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Xerox **Wide Format**
Applications Guide
Solvent Inkjet

Wide Format Solvent Inkjet

Introduction

This guide is intended to provide users of Xerox solvent inkjet media and printer solutions with information about media performance, application suitability, compatibility with the various printers and ink systems, and general help with the selection of wide format media to ensure that customers expectations are reliably met.

The procedures in this guide are general and assume that you are already familiar with general printer/RIP software functions and the user guide specific to each particular printer model to be used.

Individual media data pages give product specific details and production tips. The Applications Ideas & Procedures section gives instructions and tips specific to a range of common applications. An overview of lamination techniques is also included.

The Xerox solvent inkjet media range is formulated for use on Xerox and non-Xerox printing equipment alike, meeting the needs of the general market for solvent and UVC inkjet systems. Many of the media characteristics are similar for solvent and UVC inkjet systems so the scope of this guide includes UVC system compatibilities.

Of the multitude of printer brands on the market, this guide specifically confirms compatibility with only the most commonly used systems from Mutoh, Seiko, and Mimaki, although media described are suitable for use on most known printer and ink systems in these categories. To confirm compatibility with any other printer systems, please contact Xerox via the inquiries facility in:

www.xerox.com/iccprofiles.

Solvent inkjet is traditionally considered for applications in signage and outdoor messaging and display, where solvent inks offer a greater durability without the need for laminating. Modern solvent inkjet printers are also capable and effective for indoor and high-resolution close-viewed display. The Xerox solvent inkjet range is designed to fully enable solvent inkjet printers for the full array of applications suited to the technology.

All Xerox Inkjet media are tested and supported for the printing applications described and are backed by the usual Xerox guarantees. Xerox identifies the media recommended for solvent/UVC inkjet printing with an orange-colored band on the label. These media should **not** be confused with inkjet media for aqueous or oil systems as properties and compatibilities are specific.

Further information on Xerox solvent inkjet media, as well as other ranges for aqueous and oil inkjet printing is available through your Xerox supplies representative or via the same inquiries facility on the Xerox website.

Printer Compatibility

Most Xerox solvent inkjet media is formulated to give universal compatibility across the broadest range of commonly used printing equipment in this sector, including eco, mild and full solvent systems, and UVC printers.

Be sure to check compatibility of the media with your combination of printer and ink using the tables and data sheets in this guide. If you have any questions about compatibility with your particular printer, please ask your Xerox supplies representative to check and confirm any technical considerations, or make contact directly via our website www.xerox.com/iccprofiles.

Appropriate print testing should be carried out before beginning any large-scale production to ensure expectations are fully met.

Settings vary per printer model and ink type and drying times can also vary. ICC profiles are posted to www.xerox.com/iccprofiles for Xerox and other printer models.

ICC Profiles and Settings

Although certain generic settings can enable good color reproduction, the overall ink limit, individual ink restrictions and linearization should be adjusted and set specifically per printer, ink, RIP software and media used. Limiting and calibrating the amount of ink used optimizes both image quality and drying time, and consequently accelerates the production process. A specifically created ICC profile should also be used whenever possible to optimize image quality and production of color. A selection of settings and profiles is available from www.xerox.com/iccprofiles or via your Xerox supplies representative.

Closely follow guidelines for temperatures settings for preheat and drying heaters. Subjecting media to too much heat can distort or damage the media, adversely affect the color of print output or cause banding. In extreme cases excessive heating can cause the surface of the media to come into contact with the print head, damaging the printer itself. If reducing temperature settings, allow sufficient time for the actual temperature at the point of contact with the media to cool before inserting a new media.

Choosing Appropriate Materials

Xerox Solvent Inkjet Media all vary in coating structure, physical properties (such as base weight and thickness), and base material type (paper, fabric, film or vinyl). These variances not only need a specific printer set-up to successfully run each material through the printer, but will cause some differences in achievable image quality per media type, e.g., Fabrics give different image quality to vinyl even if both are printed in the same resolution.

The coating layer or layers on each media type differ because the structure must account for base properties (i.e., thickness, absorbency, smoothness, texture), must provide suitable adhesion to both printed image (ink) and the base material, and the base-coating combination must meet the needs of the application. Each media is also specified to print within a range of resolutions.

The most common mistake in constructing a graphic is using incorrect materials. The choice of materials requires critical information about the end-use. Ask the following questions to determine the application requirements and use the information in this guide to select the materials that will work best.

1. How will the print be viewed?
   What is the viewing distance – close-up in an exhibition hall, hanging 10 stories up on the side of a building or on the side of a moving vehicle?

2. What are the environmental conditions where the print will be displayed?
   Indoors or outdoors? Is there a harsh element such as pollution, water, wind or direct exposure to sunlight? Are there extreme weather patterns and fluctuations?

3. What is the expected life or durability of the print?
   How long will it be displayed? How many times will it be used, stored or posted?

4. What types of finishing or rigid materials for mounting are needed?
   Will it be finished with a laminate or encapsulated? Is a glossy surface best or would glare hinder viewing? Does the print need to be made into a banner with seams and eyelets?

5. What is the budget for the job?

Durability of Graphics

Durability is a function of both ink and media.

Solvent-based pigmented inks for the range of printers commonly used offer properties that vary considerably in terms of UV stability/light-fastness and abrasion resistance. All are generally suitable for use outdoors, with or without lamination or other protection. Most eco and mild solvent inks are warranted for between 1 and 3 years. Other solvent and UVC inks can give longer life expectancy.

Often a graphic has a life requirement of a few weeks, but permanent signage applications can require the print to survive without deterioration for several years. The conditions of the environment in which a graphic is to be displayed should also be taken into consideration.

