven cloth usually frays at the edges, unless measures are taken to counter this, such as the use of pinking shears or hemming.

NAP

Nap is the raised (fuzzy) surface on certain kinds of cloth, such as velvet. Nap can refer additionally to other surfaces that look like the surface of a napped cloth, such as the surface of a felt or beaver hat.

WARP

Warp is the lengthwise or longitudinal thread in a roll. The warp will be parallel to the selvage.

WEFT

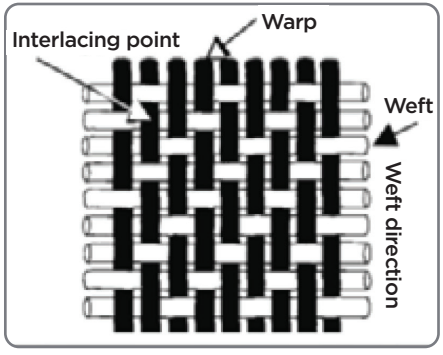
Weft is the horizontal threads in roll of fabric that run from selvage to selvage. Also called woof.

Selvage

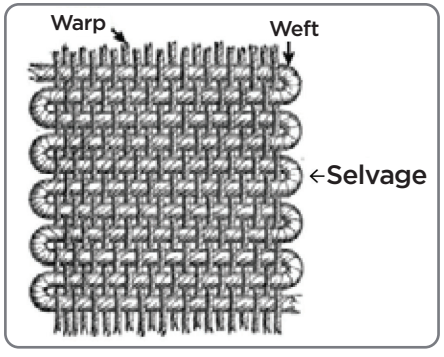
Selvage is the term for the self-finished edges of fabric. The selvage keeps the fabric from unraveling or fraying.

Soft hand

Soft hand is the degree of print softness in a textile after printing; a textile print with a soft feel.



EXAMPLE OF WOVEN FABRIC



AN ILLUSTRATION OF WARP AND WEFT THREADS

OTHER TYPES OF FABRICS

Poplin

A strong fabric produced by the rib variation of the plain weave and characterized by fine, closely spaced, crosswise ribs. It is made with heavier filling yarns and a greater number of warp yarns and is similar to broadcloth, which has even finer, more closely spaced ribs.

Canvas

A stout cloth probably named after cannabis (Latin: "hemp"). Hemp and flax fibre have been used for ages to produce cloth for sails.

Canvas yarns (usually cotton, flax, or jute) are almost invariably two or more ply, an arrangement that tends to produce a uniform thickness. A plain weave is extensively used for these fabrics, but in many cases special weaves are used that leave the open spaces well defined.

Artists' canvas, a single-warp variety, used for painting in oils, is much lighter than sail canvas. The best qualities are made of cream or bleached flax fibre about 25 cm (10 inches) long (line).

A mixture of shorter linen fibre (tow), and even of cotton is found in common types. When the cloth comes from the loom it is treated to prepare the surface for the paint or ink.

Linen

Fibre, yarn, and fabric made from the flax plant. Flax is one of the oldest textile fibres used by humans; evidence of its use has been found in Switzerland's prehistoric lake dwellings.

Fine linen fabrics have been discovered in ancient Egyptian tombs. The fibre is obtained by subjecting plant stalks to a series of operations, including retting (a fermentation process), drying, crushing, and beating.

Linen is stronger than cotton, dries more quickly, and is more slowly affected by exposure to sunlight. Low elasticity, imparting a hard, smooth texture, makes linen subject to wrinkling.

NOTE ABOUT THE TEXTILE TYPES:
Although the definitions state that they are made from cotton, hemp, flax, etc., most digital printable textiles are made from polyester fibers. Coatings are added to the textile to allow different types of inks to be used.

Textiles and Soft Signage

Recommended Light-Weight Fabric

- Seal PureColor Samba Fabric
- Beaver Salute DTF

Recommended Multi-Purpose Fabric

- Seal PureColor Mambo Fabric
- Seal PureColor VersaFabric
- Ultraflex UltraPoplin D240
- Aberdeen Heavy Bannerstand

Recommended Backlit Fabric

- Beaver PrintTex Artist Mambo
- Ultraflex Vortex Backlit Optimum D270
- Ultraflex UltraCanvas Backlit D280
- Fredricks Canvas

Recommended Adhesive-Backed Textile

- PhotoTex
- Ultraflex FabriTac

Recommended Blockout Fabric

- Ultraflex UltraTex Blockout S335
- Ultraflex VorTex Blockout D252

Recommended Canvas

- Seal PureColor Monet Canvas
- Seal PureColor Monet Light Canvas
- Fredrix 558 Raw Canvas Natural
- Fredrix 901RG Regent Glossy Canvas

Recommended Flag

- Seal PureColor Apollo Flag
- Beaver Salute DTF
- Ultraflex Vortex Flag

Rigid Materials & Substrates

If you only have a roll to roll printer, rigid materials can be the substrate to which adhesive-backed vinyls are mounted. However, if you have a Hybrid or Flat-bed UV curable printer, you can print directly on a huge variety of materials, including plastics, woods and metals.

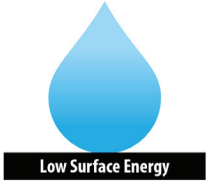
There are some basic considerations for direct printing. UV inks can be applied to most any material, but that doesn't automatically mean that the inks will adhere well.

Adhesion is a product of the chemistry of the inks, combined with the surface of the material.

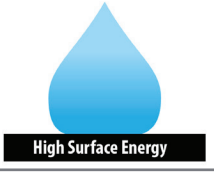
Very smooth, non-porous surfaces, like glass can be difficult to print to without primer or adhesion promoters.

In addition, low surface-energy plastics like polyethylene, are also difficult for ink adhesion.

It is also important to clean surfaces to be printed, to remove dust and dirt, as well as any oil, grease or waxes that might inhibit the adhesion of ink onto the surface.



On a substrate with low surface energy, the ink drop sits like a sphere on the surface with a small area of contact. This creates weak adhesion when the ink is cured.



With higher surface energy, the ink drop is pulled down and more contact with the surface of the substrate occurs. The more area in contact, the stronger the adhesion.

Rigid Materials & Substrates

Choosing a substrate will depend on the application needs, cost and material specifications.

There is no “best” sign material for every project.

Without being all inclusive, the chart below, does give a decent overview of the different characteristics of each material and how it might be used.

Once familiar with the materials, you’ll be able to suggest the correct digitally-printable substrate for the customer’s application.

Name	Flexible	Weight	Standard Thicknesses	Composition	Finish	Indoor Durability	Outdoor Durability
Styrene	Yes	Very Light	.020, .030, .040, .060 inch	High Impact Polystyrene	Gloss	Medium term	No
Gator Board (GatorFoam)	No	Very Light	3/16, 3/8, 1/2, 3/4, 1 inch	Polystyrene foam sandwiched with a wood-veneer face	Gloss	Medium term	No
Foam Board (Foam-Cor)	No	Ultra Light	1/8, 3/16, 3/8, 1/2 inch	Polystyrene foam sandwiched with a kraft-paper face	Matte	Short term	No
Ultra Board	No	Very Light	3/16, 1/2, 3/4, 1 inch	Polystyrene foam sandwiched with a styrene face	Gloss	Medium Term	No
PVC Board (Sintra)	Yes	Light	1, 2, 3, 6 mm	Closed cell PVC foam	Satin	Medium term	Medium term
Corrugated Plastic	No	Ultra Light	4, 10 mm	Fluted Polypropylene	Low Gloss	Short term	Short term
Aluminum Composite (DiBond)	No	Light	2, 3, 4 mm	.012” aluminum sheets with polyethylene core	Painted or brushed metal	Long term	Long term
Plywood or MDO	No	Heavy	3/8, 1/2, 3/4 inch	Wood	painted	Long term	Medium term

OUTDOOR SIGNAGE: LONG-TERM: 7+YEARS / MEDIUM-TERM: 5 YEARS / SHORT-TERM: 4 YEARS OR LESS
INDOOR SIGNAGE: LONG-TERM: PERMANENT / SHORT-TERM: REMOVABLE

PVC BOARD (SINTRA)

3A Composites is the manufacturer of Sintra. Sintra is the industry's leading PVC board for more than 30 years.

It is comprised of moderately expanded closed-cell polyvinyl chloride (PVC) in a homogeneous sheet with a low-gloss matte finish.

Made In USA.

- Sintra Bright White is now the brightest and whitest PVC board on the market
- The trusted brand leader by which all others are measured
- Lightweight yet rigid and durable
- Easily formed into just about any shape imaginable using wood and foam board fabrication techniques
- Heat formable and chemical resistant
- Superior dent and scratch resistance

Flammability Characteristics

- Self extinguishing UL 94V-0
- UL 94 5-V
- Class 1 or Class A (ASTM E-84) in gauges of 3mm or less

3A Composites

- Sintra PVC
- e-PVC
- Sintra Eclipse

Other manufacturers of PVC foam sheets are:

Kommerling

- Komatex
- Komacel
- Komacel Plus
- Komacel Plus Embossed
- Komadur

Palram Americas

- Palight ProjectPVC
- Palight Premium
- Palight EPS
- Palight Outdoor
- PalBoard

POLYSTYRENE

Hi-impact polystyrene is frequently used in retail environments such as Point of Purchase and Point of Sale graphics. They are one of the lowest cost substrates available for many applications.

Primex is a manufacturer of Prime Digital HIPS and Prime Digi-HIPS. Each are specialized high impact polystyrene designed for UV digital printing.

Prime Digital HIPS™ is a great choice for standard UV digital printing and is available with or without corona treating.

Applications:

- Indoor & Temporary Outdoor Signage, Posters/Signs
- Aisle Markers, Point of Purchase Displays, Backlight
- Signs/Displays, Pump Toppers and Horticultural Tags

Prime Digital HIPS™ is engineered to meet the demands of digital printing especially for processes that require a higher dyne level material, UV Inhibiting characteristics and improved impact levels.

Prime Digital HIPS™ and Prime Digi-HIPS™ are available in sheets and rolls in natural, white and custom colors. A variety of opacities and controlled textures such as Matte/Matte, Matte/Polish or Matte/Gloss are available in thicknesses ranging from .010 to .1875

Polystryrene Products from Primex include:

- Primex Prime Clear-X 200
- Primex Prime DIGI-HIPS™
- Primex Prime Digital™
- Prime DIGI-HIPS™
- Primex Prime Impax 250
- Primex Prime Impax 450
- Primex Prime Impax 650D

Other manufacturers of Polystyrene Sheeting are:

Spartec

- Printable Styrene Sheet
- FormPro HIPS

King Plastics

- King HIPS High Impact Polystyrene

PolyOne

- PolyOne™ DigiMax™

FLUTED CORRUGATED PLASTIC

Primex is also one of the leading manufacturers of corrugated plastic sheets.

Their PRIME COR-X™ and PRIME COR-X PRINT-X, is a printable polypropylene corrugated product that provides printers and designers to create long lasting indoor or outdoor promotional displays.

This unique brand of corrugated products are strong and durable, yet light weight and versatile for a variety of processes.

PRIME COR-X™ offers exceptional printability, consistent gauge and great lay flat characteristics for screen and digital printing. Available in gauges of 3 to 10 millimeters (mm) in white and 9 other standard colors.

PRIME COR-X PRINT-X™ is graphic quality printable polypropylene corrugated product with a super smooth surface for high quality graphics. Available in gauges of 3 to 10 millimeters (mm) in widths up to 104” in white and custom colors.

Fluted corrugated plastic sheets are often paired with wire H-stakes that slide into the flutes and allow for easy to install yard signs.

Applications:

- Indoor/Outdoor Signage
- Pole Wraps
- Real Estate and Political Signs
- Point of Purchase Displays
- Totes
- Boxes
- Partitions
- Convenience Store Outside Displays

Other manufacturers of Fluted Corrugated Plastic Sheeting are:

Coroplast

- Coroplast
- Coroplast Smooth
- Coroplast Archival
- CoroClear

IntePlast Group

- Ultrasmooth IntePro
- Ultraclear IntePro (available with profile flutes, X flutes, conical flutes and S flutes)

CLEAR PLASTICS

There are three different clear plastics that are commonly used in signage, acrylic, polycarbonate and PETG.

While all are clear and available in a variety of thicknesses, there are differences in price, impact resistance, and printability. There are also dozens of options for each type of material that the manufacturer can offer, such as UV resistance treatment, color, finish, etc. In general acrylic is the lowest in cost but also the weakest when it comes to impact resistance.

Acrylic is a plastic manufactured using one or more derivatives of acrylic acid. Polymethyl Methacrylate acrylic, or PMMA, is one of the more widely used forms of acrylic due to its exceptional weatherability, strength, clarity and versatility.

Polyethylene Terephthalate Glycol, or PETG, is a clear thermoplastic that can be formed into a number of shapes, making it suitable for use in a broad range of applications. Primarily used in indoor applications, it can also be printed or painted for graphics applications.

PETG falls between acrylic and polycarbonate on the scale of impact resistance, with higher impact resistance than acrylic, but lower resistance than polycarbonate.

Polycarbonate, also referred to as PC, is a tough, impact-resistant, virtually unbreakable material used in wide variety of applications.

LEXAN™ is one of the most commonly recognized polycarbonate brands.

While acrylic and PETG laser cut well, polycarbonate will emit a thick oily smoke when laser cut. Do not even attempt this unless your laser cutter has a fume extraction, filter system.

Polycarbonate's impact resistance is approximately 200 times greater than plate glass. PETG is about 70% less than that.

Many manufacturers are now making clear plastic sheets particularly for digital printing systems such as UV curable printers.

Make sure you choose high quality products that have a film liner and that are treated or coated for optimal print adhesion.

3A Composites

- PETG - .030 to .236 inches thick

Primex

- PETG - .060 to .236 inches thick

SABIC Polymershapes

- Polycarbonate - .03 to .5 inches thick
- PETG - .020 to .236 inches thick

Plaskolite

- Optix DA Acrylic

METALS

Printing on metals or metallic surfaces give a sheen and gloss that can't be duplicated with other methods.

One of the most popular choices for a metallic substrate is Dibond. Dibond is a composite aluminum product with an aluminum face and back and a solid polyethylene core.

There are also many off-brand versions available on the market. The face can be painted or have a brushed finish. Brushed steel, brushed silver and brushed gold are some additional variations.

Dibond can also be routed and is a popular choice for dimensional logos.

Another popular choice are aluminum sheets in .040, 060, and .080 thicknesses. Aluminum sheeting is also available as sign blanks that have rounded corners and pre-drilled mounting holes.

For use in trophies and plaques, you can also find copper and brass sheets that can be printed and/or engraved.

Other options are plywood or other wood-based products that have an aluminum face mounted to one or both sides.

Need a magnetic receptive surface? Steel sheeting is yet another metal option that can be layered beneath a printed vinyl graphic, or printed to directly with an adhesion promoter and UV curable inks.

Aluminum can be cut or routed by most wood-cutting routing bits or saws.

Applications:

- POP Displays
- Exhibits and Kiosks
- Exterior and Structural Signage

Dibond

Painted: White, Black, Red, Yellow, Green, Blue.

Brushed: Fine Silver, Silver, Copper, Bronze, Stainless

WOOD

Wood can be printed to allow the grain of the wood to show through, or if backed with white ink on a UV curable printer, then true color can be maintained when printing on either light or dark wood.

Woods come in many forms. Veneers, plywood, hardwoods, and engineered boards, like MDO and MDF.

Ideally all wood products to be printed should be flat and uniform in thickness. Moisture is not your friend here, as it will be absorbed by the wood and cause the product to warp.

Wood should always be stored in a cool, dry environment, and laid flat to avoid any bowing that might occur when stored on it's side.

Lighter colored woods, like pine and oak, are often printed on directly to create a rustic, homey look. Digital printing on wood can be distressed to look aged, and can take the place of many hand-painted signs and decor pieces.

Darker-colored woods like walnut would be challenging to print on without layering the color with white ink. White ink under the colors will block the bleed through and keep color looking true to the original image.

Plywoods and veneer-coated plywoods are popular for outdoor site signs, and can also be purchased pre-primed and painted.

Thin veneers can be purchased in rolls or sheets and allow you to have a wood surface without the mass and weight of hardwoods.

Engineered boards like MDF will always be perfectly flat and smooth, unlike hardwoods, which may have knots and grain that affects how ink adheres.