Over-laminates and encapsulation will extend the life of most images, protecting against moisture, mechanical handling, abrasion or UV.

Media is a critical factor in the life expectancy of any print produced, but the longevity of the image or its durability under any given condition is predominantly determined by the properties of the ink. The properties of the media must support the ink capabilities and must match the needs of the application as part of the total graphics construction. This guide describes the capabilities in this respect for each media type.

Image Quality

The following tips may help you understand the image quality you should expect from using Xerox media in your printer, as well as offering hints for ensuring output quality meets application needs:

EXPECTATIONS Image quality varies from one media to another. Each media is designed for a set of application needs. Selecting the right media ensures that image quality expectations are met.

ENVIRONMENT Viewing distance and display environment must be considered when determining if output quality is acceptable, e.g., viewing distance of 15 feet may allow a degree of image imperfection.

CONSIDER ALTERNATIVES More than one media type may suit any given application. Ease-of-use, image quality, and display site all have a bearing on selection. Experiment with alternatives.

PRINTER SPEED Due to specific media characteristics, different print modes or printing speeds are used. For projects requiring duplicate images in significant quantities, run test images in various modes to determine the most appropriate speed for your application needs.

PANTONE® COLORS Color reproduction is a function of the RIP or software connected to the printer. Xerox provides profiles and settings specific to media, RIP, ink and printer. These profiles are balanced to perform in a wide range of color applications. You should perform a test print from your desired application through the RIP to determine the range of color available in your system. Most RIPs also allow the user to update, adjust or create color profiles to meet specific color requirements. Profiles can be downloaded from www.xerox.com/iccprofiles for Xerox and other printer and software combinations.

HEATER SETTINGS Profiles include settings for the various staged heaters in each solvent inkjet device. Heater settings are critically important in print performance and every media has optimum heat requirements. Applying too much or too little heat, and at the wrong stage in the media passage through the printer can adversely affect print performance and can also cause media distortion that can result in head contact.

COCKLE Exceeding the media ink limits can cause cockle. This is undesirable not only in the finished print but also because it may result in head strikes. A head strike occurs when the print head rubs a raised point on the media surface. All Xerox inkjet media is tested to ensure that recommended settings and profiles will not risk a problem with head strike and will have acceptable finished quality when dried.

BANDING A certain level of banding may be visible in inkjet print output. This is inherent to the inkjet printing technology. Some possible actions to address banding:

a) Increase Passes – Banding becomes more obscured as the number of passes is increased.

b) Set Printing Direction – Printing in unidirectional mode generally gives less banding than with bidirectional mode.

c) Adjust Carriage Speed – Some printers give the operator the ability to slow the carriage speed, to help improve print quality.

d) Convert Black – Convert single color black areas to four-colors (CMYK) in the application software.

e) Rotate – Try rotating the image to reduce the appearance of banding.

Roll Dimensions

The scope of this range is generally from 30" (76cm) to 100" (250cm), with the selection of sizes taking account of dimensions for all of the commonly used inkjet printing equipment.

Manufacturing processes do limit widths that can be produced for certain media types such as papers or polyester films. Also, demand for some media types will naturally fall within a more limited range of widths due to the applications those media types serve.

Nevertheless, Xerox continues to introduce new widths, either as new standard products or as special productions, to extend application possibilities. While every effort is made to keep this guide current, listings may not include all sizes available. All requests for specific sizes not included in the guide are welcome.

Supplies Storage and Handling

- Ink and media are sensitive to environmental conditions. It is important that supplies are kept in a controlled area for the best image quality and operations when used in the printer.

- Store and print these inkjet media within the temperature range 57°-86°F (14°-30°C) and relative humidity between 40% and 65%. If media are kept in an environment outside of these parameters, they may still be used to print perfectly, but media should be allowed to normalize in the correct conditions for sufficient time.

- Always store inkjet media products in their original cartons and also in the original wrapper or bag. The full packaging is designed to give the best protection to base materials and ink receiver coatings to maximize product life.

- In case media rolls are separated from their cartons, every roll of Xerox media can be precisely identified from information printed on the inside of the core.

- Most media where sensitized with an ink receiving coating or with other treatments such as adhesive will have a finite shelf life. Nominally the shelf life expectancy of the media described in this guide will be 2 years but this largely depends on precise storage conditions.

- The image surface must be kept dry and free of grease, oil, silicones and dirt to achieve best results. It is recommended that cotton gloves be used when handling inkjet-coated materials to avoid fingerprints.

- Inks can be permanently damaged if exposed to temperatures outside their range for any period of time.

Fire Resistance and Flame Retardant Properties

Media for exhibition and display graphics are sometimes required to meet flammability ratings.

The main standards used are the "M" and the "B" ratings (B1 often considered similar but not higher than M1) and the US NFPA standards. There is no common international standard at the time of writing.

M1

A material is classified M1 if the tests with the electrical burner (NF P 92-503) results in:

- No inflammation remaining longer than 5 seconds after removing the flame
- No points of ignition with flame propagation higher than 10" above the lower edge of the probe
- No drops of flaming material (test for thermo fusible materials NF P 92-505 to be passed)

If the material pierces without inflammation or with inflammation which subsides within 5 seconds, the persistency test (NF P 92-504) results in *no flame persistency at all and no burning material drops*.

M2

A material is classified M2 if it does not fall into category M1 because

- Inflammation persists longer than 5 seconds after removing of the flame
- Destruction of the material deeper than 14" from the lower edge of the probe is observed
- No drops of flaming material (test for thermo fusible materials NF P 92-505 to be passed)

If the material pierces without inflammation or with inflammation which subsides within 5 seconds, the persistency test NF P 92-504 results in *flame persisting for no longer than 5 seconds without propagation and no burning material drops.*

This guide is designed to offer information and guidance to assist you. It is not an instruction manual. The following matrix offers a quick reference guide for which media often suit these categories of display application.