Wood is another popular choice for routed signs and dimensional logos.

Applications:

- POP Displays
- Decor
- Exhibits and Kiosks
- Exterior and Structural Signage

ENVIRONMENTALLY-FRIENDLY BOARDS

While some of the previous substrates can be recycled or reused, there is also a category of products that are specifically manufactured to be easy to recycle because they are entirely manufactured from paper products.

One of the first on the market was a honeycomb board from Xanita. They manufacture two products, Xanita Print and Xanita Kraft.

Xanita Print is a natural fibre based board consisting of a recycled kraft core sandwiched between printable white kraft liners.

The high crush strength kraft core is manufactured from post-consumer recycled kraft waste. This offers designers and board converters a VOC-free and fully repulpable alternative to MDF, particle board and non-renewable rigid or foam-filled plastic sheeting.

Another product is EagleCell from Gilman Brothers.

EagleCell is a recyclable, all-paper honeycomb graphics board with triple-thick bright white clay coated liners manufactured with 100% fully recyclable paper core and surface papers, available in both White and Kraft Core Options.

These products are ideal for short-term retail displays such as point-of-purchase displays. Even structural, weight-bearing tables, chairs and shelving can be manufactured.

With a digital flatbed cutter, like the Colex Sharpcut, and optional Engview software, these products can be used to create a wide variety of customizable POP and POS displays.

FOAMBOARDS

For event signage, presentation boards, easel prints, mounted posters, etc., the substrate of choice is often a lightweight board with a foam core.

Not all foam core materials are the same, however. Some have more durable surfaces, and may also have a denser foam between the faces.

Three options are Foamcore, Gatorfoam and Ultra Board.

Gatorfoam is 2-3x the cost of foamcore but also 2-3 times more durable.

Ultra Board is more durable than Gatorfoam, but costs a bit more.

Which you choose to use will depend on the customer's budget and the durability needed for their application.

Foamcore is comprised of extruded polystyrene foam with clay-coated white or kraft black paper facers. It's cheap, lightweight, easy to install and perfect for temporary displays. Unfortunately, due to the paper face, it's extremely susceptible to water damage, scratches and general wear and tear. Foamcore is best for one-time usage as the material can bend or dent easily.

Gatorfoam is comprised of extruded polystyrene foam bonded between two layers of wood-fiber veneers. It's a perfect solution for long-term interior signage or dimensional lettering.

Ultra Board is a heavy-duty, all-plastic panel that features a litho-grade, high-impact polystyrene surface perfect for screen printing and digital printing. It is ideal for permanent displays and signs.

Ultra Board is designed for interior use and is favored for its durability. The dent-resistant styrene liners are secured to the foam center with a remarkable bond that keeps the panel flat and rigid. The Ultra Board surface does not allow moisture to penetrate, so inks and paints stand out vividly for screen-printed, digital-printed, or painted images.

3A Composites

- Foamcore
- Gatorfoam

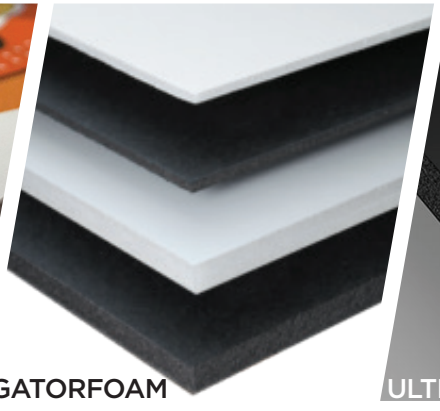
United Industries

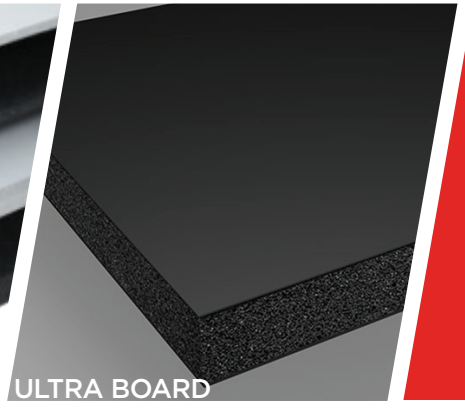
- Ultraboard White, Classic and White

Gilman

- Insite Reveal (foam board)
- Infinity (styrene-based board)

FOAMCORE


GATORFOAM


ULTRA BOARD

Glossary of Large Format Terminology

ADHESIVE AND SELF-ADHESIVE VINYL TERMS

ACRYLIC ADHESIVE - Pressure sensitive, viscoelastic blend of acrylic-based high strength polymers which may be modified by tackifying additives. Acrylic adhesives are a very broad class of materials and come in many types to achieve different properties.

ADHESION - Bond produced between a pressure sensitive adhesive and a surface, determined by the materials' surface energy and the chemical makeup of the adhesive. The ultimate adhesion varies with the adhesive, but it is usually in the range of 72-96 hours.

ADHESION, PEEL - Measure of the force required to remove a material from a test panel at a specified angle and speed after the material was applied to the panel under specific conditions.

ADHESION SHEAR - Measure of the time required to slide a standard area (as of a decal) from a standard flat surface in a direction parallel to the surface.

ADHESIVE, PERMANENT - Adhesive with relatively high ultimate adhesion properties.

ADHESIVE, PRESSURE SENSITIVE - Type of adhesive that in dry (solvent free) form is aggressively tacky at room temperature with the capability of inducing a bond with dissimilar surfaces on contact with slightly firm pressure.

ADHESIVE, REMOVABLE - Adhesive characterized by high cohesive strength and low ultimate adhesion strength.

ADHESIVE, TEMPORARY - Adhesive characterized by relatively short ultimate adhesion.

ADHESIVE RESIDUE - Adhesive remaining on a substrate when a self-adhesive material is removed from the substrate.

ADHESIVE BLEED - A condition in which adhesive has oozed out or has been mechanically drawn from under the edge of a pressure-sensitive material through a split in the back of the material or through the edge of sheeted stock.

ADHESIVE TRANSFER - Transfer of adhesive from its normal position on the tape to the surface to which the tape was attached, either during unwind or removal, resulting in tacky areas on the surface.

CARRIER - Support aid such as the plastic or paper support sheet of pressure sensitive laminations.

CHANGEABLE ADHESIVE - Can be removed without heat or chemicals, leaves minimal residue.

HEAT-SET OR LOW-MELT ADHESIVE - Adhesive is activated with temperature ranges between 185° and 195° F.

HEAT-ACTIVATED ADHESIVE - Adhesive is activated with temperature ranges between 185° to 220° F.

LOW TACK - Adhesive with an initial non- aggressive character for ease of application that usually becomes a more permanent bond after 24 hours or other pre-selected time period. (This does not necessarily mean the tape has low adhesion as well as low tack).

PERMANENT ADHESIVE - Not intended to be removed.

PRESSURE ACTIVATED ADHESIVE - Slideable until firm pressure is applied.

PRESSURE SENSITIVE ADHESIVE (PSA) - Adheres upon contact to the substrate, does not slide and cannot be repositioned.

RELEASE LINER - Extremely smooth paper on one side usually treated with a silicone used as a carrier for the pressure sensitive label stock, and serves as a protectant for the adhesive prior to application.

REMOVABILITY - Ability to remove the tape from the substrate without damaging or contaminating the substrate under specified conditions, usually after a long period of time.

REMOVABLE ADHESIVE - Pressure-sensitive adhesive characterized by low ultimate adhesion and clean removability from a wide variety of surfaces. Generally removes with no heat.

REPOSITIONABILITY - Ability to remove the adhesive from the substrate without damaging or contaminating the substrate under specified conditions, yet retaining bond strength when re-applied, usually after a short period of time. Easy to remove and reapply without heat or aid, in some instances firm pressure can eliminate this feature.

SAV – Self-Adhesive Vinyl.

SILICONE ADHESIVE - Pressure sensitive, viscoelastic blend of polymeric silicone- based materials and tackifying resin. The silicone materials may be natural or synthetic. Silicone adhesives have a wide temperature performance, low temperatures to 600 F° and have excellent chemical, UV, solvent and aging resistance.

SILVERING – Silvering occurs when small air bubbles get trapped between a lamination film and a substrate. The bubbles reflect light and can appear silver at certain angles.

SLIDEABLE - Film slides easily across a substrate while positioning for an application, adhesive is activated by applying pressure.

SOLVENT ADHESIVE - Adhesive component that is dissolved in an organic solvent for coating. Rubber or acrylic based systems can be coated this way.

TACK (QUICK STICK, INITIAL TACK, FINGER TACK) - Ability of an adhesive to latch onto a substrate or surface with a minimum of pressure or to adhere to itself.

TACKY - Condition of the adhesive when it feels sticky or highly adhesive. Sometimes, used to express the ideas of pressure sensitivity.

WET OUT - Ability of an adhesive to spread, thereby filling in the hills and valleys of the substrate.

TEXTILE MEASUREMENT

DENIER - Unit of measure for the linear mass density of fibers. It is defined as the mass in grams per 9000 meters. The denier is based on a natural reference—i.e., a single strand of silk is approximately one denier. 1 denier – 1 gram per 9,000 meters. (A one-denier polyester fiber has a diameter of about 10 micrometers.)

ENDS PER INCH (EPI) - Number of warp threads per inch of woven fabric.

FABRIC WEIGHT – Heavyweight fabric heavier than 10 ounces per linear yard; equal to 1.60 yield. (Standard weight in the industry is 8 ounces, 2.0 yield or lighter).

GSM OR G/M² – Stands for grams per square meter. In other parts of the world, textile weight is measured in grams per square meter. (1 oz/yd2 is equal to 33.9057 gsm)

MICRON (µM) – Unit of thickness. 1 micron is equal to one millionth of a meter.
(1 inch = 25,400 microns)
(1 micron = .001 millimeters)

MIL – Unit of thickness. 1 mil is equal to 1/1000 of an inch. Films normally have their thickness measured in mil within the U.S., or microns in the rest of the world.
(1 mil = .001 inches)

OZ/YD² – Stands for ounce per square yard. In the US, the weights of textiles are measured in ounces per square yard.

PICKS PER INCH (PPI) - Number of weft threads per inch of woven fabric.

TEAR STRENGTH - Force required to tear the fabric. Tear strength is important in that if a fabric ruptures in place, it generally will do so by tearing. This can occur when a local stress concentration or local damage results in the failure of one yarn, which thereby increases the stress on remaining yarns.

TENSILE STRENGTH - Basic indicator of relative strength. It is fundamental for architectural fabrics that function primarily in tension. The base fabric's tensile strength is determined by the size (denier) and strength (tenacity) of the yarns and the number of yarns per linear inch or meter. The larger the yarn and the more yarns per inch, the greater the finished product's tensile strength.

TEX – Unit of measurement for the linear mass density of fibers and is defined as the mass in grams per 1000 meters. Tex is more likely to be used in Canada and Europe, while denier remains more common in the United States and the United Kingdom.

INKJET INK TYPES

AQUEOUS INKS - Inks that use water as a carrier. Aqueous inks may contain dyes or pigments as colorants. Typically used for indoor prints only as the pigments and dyes used will fade when exposed to UV light. All media types must be coated to use with aqueous inks. Common manufacturers of aqueous printers are Hewlett-Packard, Epson and Canon.

ECO-SOLVENT INKS - Inks using less toxic solvent- based carrier. Printers using eco-solvent inks emit less harmful VOCs (volatile organic compounds). Compared to Solvent inks, eco- solvent inks take longer to dry but have similar durability. Common manufacturers of eco-solvent printers are Epson, Mimaki, Mutoh, Roland and Seiko.

LATEX INKS - A new type of water-borne inkjet inks developed by HP designed for outdoor wide-format printing applications. The inks contain about 70% water, 30% co-solvents, pigments and latex polymer particles that form a film that binds with substrates with the application of heat. Latex inks can print on aqueous or solvent coated media, but work best with aqueous. Since it creates its own coating in a way, latex inks work well on most textiles, regardless of the coating type and in some cases can even be used on uncoated textiles.

SOLVENT INKS - Inks that use a carrier made of various chemicals that penetrate material, but evaporate quickly. Printers using solvent-based inks emit Volatile Organic Compounds (VOCs) and should be ventilated. Can also be referred to as hard or true solvents. Solvent inks can be used on PVC materials without a coating. These inks dry fast, are scratch resistant and have long-term outdoor durability. Hard solvent printers are in a decline and few a currently being manufactured. An example of a hard- solvent printer is the HP Scitex XL1500.

UV INKS - UV-curable inks are "cured" once they are exposed to wavelengths of UV light. The ink consists of a photo initiator, and when exposed to the UV light, it undergoes a chemical process (polymerization) that transforms the ink into a solid film that tightly adheres directly onto the substrate's surface. UV inks do not penetrate into a substrate, but sit on the surface. They can also be brittle and may crack when stretched too far.

DIFFERENT TYPES OF DYE-SUBLIMATION INKS ARE USED FOR DIFFERENT TYPES OF FABRICS

DYE-SUBLIMATION INKS – The dye-sublimation printing process is used to print on polyester or other synthetic fabrics. The dye sublimation inks are a pigment suspended in a liquid solvent, like water. The images are initially printed on coated heat-resistant transfer paper as a reverse image of the final design, which is then transferred onto polyester fabric in a heat press operating at a temperature around 180° to 210° C (375° F). Under high temperature and pressure, the dye turns into a gas and permeates the fabric and then solidifies into its fibers. The fabric is permanently dyed so it can be washed without damaging the quality of the image. Dye-sublimation inks can also be printed directly to textiles, but the fabric must still be heat set to bond the dyes to the fabric as described above. Eco-solvent printers, like Mutoh and Roland, are often converted to run dye-sublimation inks.

ACID DYE - Textile printing color containing salts of organic acids and used for applying color to protein fibers such as silk, wool and polyamides.

DISPERSE DYE - Water-insoluble textile dye used on polyester or acetate.

REACTIVE DYE - Works by forming a chemical bond between the fiber and the solution where heat is used to develop the proper shade and to make the fabric colorfast.

FIBER REACTIVE DYE - Used on 100% cotton or rayon. It is expensive but has superior color fastness and brightness.

MATERIAL FINISHES (SURFACE GLOSS)

Like paint, ink, printable substrates, and overlaminates all have a gloss level that characterizes its level of specular reflection.

Levels of gloss are measured by the angular distribution of light scattered from a surface, measured with a gloss meter.

Common names for levels of gloss are: matte, lustre, satin, semi- gloss and gloss. The terms are not standardized and may vary from different manufacturers.

GLOSS – Gloss or High-gloss has the highest level of specular reflectivity. A gloss finish will reveal surface imperfections.

Colors will seem brighter because of the additional reflected light.

Gloss laminates will have a very smooth surface and will be easier to clean than matte or textured surfaces.

LUSTRE OR SATIN – This is a step up from matte. It still has low glare, but reflects more light.

MATTE – Dull, low-gloss or no-gloss finish. Good for use when no glare is required. Matte surfaces are generally more resistant to scratches. Some matte finishes may also impart texture. A matte surface may make colors appear muted.

SEMI-GLOSS – Semi-gloss has a shiny surface that makes color brighter, but also shows highlights and imperfections more easily.

TEXTILE FINISHING TOOLS

AIRFLOW - Air is blown through the printing zone to speed up the drying process. Too much or too little airflow may cause print quality defects.

BACK TENSION - The backwards tension applied to the substrate by the input spindle, which must be constant across the width of the substrate. Too much or too little tension may cause substrate deformation and print quality defects.

BIDIRECTIONAL - Printheads print while moving in both directions. This increases the speed of printing but may reduce print quality.

BLEEDING - Print-quality defect that occurs when the ink spreads on the substrate across areas of different colors.

COALESCENCE - Print-quality defect that occurs when the ink spreads on the substrate within an area of the same color.

COCKLE - Substrate condition in which it is not lying perfectly flat, but rises and falls slightly in shallow waves.

COCKLING - Undesirable effect in paper identified by the uneven, rippled appearance of the paper surface caused by improper drying.

COLOR ACCURACY - Ability to print colors that match the original image as closely as possible, given the fact that all devices have a limited color gamut and might not be able to match certain colors precisely.

COLOR CONSISTENCY - Ability to print the same colors in a particular print job, from print to print and from printer to printer.