While care has been taken to anticipate problems and outline possible difficulties, it is impossible to cover all situations. Therefore, it is highly recommended that you test any application before an actual job is attempted.

Each media data sheet gives a more detailed description of specific media capabilities.

	Poster Graphics	Photographic	Mounted Graphic	Multi-Panel	Signage	Retail POP	Window Graphic	Outdoor Banner	Indoor Banner	Pop-Up Display	Art Reproductions
Photo-Gloss Paper	●	●	●			●			●	●	
Standard Satin Outdoor Paper	●	●	●	●	●	●		●	●	●	
Premium Satin Outdoor Paper	●	●	●	●	●	●		●	●	●	
Gloss Self-Adhesive Vinyl			●	●	●	●					
Matte Self-Adhesive Vinyl			●	●	●	●					
Economy Banner Vinyl	●		●		●	●		●	●		
Premium Banner Vinyl					●	●		●	●		
Indoor Banner Fabric	●					●			●		

Xerox Media Range

The range of media available is constantly changing to meet the needs of new printer models and new applications. New media types as well as new sizes are regularly introduced and this guide may not include the full selection available.

New inquiries for media to suit specific applications or where material properties need to be confirmed, please contact Xerox via the inquiries section in www.xerox.com/iccprofiles or contact your supplies representative.

Xerox Solvent Inkjet Papers and Films

		Width		Length		Code	Page
230 g/m²	**Photo Gloss Paper**	36"	914 mm	98'	30 m	023R02230	8
		54"	1372 mm	98'	30 m	023R02231	
140 g/m²	**Standard Satin Outdoor Paper**	36"	914 mm	200'	61 m	023R02346	9
		42"	1067 mm	200'	61 m	023R02347	
		54"	1270 mm	200'	61 m	023R02228	
		63"	1600 mm	200'	61 m	023R02229	
200 g/m²	**Premium Satin Outdoor Paper**	42"	1067 mm	164'	50 m	023R02418	10
		50"	1270 mm	164'	50 m	023R02237	
		63"	1600 mm	164'	50 m	023R02238	

Xerox Solvent Inkjet Self-Adhesive Media

		Width		Length		Code	Page
100 mic	**Gloss Self-Adhesive Vinyl** Permanent Grey Adhesive	42"	1050 mm	164'	50 m	023R02247	11
		54"	1370 mm	164'	50 m	023R02313	
80 mic	**Gloss Self-Adhesive Vinyl** Permanent Grey Adhesive	63"	1600 mm	164'	50 m	023R02245	11
		80"	2000 mm	164'	50 m	023R02246	
100 mic	**Matte Self-Adhesive Vinyl** Removable Adhesive	42"	1050 mm	164'	50 m	023R02249	12
		54"	1370 mm	164'	50 m	023R02316	
		63"	1600 mm	164'	50 m	023R02250	

Xerox Solvent Inkjet Banner Vinyls

		Width		Length		Code	Page
510 g/m²	**Economy Banner Vinyl – Matte**	42"	1067 mm	164'	50 m	023R02419	14
		54"	1370 mm	164'	50 m	023R02420	
		63"	1600 mm	164'	50 m	023R02421	
		87"	1600 mm	164'	50 m	023R02422	
500 g/m²	**Premium Banner Vinyl**	43"	1100 mm	82'	25 m	023R02328	13
		53"	1350 mm	82'	25 m	023R02329	
		63"	1600 mm	82'	25 m	023R02255	
		87"	2200 mm	164'	50 m	023R02411	

Xerox Solvent Inkjet Textile Media

		Width		Length		Code	Page
270 g/m²	**Indoor Banner Fabric**	35"	900 mm	164'	50 m	023R02344	15
		43"	1100 mm	164'	50 m	023R02345	
		63"	1600 mm	164'	50 m	023R02261	

Changes to inkjet printers and ink systems as well as development of media for inkjet printing is continuous and, while Xerox makes every effort to provide and maintain consistent products, media specifications, as described in this guide, are subject to change without notice.

Information and advice given in this guide are based on practical test experience, and knowledge. It is given without guarantee and does not constitute a warranty. The number of possible printer, ink, software combinations and the variety of possible applications make it necessary for users to take specific steps to ascertain the suitability of materials described here for their specific purposes.

For more information contact your Xerox Supplies Representative, call toll-free 1-800-822-2200 or visit our Web site at www.xerox.com

www.xerox.com/iccprofiles

230 g/m² Photo-Gloss Paper

Description

A glossy surfaced photo based paper with PE barrier coating formulated for a wide range of solvent and eco-solvent inkjet printers. The heavyweight base gives great stability and stiffness while the coating gives extra-ordinarily vibrant color brilliance, image definition without bleed, even at high level of ink loading, and rapid drying for fast processing.

Finished images will have a uniform gloss finish over printed areas. The coating is splash proof and water repellent, and the material has very good light stability to maintain whiteness and long-lasting durable printed images.

No further special surface protection needed although pressure or thermal over-laminates can be used for extra protection.

Applications

Ideally suited for all indoor-applications as photo-images or high-grade presentations graphics.