CURING - The substrate is heated in the curing zone to coalesce the latex, creating a polymeric film which acts as a protective layer, while at the same time removing the remaining co-solvents from the print. Curing is vital to ensure the durability of the printed images. Too high or too low a curing temperature may cause print quality defects.

CURL - (1) Tendency of a sheet material by itself or in laminate to bend or partly wrap around the axis of one of its directions. (Uneven moisture absorption throughout the thickness is the usual cause, and conversely, removal of moisture by heat application can cause curling); (2) Deformation of a paper sheet tending to form into a roll or cylinder, the roll effect appearing across the grain direction.

CUTTER - A printer component that slides back and forth across the platen to cut the substrate.

DRYING - Substrate is heated in the printing zone to dry the ink and fix the image to the substrate. Too high or too low a drying temperature may cause print quality defects.

FADING - Partial or complete loss of color due to excessive sun exposure, humidity, or other environmental influences; a gradual "bleaching out" of the appearance of a color on a print.

FIRMWARE - Software that controls your printer's functionality and is stored semi-permanently in the printer (it can be updated).

GAMUT - Range of colors and density values reproducible on an output device, such as a printer or monitor.

GRAND-FORMAT INKJET PRINTER – Printers wider than 100 inches. Common widths are 3 meters and 5 meters.

HEAT KNIFE OR HOT KNIFE – Tool with a heated blade, used to cut material.

Often used to cut textiles as the heat will seal the cut edges and prevent fraying.

I/O - Input/Output: Passing of data between one device and another.

ICC - International Color Consortium, a group of companies that have agreed on a common standard for color profiles.

ICC PROFILE – Set of data that characterizes a color input or output device, or a color space, according to standards promulgated by the International Color Consortium.

INK DENSITY - Relative amount of ink that is deposited on the substrate per unit of area.

INKJET PRINTER - Printer that sprays tiny streams of quick-drying ink onto paper or other media.

INKJET PRINTING - Non-impact printing process where an intermittent or continuous stream of electrostatically charged microscopic ink droplets are projected onto a substrate at high velocity from a pressurized system.

INKJET INK TYPES – Common ink types are aqueous, dye-sublimation, solvent, eco- solvent, latex or UV inks. Pigments or dyes are suspended in a carrier liquid and jetted through a printhead that controls when and where a drop of ink is applied to a print media in order to reproduce an image.

IP ADDRESS - A unique identifier that identifies a particular node on a TCP/IP network. It consists of four integers separated by dots. For example, 192.168.1.5.

LARGE-FORMAT INKJET PRINTER (ALSO WIDE-FORMAT) – Range in size from 24 inches to 98 inches wide. The most common size for large-format printers is 64 inches.

LED - Light-Emitting Diode: Semiconductor device that emits light when electrically stimulated.

MEDIA FEED - Slight adjustment to the amount of substrate advance between print passes, to compensate for the characteristics of different substrate types. Incorrect substrate advance compensation may cause banding with fewer than 8 passes, or graininess with 8 passes or more. May also be called Substrate Advance Compensation.

MINIMUM DRYING POWER - The minimum heat applied in the printing zone so that the substrate does not cool too much in lightly-inked areas. Low minimum power may cause print quality defects; high minimum power may damage the substrate, especially with a high number of passes and in blank or lightly-inked areas.

NOZZLE - One of many tiny holes in a printhead through which ink is deposited onto the substrate.

PASSES - Number of print passes specifies how many times the printheads will print on the same area of substrate. A higher number of passes tends to improve print quality and printhead health, but reduces the speed of printing.

PIEZO INKJET PRINTHEADS - Type of inkjet technology that use piezo crystals that vibrate when tiny electric charges are applied. This action forces ink out of the nozzles in the head.

PINKING SHEARS - Scissors, the blades of which are saw-toothed instead of straight. They leave a zigzag pattern instead of a straight edge. Pinking shears have a utilitarian function for cutting woven cloth. Cloth edges that are unfinished will easily fray, the weave becomes undone and threads pull out easily. The saw tooth pattern does not prevent the fraying but limits the length of the frayed thread and thus minimizes damage.

PLATEN - Flat surface within the printer over which the substrate passes while it is being printed on.

PRINTHEAD - Removable printer component that takes ink of one or more colors from the corresponding ink cartridge(s) and deposits it on the substrate, through a cluster of nozzles.

RIP – Acronym for Raster Image Processor. A software application that processes image files, applies color management via ICC profiles and then sends signals to a printer to determine what drops of ink to place where to recreate the image. Common RIP companies in the US are Onyx, Caldera, Wasatch, and FlexiSign.

SPINDLE - Rod that supports a roll of substrate while it is being used for printing.

SUBSTRATE - Thin, flat material designed to be printed on, made of paper or other materials.

SUBSTRATE ADVANCE COMPENSATION - Slight adjustment to the amount of substrate advance between print passes, to compensate for the characteristics of different substrate types. Incorrect substrate advance compensation may cause banding with fewer than 8 passes, or graininess with 8 passes or more. May also be called Media Feed.

THERMAL INKJET PRINTHEADS - Type of inkjet technology that uses heat to vaporize ink to create a bubble. As the bubble expands, some of the ink is pushed out of a nozzle onto the media. When the bubble "pops" (collapses), a vacuum is created pulling more ink into the print head from the cartridge.

UNIDIRECTIONAL - Printheads print while moving in only one direction, which may improve print quality. In general, increasing the number of passes is a better way of improving print quality.

VACUUM PRESSURE - The substrate is held flat against the platen by vacuum suction. Too much or too little suction may cause print quality defects. Too little suction may also cause a substrate jam or damage the printheads.

WICKING - (1) Bleeding of ink or ink additives into surrounding garment fibers; (2) moisture on the surface of the fabric that is not absorbed by the fibers; (3) tendency of moisture to spread on a surface; (4) drawing up of a liquid by capillary action.

WRINKLING - (1) Puckering or creasing of a pliable material that occurs during printing; (2) Uneven ink surface formed during drying.

FINISHING TERMINOLOGY

ABRASION RESISTANCE - Ability of a film to withstand rubbing without showing scuff marks.

ACCELERATED AGING - Means whereby the deterioration of a film encountered in natural aging may be accelerated and reproduced in the laboratory.

ACCELERATED WEATHERING - Means whereby the deterioration caused by outdoor exposure may be accelerated and reproduced in the laboratory.

ACETATE - See Base Film

ACRYLIC RESIN - Glassy thermoplastic made by combining several acrylic acids used as coatings and adhesives; used in Pressure Sensitive Adhesives.

ADHESION (Verb) - Process or interaction that opposes separation (or promotes contact) between layers in a multilayer structure. (Noun) The minimum force required to separate these layers. Also see Finishing Failure.

ADHESIVE (Noun) - Substance capable of holding materials together by surface attachment, in this case acting as the mechanism which attaches film to a graphic arts media. (Adjective) Type of bonding interaction between a thermal adhesive and the surface of a graphics media or film to which it is laminated.

ADHESION BUILD - Up An increase in the peel adhesion value of a pressure-sensitive film after it has been allowed to dwell to the applied surface.

ADHESIVE MASS - Sometimes used as another name for the adhesive.

ADHESIVE TRANSFER - Transfer of adhesive from its normal position on the film to the surface to which the film was attached either during unwind or removal.

ANCHOR - (1) Strength of adhesive to the substrate in laminating film; (2) anchor strength of the laminating film to the product that has been laminated; (3) strength of adhesive-to-adhesive bond when two layers of film are laminated together.

BACKING - Relatively thin flexible material to which the adhesive is applied. Theoretically, any material that is reasonably flat, relatively thin, and flexible could be used as a backing. This term is primarily used with PSA Films and is the same as Base Film.

BASE FILM - Type of film describes the base polymer or plastic used to make the overlaminate. It is the base film onto which the adhesive is coated. The innate properties of the base film define many of the key performance characteristics of a laminating film.

BELLED EDGES - Raised edge(s) of a slit roll.

BLOCKING - Undesired adhesion between touching layers of material, backing adhering to the adhesive, occurring under storage or use.

BOND STRENGTH - Refers to one of three conditions:

CLEARING OUT - See Wet Out

COATING - Process of applying an emulsion, varnish or lacquer over a printed surface to give it added protection.

COF OR COEFFICIENT OF FRICTION - Measurement of the slip or friction of the surface of a film.

COHESION (Verb) - Process or interaction that opposes separation within a layer of a multilayer structure. (Noun) also known as cohesive strength. The ability of a material to resist splitting or separating into layers within itself; or the minimum force required to separate the material.

COLD FLOW - Tendency of a pressure sensitive adhesive to act like a heavy viscous liquid over long periods of time. Such phenomena as oozing and increases in adhesion are the result of this characteristic.

COLOR SHIFT - Change in the apparent color of the ink/toner after laminating.

COLOR STABILITY - Ability of a film to retain its original color, particularly when exposed to light.

CONFORMABILITY - Ability of film to fit snugly or make essentially complete contact with the surface of an irregular surface without creasing or folding.

CONTAMINATION - Foreign substance on the film, i.e., bugs, wax, fiber, trim, drool.

COPOLYMER - Combination of two or more polymers used to produce special adhesives, such as EVA.

CORE OVERHANG - Term used to describe when the core is larger than the roll; opposite of recessed core.

CORONA TREATMENT - Method of treating films to increase dyne levels, promoting adhesion.

CREASES - Permanent line in the film surface caused by folding.

CROSS-LINKING - Development of a three-dimensional structure in an adhesive which is activated normally by heat. An improvement in shear resistance, temperature resistance, and oil or solvent resistance will normally result.

CUPPING - Slight U-shaped deformation of the film (at right angles to the length) which usually appears after unwind tension is relaxed.

CURED - See Cross-Linking.

CURL OR EDGE CURL - Tendency of laminated product to roll up or down at edges after cooling. Curl tends to be magnified by excessive heat and/or tension.

DEAD STRETCH - Net increase in length after a film has been elongated without breaking and allowed to recover.

DELAMINATION - Separation of layers.

DIMENSIONAL STABILITY - Ability of a film to retain its shape at operating temperatures.

DISHING - See Telescoping.

DUROMETER - Measurement of the hardness of a roller. Very hard rollers can cause Orange Peel.

DWELL TIME - Amount of time that the laminating film is exposed to the heat source in a laminator.

DYNE - Measure of surface energy (surface tension) of a surface. Important for adhesion and ink receptivity.

EDGE VARIATION - Change in edge registration due to small amount of film protruding beyond the edge of a roll.

ELASTIC MEMORY - Tendency of some backings or base films to attempt to return to their original length after being elongated.

ELONGATION OR STRETCH - Distance a film will stretch lengthwise before tearing, expressed as a percentage of original length. Elongation is not necessarily an indication of conformability.

EMBOSS - Process of impressing an image onto a product to achieve a raised surface on the product. See also Film Finishes.

ENCAPSULATION - Term which refers to the product being totally encased in the laminating film. Generally a border would exist around the product where the top and bottom film layers are bonded together.

EVA OR ETHYL VINYL ACETATE- Base resin used as adhesive on some thermal laminating films.

EXTRUSION COATED FILM - Manufacturing process used to make laminating film. Film which has had thermoplastic resin applied under force through an opening in a slot die.

FACE FILM - Also known as face stock. See section base film.

FILM FINISHES - Refers to the level of gloss and/or texture of an overlaminate film. Most overlaminate films are available in a range of finishes from matte to gloss, with finishes in between described as satin or semi-gloss. Overlaminate films are also offered in a wide variety of textures, including pebble, embossed, canvas and leather.

FILM GAUGE - Total thickness of a particular film construction including its individual layers. The gauge is measured with a micrometer. The unit of measure is in thousandths of an inch (mils) or microns.

FILM RATIO OR FILM-TO-ADHESIVE RATIO - Ratio of the thickness of the base film to the thickness of the adhesive layer in a laminating film.

FLUSH CUT - Trimming of excess film from the edges of the laminated document. Flush cutting exposes the edges of the material and increases the likelihood of the material splitting.

FISHEYES - Relatively small deformations (pock marks) in the adhesive caused by the entrapment of air between layers in the roll. They are not an indication of a quality defect.

FLATBACK - Smooth paper backing.

FLEXIBILITY - Ability of a film to be bent or flexed freely.

FLUTING - Distortion of a roll of film so that layers no longer form a circle.

FOOTBALLS OR AIR BUBBLES - Microscopic bubbles in the film caused by entrapped air between substrate and adhesive. The laminated film appears streaky and cloudy.

GAUGE - See also Film Gauge and Film Ratio. Synonym to thickness or caliper: Measured with a micrometer especially designed for films.

GAUGE BAND - Abrupt increase or decrease in film thickness in a small area in the transverse direction. Visible as a hump or valley around the circumference of the slit roll.

GELS - Lumps or specks in the laminated film caused by hard adhesive resins which did not fully melt during film manufacturing and/or extrusion coating.

GLOSS OR GLOSS LEVEL - Measurement of light reflectivity of the surface of a film. When used to describe the appearance of a film, see Film Finishes.

HARDCOAT - See Film Finishes.

HAZE - Measurement of light transmission of a film.

HEAT ASSIST PSA - Pressure sensitive adhesive that requires heat to fully activate and maximize its adhesion.

HEAT RESISTANCE - Ability of a film to withstand exposure to specified temperatures after application to a surface.

HEAT SHOE LAMINATOR - Laminating machine that applies laminating film to both sides of the document simultaneously. The laminating film adhesive is activated by passing over stationary heaters, called shoes.

KRAFT - Strong paper made from wood pulp, derived from wood chips boiled in an alkaline solution containing sodium sulfate.

LAMINATING TEMPERATURE - Temperature at which adhesive is fully activated.

LAMINATION - Product made by bonding together two or more layers of material and the process of bonding them.

MASTER ROLL OR MILL ROLL - Term used to designate the manufactured roll from which the narrower, standard stock roll widths are slit.

MATTE - See Film Finishes.

MSI - Abbreviation for thousand (M) square inches (SI). A commonly used unit of measure for thermal laminating films.

NIP OR NIP POINT - Point of contact in a laminator where laminating film(s) and print (or product to be laminated or mounted) are pressed/squeezed together.

NYLON OR POLYAMIDE - See Base Film.

ORANGE PEEL OVERLAMINATE - Looks like the dimpled skin of an orange, often caused by excessive coating thickness or improper drying temperature.

POLYESTER - See Base Film.

POLYETHYLENE - Base resin used as adhesive on some thermal laminating films.

POLYPROPYLENE - See Base Film.

POLYVINYL CHLORIDE (VINYL) - See Base Film.

PRESSURE-SENSITIVE FILM OR PSA FILM OR SELF- ADHESIVE FILM - Film with a PSA and a release liner. Pressure sensitive laminating film does not require heat. Once the protective release liner is removed, exposing the sticky surface, the film is then pressed on the material to be laminated.

PT - Abbreviation for Point, a printer's unit of measurement regarding paper thickness. There are approximately 72 points to an inch, and 10 pt paper equates to 10 mil laminating film.

PVC - See Polyvinyl Chloride.

RESIN - Another term for Thermal Adhesive. A solid organic material, usually having a melting range and a tendency to flow when subjected to stress.

SATIN - See Film Finishes.

SEMI-GLOSS - See Film Finishes.

SHRINK OR THERMAL STABILITY - Tendency of film to contract in the transverse direction when subjected to heat.

SILVERING - Air pockets trapped between the product and the adhesive on the film. The result is unlaminated areas. Three factors contribute to silvering; not enough heat to melt the adhesive, not enough pressure at the nip point to press out entrapped air, and/or not enough adhesive.

SLIP - Tendency for two laminated surfaces to slide on one another.

SPLICE - How film ends are jointed to make a straight continuous web.

SQUEEZE OUT (ALSO KNOWN AS WICKING OR OOZING) - Heat-activated adhesive which has been forced out at the edges of a laminate by excessive pressure or heat.

STIFFNESS - Established by the thickness of the Base Film.

STREAKS - A term used to describe lines in the film, typically in the machine direction.

SUBSTRATE - See Base Film.

TABER ABRASION - Test method to compare scuff resistance of films.

TEXTURE - See Film Finishes.

THERMAL ADHESIVE - Solid organic material, usually having a melting range and a tendency to flow when subjected to stress.