Physical Characteristics

Weight	232 g/m² / 61 lbs
Thickness	220 micron / 8.7 mil
Opacity	99%
Brightness	98%

Dimensions

914 mm (36") width	30 m (98') length	1 roll/ctn	24 ctns/pallet	023R02230
1372 mm (54") width	30 m (98') length	1 roll/ctn	24 ctns/pallet	023R02231

Compatibilty

Xerox 82XX and 83XX
Seiko ColorPainter 64S/100S
HP 8000 and 9000
Mimaki JV3 and JV5
Mutoh Rockhopper, Spitfire, Osprey, Toucan
Roland Soljet

Critical Operating Instructions

- Temperature for preheating or drying the media should not exceed 100°F (40°C) – overheating can impair paper flatness.

- Laminate with either pressure or thermal laminates if prints are to be exposed to severe conditions, or if longer durability is required.

- Allow prints to dry before laminating.

- The image surface must be dry and free of grease, oil, silicones and dirt to achieve best results. Handle with cotton gloves.

- Store and use within temperatures of 50°-86°F (10°-30°C) and relative humidity of 40-65%. Store the product in its original carton and bag/wrapper.

140 g/m² Standard Satin Outdoor Paper

Description
Barrier-coated white paper with an attractive semi-gloss finish specially developed for printing with solvent and UVC inks. This general-purpose poster paper is suitable for photo-realistic graphics in both indoor and outdoor applications. It can give impressive color brilliance and color density with excellent edge definition. Its advanced coating technology allows 10-20% reduced ink consumption for equivalent image quality when compared with alternatives.

As a base material, Standard Satin Outdoor Paper has wet strength and a high degree of mechanical stability. It will stay flat in highly humid environments and is suitable for billboard posting giving an outdoor life of 3 months unlaminated.

Applications
Photo-realistic presentation print-outs, indoor signs and posters, outdoor signage, billboards and outdoor graphics, general advertising.

Physical Characteristics

Weight	138 g/m² / 37 lbs
Thickness	150 micron / 5.9 mil
Opacity	94%
Whiteness	99%

Dimensions

914 mm (36") width	61 m (200') length	1 roll/ctn	24 ctns/pallet	023R02346
1067 mm (42") width	61m (200') length	1 roll/ctn	24 ctns/pallet	023R02347
1270 mm (50") width	61 m (200') length	1 roll/ctn	24 ctns/pallet	023R02228
1600 mm (63") width	61 m (200') length	1 roll/ctn	24 ctns/pallet	023R02229

Compatibilty

Xerox 82XX and 83XX
Seiko ColorPainter 64S/100S
HP 8000 and 9000
Mimaki JV3 & JV5
Mutoh Rockhopper, Spitfire, Osprey, Toucan
Roland Soljet
Most solvent, eco-solvent and UVC systems

Critical Operating Instructions

- Temperature for preheating or drying the media should not exceed 100°F (40°C) – overheating can impair paper flatness.

- This paper will remain stable if soaked in water for up to 2 days. Appropriate microbiological precautions will be necessary.

- Laminate with either pressure or thermal laminates if prints are to be exposed to severe conditions, or if longer durability is required.

- Allow prints to dry before laminating.

- For best results store and use within temperatures of 50°-86°F (10°-30°C) and relative humidity of 40-65%. Store the product in its original carton and bag/wrapper.

200 g/m² Premium Satin Outdoor Paper

Description

Highly opaque, barrier-coated, heavyweight, white paper with an attractive semi-gloss finish specially developed for printing with solvent and UV curing inks. This general-purpose poster paper is suitable for photo-realistic posters and signs in both indoor and outdoor applications.

This paper can give impressive color brilliance and color density with excellent edge definition. Its advanced coating technology allows 10-20% reduced ink consumption for equivalent image quality when compared with alternatives, and superior abrasion resistance.

The 200 g/m² base weight gives excellent mechanical strength and stability in a wide range of conditions, and Premium Satin Outdoor Paper has ability to withstand soaking. It will stay flat in highly humid environments, and is suitable for billboard posting giving 3 months life outdoors, unlaminated.

Applications

Photo-realistic presentation print-outs, indoor signs and posters, outdoor signage, billboards and outdoor graphics, general advertising.

Physical Characteristics

Weight	200 g/m² / 53 lbs
Thickness	220 micron / 8.7 mil
Opacity	99%
Whiteness	98%

Dimensions

1067 mm (42") width	50 m (164') length	1 roll/ctn	24 ctns/pallet	023R02418
1270 mm (50") width	50 m (164') length	1 roll/ctn	24 ctns/pallet	023R02237
1600 mm (63") width	50 m (164') length	1 roll/ctn	24 ctns/pallet	023R02238

Compatibilty

Xerox 82XX and 83XX
Seiko ColorPainter 64S/100S
HP 8000 and 9000
Mimaki JV3 amd JV5
Mutoh Rockhopper, Spitfire, Osprey, Toucan
Roland Soljet
Most eco, solvent and UVC systems

Critical Operating Instructions

- Temperature for preheating or drying the media should not exceed 100°F (40°C) – overheating can impair paper flatness.

- This paper will remain stable if soaked in water for up to 2 days. Appropriate microbiological precautions will be necessary.

- Laminate with either pressure or thermal laminates if prints are to be exposed to severe conditions, or if longer durability is required.

- Allow prints to dry before laminating.

- For best results store and use within temperatures of 50°-86°F (10°-30°C) and relative humidity of 40-65%. Store the product in its original carton and bag/wrapper.

Self-Adhesive Vinyl – Permanent Adhesive

Description

This soft, white, calandered, self-adhesive PVC is available with a gloss print surface. Polyacrylate adhesive, covered by a silicon coated release paper, is classified permanent for medium term display. The adhesive is grey in color to give extra opacity and prevent show-through from the substrate on to which this vinyl is mounted.