UV OR ULTRAVIOLET - Wavelength band of light, particularly prevalent in sunlight. UV can be used to cure inks or adhesives. UV can also cause inks and media to degrade.

WEB - A term used to describe film unreeled from a film supply roll.

WET OUT OR CLEARING OUT - Point at which adhesive becomes clear, and thus, activated.

WRITABLE - See Film Finishes.

MISCELLANEOUS

AIR PERMEABILITY - Relative ability of a material to permit air flow, or to breathe.

CALENDER - (1) a configuration of heated rollers used for flattening one or both sides of synthetic screen printing mesh; (2) to prepare sheets of material by pressure between two or more counter rotating rolls; (3) a set of cast iron rollers with highly polished surfaces situated at the dry end of a paper making machine.

CASTING - Act of pouring slip into a mold; process of filling a plaster, metal, or sand mold to create an object.

CONFORMABLE - Feature in some graphic films that allows it to conform around curves and rivets.

DELAMINATION - Separation of the backing into two distinct layers, separation between laminations of a tape consisting of more than one backing, or the separation between filaments and backing of a filament-reinforced tape.

DYE SUBLIMATION - Imaging process that vaporizes colorant with heat and pressure and deposits it onto a substrate in order to simulate a continuous tone or line image.

DYNE - Unit of force equal to the force that would give a free mass of one gram an acceleration of one centimeter per second.

FABRIC (CLOTH; TEXTILE) - Planar structure produced from weaving, knotting, felting, knitting, binding or otherwise combining natural or synthetic fibers or filaments.

FADE RESISTANCE - Property of a color or ink film that inhibits deterioration from environmental influences.

FILM - Uniform, homogeneous, non-fibrous synthetic webs of plastic with a thickness of under 10 mils or .010".

FLAME RESISTANCE / RETARDANT - Ability of a tape to withstand exposure to flame Fireproof materials will not burn when exposed to a flame. Flame resistant (fire retardant, self-extinguishing) materials will burn when exposed to flame but not continue to burn after the flame is removed.

FR (FLAME RETARDANT) – Compounds added to manufactured materials, such as plastics and textiles, and surface finishes and coatings that inhibit, suppress, or delay the production of flames to prevent the spread of fire. Different tests may be required for a product to be sold or used in a region, the following describes some of the typical standards

NFPA 701 - Set by National Fire Protection Association. NFPA 701 - Standard methods of fire tests for flame propagation of textiles and films.

ASTM E-84 - Set by American Society for Testing and Materials.

ASTM E84 - Standard test method for surface burning characteristics of building materials. CA Fire Test (title 19) - California Code of Regulations, Title 19, Chapters 2, 7 and 8 - Flame Retardant Regulations.

Flame retardancy does not have the same meaning as flame proofing. Fabric that contains a flame-retardant coating can withstand even a very hot point source. However, it can still burn if a large ignition source is present.

GRAIN (GR) - In paper, the direction in which the majority of the fibers lie; long grain - the fiber direction in a sheet running parallel to the length of the sheet; short grain - the fiber direction in a sheet running parallel to the short dimension or width.

LAMINATION - Sheet of material composed of two or more layers of material adhered together to form the sheet such as a liner and face material together with an adhesive to form a sheet of pressure sensitive label stock.

LIGHTFAST - Capability of a material, coating, or ink to resist fading when exposed to sunlight or artificial lighting.

LINER RELEASE - Separation of the liner from the pressure sensitive adhesive immediately before it is applied to the substrate.

MATERIAL SPLICE - Area where tape has been used to attach two rolls of material (vinyl, polyester, etc.) together to form one continuous web.

NIP POINT - Point of contact between the top and bottom roller of a wide-format laminator.

OPACITY – Value is expressed as a percentage. A 100% opaque material lets no light pass through. A 75% opaque material will allow 25% of a light source to pass through the material.

OUT GASSING - Release of volatile components in the form of vapors or gases under heat or vacuum.

OVER-LAMINATING - Application of a clear film to a label stock for the purpose of protection or to enhance graphic quality.

PERFORATING - Hole-punching the release liner, usually between kiss-cut parts.

PLASTICIZER - Substance added to a material to impart flexibility, workability, and dispensability.

PLASTICIZER MIGRATION - Migration of liquid plasticizers from some plastics into an adhesive and/or substrate that may cause excessive softening or degradation of the adhesive and film.

SHEAR STRENGTH - Ability of the adhesive to resist force applied across the tape, forcing the substrates to slide over each other.

SHELF LIFE - Period of time during which a product can be stored under specified conditions and still remain suitable for use.

SOLVENT RESISTANCE - Resistance of a pressure- sensitive adhesive to the destructive action of specific organic liquids.

SOLVENT - Dissolving, thinning, or reducing agent. Specifically, a solvent is a liquid that dissolves another substance.

SURFACE ENERGY - Measure of surface tension in dynes. The lower the surface energy of a substrate, the more difficult it becomes for an adhesive or coating to wet out that surface. Low Surface Energy (LSE) materials resist adhesive spread over the substrate while High Surface Energy (HSE) materials allow excellent spread and provide the best adhesion.

TEXTILE - Woven cloth or fabric.

THICKNESS - Distance from one surface of a tape, backing or adhesive to the other surface, usually expressed in mils or thousandths of an inch. This is usually measured under slight pressure with a special gauge. (Excludes release paper where applicable).

UV / ULTRAVIOLET LIGHT - That part of the spectrum wherein the wavelength of light is shorter than that of visible light.

UV RESISTANCE - Ability of any material to withstand extended exposure to ultra-violet rays without degradation, hardening, or excessive discoloration.

UV CURING - System that uses ultraviolet rays to facilitate the curing process of adhesives and/or inks.

WATER REPELLENT - Fabric that has been treated with a finish that caused material to shed water, but are still air permeable.

WATER RESISTANCE (WATER REPELLENT) - Resistant to water but not entirely waterproof.

WHITE POINT – Measures the brightness of a media. This is usually expressed as a number between 0 and 100; the closer to 100, the brighter white point. When printing, the color of the media will determine the brightest white in any reproduced image.

YELLOWING - Gradual change in the original appearance of a material characterized by the development of yellow and brown hues.

PRINT MATERIALS DEFINITIONS

CALENDERED FILM - Film with a very glossy surface obtained by passing the film between polished rollers under pressure, and sometimes under elevated temperature conditions.

CAST FILM - Plastic sheeting formed by spreading a molten mixture on a carrier sheet or web, baking at high temperatures to remove solvents, and fusing the material into a sheet.

CAST VINYL - (1) vinyl sheeting manufactured by coating the liquid compound onto a substrate, usually a polished chrome plated sheet, where it remains until it sets to form the plastic sheet; (2) compounds such as vinyl chloride, vinyl acetate or similar esters, formed or molded into specified shapes, and sheets.

HDPE - Acronym for high-density polyethylene.

LAMINATING FILM - Usually a clear or transparent sheeting manufactured for use as a protective top strata of a cold seal or thermal lamination to processed material.

NYLON - Synthetic polyamide fiber that has elastic properties that is used for making textile products and screen mesh; also refer to polyamide.

POLYAMIDE (PA) - Otherwise known as Nylon, is a thermoplastic which has high strength and is very resistant to wear and abrasion. It also has good puncture resistance, heat resistance, and low gas permeability.

POLYCARBONATE - High-clarity film combining the versatility of acetate with the durability of polyester. This thermoplastic polymer has excellent temperature resistance, impact resistance and optical properties. It is lightweight, easily molded and thermoformed, used in many interior applications.

POLYESTER FILM - Strong film having good resistance to moisture, solvents, oils, caustics, and many other chemicals. It is usually transparent.

POLYESTER (PET) POLYETHYLENE TEREPHTHALATE - Strong film having good resistance to moisture, solvents, oils, and many other chemicals. It is usually transparent, although it is available with a metalized finish. It has an SPI resin code of 1.

POLYETHYLENE (PE) - Polyethylene is a thermoplastic produced by polymerizing ethylene gas. A tough, stretchy material, typically a film or foam substrate, that has very good low temperature characteristics. It is classified into several different categories based mostly on its density, low density (LDPE), and high density (HDPE) polymers. Applications include sealing window glass into wood, aluminum or plastic frames, general purpose bonding & mounting.