Excellent dimensional stability, temperature and water resistance make this material an economical short or mid term print base for self-adhesive signs or mounted displays, for brilliantly colored graphics, in outdoor as well as indoor applications.

Ink properties and performance are the primary factors influencing durability of the printed image, but the life expectancy of this vinyl will be 4 years if applied correctly.

Applications

For indoor and outdoor applications where the printed image is needed to adhere to a smooth, flat or slightly curved surface: used for general signage, retail and event promotions, trade show displays, galleries and museums, long hallways, showrooms or other retail merchandising and displays.

Physical Characteristics

Caliper / Thickness (excluding adhesive and backer)	63" and 80" – 80 microns / 3.5 mil 36", 42" and 54" – 100 microns / 3.95 mil
Adhesive Power	16N/25 mm
Tensile Strength	19Mpa
Elongation at Break	Min. 130%
Fire Retardancy	DIN 75200 – Self Extinguishing
Estimated Service Life	4 years (subject to correct application)

Dimensions

Gloss	1050 mm (42") width	Grey Adhesive	50 m (164') length	1 roll/ctn	36 ctns/pallet	023R02247
Gloss	1370 mm (54") width	Grey Adhesive	50 m (164') length	1 roll/ctn	28 ctns/pallet	023R02313
Gloss	1600 mm (63") width	Grey Adhesive	50 m (164') length	1 roll/ctn	28 ctns/pallet	023R02245
Gloss	2000 mm (80") width	Grey Adhesive	50 m (164') length	1 roll/ctn	28 ctns/pallet	023R02246

Compatibilty

Mutoh Rockhopper, Osprey, Toucan, Spitfire
Seiko ColorPainter
Mimaki JV3 and JV5
Xerox 82XX and 83XX
HP 8000 and 9000
Roland Soljet
Most solvent and UVC printers

Critical Operating Instructions

• Keep the image surface dry and free of grease, oil, silicones and dirt for best results.

• Store and print within temperatures of 50°-86°F (10°-30°C) and relative humidity of 35-65%.

• Shelf life of this material is 2 years if kept in original packaging, wrapper and carton, within conditions specified.

• Use only cold (pressure) laminates. Allow time for print to dry before lamination.

• Freshly lacquered or painted surfaces should be allowed to dry or cure completely before self-adhesive vinyl is applied. Test compatibility of surfaces, paints or lacquers prior to application.

Self-Adhesive Vinyl – Removable Adhesive

Description

This soft, white, calandered, self-adhesive PVC has a non-glare, matte print surface. Polyacrylate, removable, clear adhesive, covered by a silicon coated release paper, makes this suitable for a variety of short to medium term applications, with smooth, flat, or slightly curved surface, where ease of removal or the mounting substrate may be considerations.

Excellent dimensional stability, temperature and water resistance make this material an economical short or mid term print base for self-adhesive signs and brilliantly colored graphics, in outdoor as well as indoor applications.

Ink properties and performance are the primary factor influencing durability of the printed image, but the life expectancy of this vinyl will be 4 years if applied correctly.

Applications

For indoor and outdoor applications where a semi-permanent, printed image is needed to adhere to a smooth surface: General signage, retail and event promotions, trade show displays, galleries and museums, long hallways, showrooms or other retail merchandising and displays.

Physical Characteristics

Calliper / Thickness	100 microns (excluding adhesive and backer) / 3.95 mil
Adhesive Power	6N/25 mm
Tensile Strength	19Mpa
Elongation at Break	Min. 130%
Fire Retardancy	DIN 75200 – Self Extinguishing
Estimated Service Life	4 years (subject to correct application)

Dimensions

Matte	1050 mm (42") width	Clear Adhesive	50 m (164') length	1 roll/ctn	28 ctns/pallet	023R02249
Matte	1370 mm (54") width	Clear Adhesive	50 m (164') length	1 roll/ctn	28 ctns/pallet	023R02316
Matte	1600 mm (63") width	Clear Adhesive	50 m (164') length	1 roll/ctn	28 ctns/pallet	023R02250

Other dimensions available on request.

Compatibilty

Mutoh Rockhopper, Osprey, Toucan, Spitfire
Seiko ColorPainter
Mimaki JV3 & JV5
Xerox 82XX and 83XX
HP 8000 and 9000
Roland Soljet
Most solvent and UVC printers

Critical Operating Instructions

• Keep the image surface dry and free of grease, oil, silicones and dirt for best results.

• Store and print within temperatures of 50°-86°F (10°-30°C) and relative humidity of 35-65%.

• Shelf life of this material is 2 years if kept in original packaging as specified.

• Use only cold (pressure) laminates. Allow time for print to dry before lamination.

• Freshly lacquered or painted surfaces should be allowed to dry or cure completely before self-adhesive vinyl is applied. Test compatibility of surfaces, paints or lacquers prior to application.

500 g/m² Premium Banner Vinyl

Description
Heavyweight material, suitable for large frontlit signs and banners. It consists of a tear-resistant polyester base fabric sandwiched between two layers of white vinyl to provide a flexible, resilient base for indoor and outdoor banner applications.

Depending on application needs, print on either the glossy front side or the matte back side. Rolls are wound glossy side out. The smooth surfaces provide very good printability and brilliant colors. This substrate is weldable, and resists both UV and temperature changes between -20°C to +70°C. It also has exceptional surface area stability.

Applications
Suitable for outdoor and indoor banner applications where fire retardancy is not a requirement, such as retail, exhibitions and event promotions, walkways, supermarkets, gas stations, parking garage advertising, sport arenas, backdrops, signage.