POLYMER / ELASTOMER - Material formed by the joining together of many (poly) individual units of a monomer. The units may be the same or different. There are copolymers, tri or ter polymers, quadric-polymer, high polymers, etc.

POLYOLEFIN (PO) - Thermoplastic (polyethylene or polypropylene) that is based on polymers of olefin.

POLYPROPYLENE (PP) - A cousin of polyethylene, with generally similar properties, but stronger, lightweight and having a higher temperature resistance. This rigid plastic has a SPI resin code of 5.

POLYSTYRENE (PS) - Thermoplastic substance, which is in solid state at room temperature, but flows if heated above its glass transition temperature (for molding or extrusion), and becoming solid again when cooling off. It can be rigid or foamed, and has a relatively low melting point. Typical applications are containers and protective packaging. It has a SPI resin code of 6.

PVC / PLASTICIZED POLYVINYL CHLORIDE (VINYL) - POLYVINYL CHLORIDE (PVC) - Thermoplastic material created by the polymerization of vinyl chloride, depending on the composition may be flexible or rigid. PVC is commonly used to make printable substrates, used with (self-adhesive vinyl) and without adhesive (banner).

POLYVINYL FLUORIDE (PVF) - Polymer of vinyl fluoride (fluoroethylene), a monomer structurally similar to ethylene with a high melting point, chemical inertness and resistance to ultraviolet light.

RIGID PVC FILM - Polyvinyl chloride film which do not incorporate plasticizers or do so in such significantly low amounts so as not to lower the modulus (stiffness) appreciably. Also known as un-plasticized PVC. When formed or molded, it maintains its shape when empty or unsupported.

TRANSFER PAPER - Wide variety of papers on which a design is printed and which acts as a temporary carrier of the design until permanently attached to a substrate.

WET-STRENGTH PAPER - (1) a type of paper designed and made for the production of outdoor posters that accepts printing and has a high tear resistance when wet with poster paste during hanging; (2) a material's ability to retain a proportion of its dry strength even when wet; a paper that maintains at least 15% of its dry tensile strength when wet with water.

7 Classifications for Plastics

PET is one of the most commonly used plastics in consumer products, and is found in most water and pop bottles, and some packaging. It is intended for single use applications; repeated use increases the risk of leaching and bacterial growth. PET plastic is difficult to decontaminate, and proper cleaning requires harmful chemicals. Polyethylene terephthalates may leach carcinogens.

PET plastic is recyclable and about 25% of PET bottles in the US today are recycled. The plastic is crushed and then shredded into small flakes which are then reprocessed to make new PET bottles, or spun into polyester fiber.

This recycled fiber is used to make textiles such as fleece garments, carpets, stuffing for pillows and life jackets, and similar products.

Products made of #1 (PET) plastic should be recycled but not reused.

HDPE plastic is the stiff plastic used to make milk jugs, detergent and oil bottles, toys, and some plastic bags. HDPE is the most commonly recycled plastic and is considered one of the safest forms of plastic. It is a relatively simple and cost-effective process to recycle HDPE plastic for secondary use.

HDPE plastic is very hard-wearing and does not break down under exposure to sunlight or extremes of heating or freezing. For this reason, HDPE is used to make picnic tables, plastic lumber, waste bins, park benches, bed liners for trucks and other products which require durability and weather-resistance.

Products made of HDPE are reusable and recyclable.

PVC is a soft, flexible plastic used to make clear plastic food wrapping, cooking oil bottles, teething rings, children's and pets' toys, and blister packaging for myriad consumer products.

It is commonly used as the sheathing material for computer cables, and to make plastic pipes and parts for plumbing. Because PVC is relatively impervious to sunlight and weather, it is used to make window frames, garden hoses, arbors, raised beds and trellises.

PVC is dubbed the "poison plastic" because it contains numerous toxins which it can leach throughout its entire life cycle. Almost all products using PVC require virgin material for their construction; less than 1% of PVC material is recycled.

Products made using PVC plastic are not recyclable. While some PVC products can be repurposed, PVC products should not be reused for applications with food or for children's use.

LDPE is often found in shrink wraps, dry cleaner garment bags, squeezable bottles, and the type of plastic bags used to package bread. The plastic grocery bags used in most stores today are made using LDPE plastic. Some clothing and furniture also uses this type of plastic.

LDPE is considered less toxic than other plastics, and relatively safe for use. It is not commonly recycled, however, although this is changing in many communities today as more plastic recycling programs gear up to handle this material. When recycled, LDPE plastic is used for plastic lumber, landscaping boards, garbage can liners and floor tiles. Products made using recycled LDPE are not as hard or rigid as those made using recycled HDPE plastic.

Products made using LDPE plastic are reusable, but not always recyclable. You need to check with your local collection service to see if they are accepting LDPE plastic items for recycling.

POLYPROPYLENE PLASTIC is tough and lightweight, and has excellent heat-resistance qualities. It serves as a barrier against moisture, grease and chemicals. When you try to open the thin plastic liner in a cereal box, it is polypropylene. This keeps your cereal dry and fresh. PP is also commonly used for disposable diapers, pails,

plastic bottle tops, margarine and yogurt containers, potato chip bags, straws, packing tape and rope.

Polypropylene is recyclable through some curbside recycling programs, but only about 3% of PP products are currently being recycled in the US. Recycled PP is used to make landscaping border stripping, battery cases, brooms, bins and trays. However, #5 plastic is today becoming more accepted by recyclers.

PP is considered safe for reuse. To recycle products made from PP, check with your local curbside program to see if they are now accepting this material.

POLYSTYRENE is an inexpensive, lightweight and easily-formed plastic with a wide variety of uses. It is most often used to make disposable styrofoam drinking cups, take-out "clamshell" food containers, egg cartons, plastic picnic cutlery, foam packaging and those ubiquitous "peanut" foam chips used to fill shipping boxes to protect the contents.

Polystyrene is also widely used to make rigid foam insulation and underlay sheeting for laminate flooring used in home construction.

Because polystyrene is structurally weak and ultra-lightweight, it breaks up easily and is dispersed readily throughout the natural environment. Polystyrene may leach styrene, a possible human carcinogen, into food products (especially when heated in a microwave). Chemicals present in polystyrene have been linked with human health and reproductive system dysfunction.

Recycling is not widely available for polystyrene products. Most curbside collection services will not accept polystyrene, which is why this material accounts for about 35% of US landfill material. While the technology for recycling polystyrene is available, the market for recycling is small. Awareness among consumers has grown, however, and polystyrene is being reused more often. While it is difficult to find a recycler for PS, some businesses like Mailboxes Etc which provide shipping services are happy to receive foam packing chips for reuse.

Polystyrene should be avoided where possible.

THE #7 CATEGORY

was designed as a catch- all for polycarbonate (PC) and "other" plastics, such as acrylic, nylon and fiberglass, so reuse and recycling protocols are not standardized within this category. Of primary concern with #7 plastics, however, is the potential for chemical leaching into food or drink products packaged in polycarbonate containers made using BPA (Bisphenol A). BPA is a xenoestrogen, a known endocrine disruptor.

Number 7 plastics are used to make baby bottles, sippy cups, water cooler bottles and car parts. BPA is found in polycarbonate plastic food containers often marked on the bottom with the letters "PC" by the recycling label #7. Some polycarbonate water bottles are marketed as 'non- leaching' for minimizing plastic taste or odor, however there is still a possibility that trace amounts of BPA will migrate from these containers, particularly if used to heat liquids.

A new generation of compostable plastics, made from bio-based polymers like corn starch, is being developed to replace polycarbonates. These are also included in category #7, which can be confusing to the consumer.

These compostable plastics have the initials "PLA" on the bottom near the recycling symbol. Some may also say "Compostable."

#7 plastics are not for reuse, unless they have the PLA compostable coding. When possible it is best to avoid #7 plastics, especially for children's food. Plastics with the recycling labels #1, #2 and #4 on the bottom are safer choices and do not contain BPA. PLA coded plastics should be thrown in the compost and not the recycle bin since PLA compostable plastics are not recyclable.

The plastics industry has conformed to regulations by applying the required codes to consumer products, but it is up to individuals to read and understand the codes. By understanding these simple classifications, we can best use plastics to our advantage while minimizing the health and disposal issues that may otherwise arise.

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