Physical Characteristics

Weight	500 g/m² / 133 lbs
Thickness	500 micron / 19.7 mil
Tensile strength	>2000N/5cm
Tearing resistance	>200N

Dimensions

1100 mm (43") width	25 m (82') length	1 roll/ctn	24 ctns/pallet	023R02328
1350 mm (53") width	25 m (82') length	1 roll/ctn	24 ctns/pallet	023R02329
1600 mm (63") width	25 m (82') length	1 roll/ctn	24 ctns/pallet	023R02255
2200 mm (87") width	50 m (164') length	1 roll/ctn	12 ctns/pallet	023R02411

Compatibilty

Mutoh Rockhopper 3, Osprey, Toucan, Spitfire
Seiko ColorPainter
Mimaki JV3 and JV5
Xerox 82XX and 83XX
HP 8000 and 9000
Roland Soljet
Most solvent and UVC printers

Critical Operating Instructions
- Store in a cool, dry environment, out of direct sunlight. Keep the material in its original packaging including the polythene wrapper to protect against dust and humidity.

- Before printing, the surface of the substrate must be dry and free of grease, oil, silicones and dirt to achieve optimal results.

- Working at lower ink limits can improve image weather resistance.

- Depending on climactic conditions, the material will last up to three years, although image durability depends on the ink system. A gradual fading is common and depends on the properties of the ink.

- This material is suitable for the range of standard finishing procedures for banners: Edges can be sewn or welded by inductive high frequency welding, and the banner can be punched for eyelets. To form large displays, panels should be overlapped 2-3 cm and seamed with high-frequency welding equipment. Hot-air welding can also be used for overlap seaming.

- This media is suitable for pressure (cold) laminates but not thermal (hot-melt) laminates. Alternatively use one or two coats of compound polyurethane lacquer taking care to protect borders and edges.

510 g/m² Economy Banner Vinyl

Description

This heavyweight scrim vinyl for large front-lit signs and banners gives good durability at an economical price. Based on a polyester fabric, the print surface is a bright white vinyl, with a non-glare matte surface, designed for solvent and UVC inkjet imaging, to produce tough, general-purpose banners for use outdoor or indoor where fire certification is not a requirement.

This substrate can be welded, and resists both UV and temperature changes with good surface area stability.

Applications

Banner applications, such as retail and event promotions, walkways, supermarkets, entranceways, gas stations, parking garage advertising, sport arenas, backdrops, signage, and tradeshows.

Physical Characteristics

Weight	510 g/m² / 136 lbs
Thickness	450 micron / 17.7 mil

Dimensions

1067 mm (42") width	50 m (164') length	1 roll/ctn	10 ctns/pallet	023R02419
1372 mm (54") width	50 m (164') length	1 roll/ctn	10 ctns/pallet	023R02420
1600 mm (63") width	50 m (164') length	1 roll/ctn	10 ctns/pallet	023R02421
2200 mm (87") width	50 m (164') length	1 roll/ctn	10 ctns/pallet	023R02422

Compatibilty

Mutoh Rockhopper 3, Osprey, Toucan, Spitfire
Seiko ColorPainter
Mimaki JV3 and JV5
Xerox 82XX and 83XX
HP 8000 and 9000
Roland Soljet
Most solvent and UVC printers

Critical Operating Instructions

- Store in a cool, dry environment, out of direct sunlight. Keep the material in its original packaging including the polythene wrapper to protect against dust and humidity.

- Before printing, the surface of the substrate must be dry and free of grease, oil, silicones and dirt to achieve optimal results.

- Working at lower ink limits can improve image weather resistance.

- Depending on climactic conditions, the material can last up to two years, although image durability depends on the ink system. A gradual fading is common and depends on the properties of the ink.

- This material is suitable for the range of standard finishing procedures for banners: Edges can be sewn or welded by inductive high frequency welding, and the banner can be punched for eyelets. To form large displays, panels should be overlapped 2-3 cm and seamed with high-frequency welding equipment. Hot-air welding can also be used for overlap seaming.

- This media is suitable for pressure (cold) laminates but not thermal (hot-melt) laminates.

270 g/m² Indoor Banner Fabric

Description

A permanent carrier material for displays or large advertising banners. The extremely light and flame resistant material is particularly suitable for trade-fair applications.

Indoor Banner Fabric consists of a polyester fabric embedded between two white vinyl layers. This lightweight, flexible material is flame resistant, tear resistant, UV resistant against, dimensionally stable and tolerant of temperature changes within the range -20°C to +70°C. This material also has excellent resistance to curl. It can be welded to make larger displays.

Depending on external weathering and climactic conditions, this product may be expected to last for up to three years, with imaging durability subject to ink performance. A gradual fading of the print is common depending on the ink's quality.

Applications

Exhibitions, roll-up, roll-down and hanging banner displays

Physical Characteristics

Weight	330 g/m²/72 lbs
Thickness	300 micron / 11.8 mil
Tensile strength	>1500N/5 cm
Tearing resistance	>150N
Flame Retardancy	NF P 92-503 – Class M1 DIN 4102 – Class B1

Dimensions

900 mm (35") width	50 m (164') length	1 roll/ctn	24 ctns/pallet	023R02344
1100 mm (43") width	50 m (164') length	1 roll/ctn	24 ctns/pallet	023R02345
1600 mm (63") width	25 m (82') length	1 roll/ctn	24 ctns/pallet	023R02261

Compatibilty

Mutoh Rockhopper 3, Spitfire, Osprey, Toucan
Seiko ColorPainter
Mimaki JV3 and JV5
Xerox 82XX and 83XX
HP 8000 and 9000
Roland Soljet
Most solvent and UVC printers

Critical Operating Instructions

- Store in a cool, dry environment, free from direct sunlight. Keep media in original packaging, including the polythene wrapper, to protect from dust and humidity.

- The material should be handled with cotton gloves and, for best print results, should not come into contact with grease, oil, silicon, and dirt.

- Test print prior to production and ensure the printer settings are optimized – all printers and inks have differing characteristics.

- For large area displays, individual lengths should be overlapped by 2-3 cm and joined with a high frequency welding system. Panels can also be joined by hot air welding.

PrePress	• Include crop marks for trimming. Precondition the material in a controlled printer environment for 24 hours prior to printing.
Lamination	• Use only laminates approved for use with the base media and the application. • For outdoor use, prints should be fully encapsulated with a 4-6 mm sealed edge. • Laminate papers at higher temperature and slower speed to ensure successful laminate adhesion.
Trimming	• ON-PRINTER: Trim with sharp razor or automatic cutter. Check knives to make sure they're sharp and properly adjusted to cut cleanly with minimal dust. • OFF-PRINTER: Ensure images for encapsulation are individually pre-trimmed flush to the edge of the required panel size prior to being laminated. • OFF-LAMINATOR: Trim with sharp hand cutter or large format trimmer. Take precautions to keep prints from slipping or falling to the floor, especially stacked.
Handling	• PRINTS are easily damaged when handled improperly. If not laminated, avoid contact with laser printer or photo-copier output. Use a slip-sheet when rolling several posters together. Use low tack tape to secure the roll. Do not use rubber bands around an unlaminated print.
Storage	• MEDIA: Store material in all original packaging in a temperature and humidity controlled room. Keep away from direct sunlight, external doorways and heating/air conditioning vents. If rolls are stored vertically, use core hangers and keep rolls away from direct contact with floor. Do not expose graphics to extreme temperatures.
Mounting	• Mount graphics to a substrate e.g., foamboard. Clean and coat the substrate prior to mounting the graphic, or apply an adhesive coating to the back of the laminated print. • Use the overlap as a skew allowance. Mount a middle panel first to avoid a cumulative skew effect on the entire image. Beginning on either end may result in a skew effect that does not allow panels to match. • Once mounted, the graphic is flipped face down and the excess image is trimmed to fit the edges of the board.
Shipping	• Use a tube whenever possible to ship rolled images. If shipping flat, sandwich posters securely between rigid packaging. • The corners of a mounted print are easily damaged if packaged improperly. • Carriers may not handle boxes carefully, so take the time and expense before the job is sent to the customer to prepare for any possible mishandling while en route.
Printing	• Choose the appropriate "Print Mode" for the application and/or media. • "Nest" images as groups based on similar finishing requirements. • Use the media specific RIP curve available with your front-end software. If one is not available, start with a profile setting for a similar media type as a base, and make alterations to achieve acceptable output. • DO NOT COMPARE the image quality of one media to another.

1. Poster Graphics

1.1 Single Panel Poster Graphics
Single panel posters are generally intended to be viewed from a short distance. A complete design that is contained within one print is considered a poster, or a "single panel", regardless of whether multiple copies are involved.

1.2 Mounted Prints
"Mounted" prints, or "Display Graphics", are prints applied to a rigid material. The added support of the mounting surface increases the durability and life of the print. This type of post-print finishing can be utilized for all types of graphics. There are several lamination and base material options for this application, all dependent upon customer requirements for the final "look" of the presentation. When shipping, proper packaging is critical as mounted prints can damage easily.

1.3 Multi-Panel Images
Multi-panel images are prints of virtually unlimited size that require special pre-press setup and post-print construction. Accurate measurements, forethought and planning are critical to this application. The pre-press operator must obtain specific output expectations from the end-user or installer to ensure that the resulting output is successful. With the help of a computer layout program, images are "tiled" to specific panel dimensions, incorporating overlap or "butt-seam" construction.

1.4 Billboards
Display size of billboards, as well as appropriate design, will vary. Quick turnaround and image flexibility are a key advantage of digital printing methods. The final image quality depends not only on prepress and production, but also proper pasting and installation. Most limitations in expected life of billboards is due to pasting methods. Flagging, chalking, and other problems are due primarily to installation procedures.

1.5 Billboard Application Tips
- Panels should be created with a minimum 2-inch internal bleed and a 2-inch external bleed.

- Panel size should not exceed maximum width one person can handle (48" wide) but is usually determined by standard as 42".

- Carefully label panels for easier installation (e.g., 1 of 4, 2 of 4, etc.).

- The whole print may be wetted with paste immediately before application. Use a recommended billboard paste but do not add alcohol or glycol as this dissolves inks.

- POSTING: Installer should follow standard posting procedures. Ensure mounting surface is clean, dry and free of rust and debris. Loose or peeling portions of a previous layer should be removed and rough spots should be feathered by sanding. Unfold wet panel. Align top and edge to be joined. Light pressure with a soft smoothing brush or squeegee should be used to smooth wrinkles and air pockets. Work from the center towards the edges.

2. Self-Adhesive Vinyl

2.1 Application Characteristics

Adhesive backed vinyl can be directly applied to smooth, flat, or gently curved surfaces such as metal, glass, stainless steel, painted surfaces, etc. This capability saves additional steps for graphics production during imaging, finishing, and print installation. These media are designed for short-term promotional graphics, but also for long-term signage and specialist applications such as vehicle wrapping. A range of vinyls serves this variety of application.

Vinyls in the Xerox range are not suitable for applications with corrugated shaping, rivets, or complex contours. Xerox vinyl is also not suitable for vehicle wrapping. A specialist cast vinyl should be used in these cases and specialist application techniques are necessary.

2.2 Surface Cleaning and Preparation

It is the responsibility of the applicator to ensure all substrates are suitable and appropriately prepared to avoid problems with a decal either not adhering or adhering too firmly such that removal damages the substrate. The substrate surface must be completely clean, smooth, and dry. There must be no dirt, oil, grease or solvent residue remaining.

Prior to cleaning with solvents, test the cleaning solvent on an inconspicuous area of the application surface to check for potential damage. Always test adhesion and paint/adhesive compatibility prior to installation.

2.3 Painted Surfaces

Avoid highly pigmented or dull metallic paints (which tend to chalk and flake), latex paints, paints containing migratory agents such as chlorinated waxes and silicone, oil alkyd primers and enamels. If applying film to a newly painted surface, follow all drying and curing instructions. All air-drying paints should be allowed to dwell at or near room temperature and humidity conditions for one week prior to vinyl application. Chalked and otherwise weathered paint surfaces must be refurbished or refinished.

High quality exterior grade paints are recommended as a good base for self adhesive vinyl.

2.4 Other Surfaces

Tin	Including Alloys of Tin, Copper, Magnesium, Lead: Not recommended.
Stainless Steel	Stainless steel tends to maintain cold surface temperatures longer then most substrates. Use a heater immediately before and after application to accelerate bond.
MDF/Wood	Generally not recommended.
Aluminum, ABS, Acrylics	Use high quality exterior grade paints.
Galvanized Steel	Ensure the substrate is properly galvanized, it is recommended to test all galvanized steel substrates and prepare thoroughly before application.
Poly-carbonate Fiberglass	With a soft cloth wipe the surface with isopropyl alcohol. Inadequate preparation may result in air bubbles. Test for out-gassing.

2.5 Installation

Before starting installation, consult the appropriate product data sheet for information regarding application temperature range and recommended substrates. These factors are critical to a successful application and future decal performance. If the substrate surface temperature is below minimum requirements, the substrate must be heated to application temperature to accelerate the ultimate adhesion of the vinyl.

Mark the decal location on the application surface. For multi panel decals the overlap should be 6-12mm.

Generally do not use application fluid or the "wet method" for installation as this can reduce ultimate adhesion or cause fogging with clear vinyls.

The decal must be squeegee-ed before and after pre-mask removal. During pre-mask removal, decals are exposed to potential edge lifting. In order to eliminate this, re-squeegee the decal (especially the edges).

2.6 Professional Installation

Depending on the size and complexity of any specific applications, a certain amount of specialist expertise may be needed. Professional installers can be hired to ensure proper application of finished graphics. Consider hiring a professional installer whenever the application requires multiple panels to be registered, complex surfaces, such as rivets, harsh environmental conditions (i.e., outdoor applications in high heat climates) and/or remote geographic locations.

2.7 Top Hinge Installation Method

Position the decal on the application surface using small pieces of tape to hold it in place. Once the decal has been properly registered, apply a masking tape hinge along the top edge of the decal. Flip the decal up over the hinge and remove the liner. Hold the decal away from the application surface with one hand and squeegee down from the top center towards the sides using short, firm, overlapping strokes to prevent wrinkling of the vinyl and minimize air bubbles. Remove the masking tape hinge (if one was used). Re-squeegee the top edge to which the tape hinge was applied using overlapping, upward strokes. Re-squeegee the entire decal using very firm squeegee pressure, including all edges. Puncture any air bubbles with a straight pin and re-squeegee from the edge of the bubble towards the puncture.

2.8 Removal

Removal method has to be adapted to suit the specific substrate surface. This guide gives only a general removal overview of hot and cold methods. Always test a small area prior to removal.

- **Hot Method** – Warm the entire decal by holding a heat source 6-12" from the surface. After 30-60 seconds, slowly pull back a corner of the decal. Pulling and lifting slowly and steadily, at less than 90° angle, should avoid breaking the vinyl and should remove most of the adhesive. If the decal becomes hard to pull, stop and reheat it. Remove residue by wiping with a cloth saturated with decal remover.

- **Chemical Method** – XXL1000 decal remover is an environmentally safe, non-toxic, non-flammable decal remover. Apply with a spray dispenser and, after 10-15 minutes, the vinyl will begin to bubble and can be peeled from the substrate. If the vinyl doesn't remove easily, use a hot water pressure washer.

2.9 Cast and Calendered Vinyl

Xerox standard self-adhesive vinyl is calendered and designed for application to surfaces that are flat or gently curved: They are not recommended for applications with severe or complex curves or corrugations. A cast vinyl with a permanent adhesive should be used over corrugated surfaces.

Cast vinyl is an adhesive backed vinyl but, due to the way the vinyl sheet is produced, it has different properties to calendered vinyl. Cast vinyls can be made thinner, more conformable and, most importantly, they have less "memory" and will not shrink in the same way as a calendered vinyl. This makes cast vinyl a more suitable material for applying to complex shapes such as are often involved in vehicle wrapping. Any shrinkage over a curved surface will either cause the vinyl to lift away from a concave curve or to tear apart on a convex curve. Cast vinyl is effective for this because it doesn't shrink.

Cast vinyl is applied in much the same way as calendered vinyl, following the guidelines above for surface cleaning and preparation, installation and removal.

To give added surface protection from dirt and abrasion, use cast over-laminates. If too much tension is applied during lamination. To prevent water-induced staining, use 3M Edge Sealer 3950 on all exposed edges.

2.10 Preparing to Apply Cast Vinyl

Vehicle Graphics Preparation	• With respect to the application of vehicle graphics, the units should be cleaned the day prior to the installation. This will ensure that the vehicle surface is completely dry, and that no water is trapped behind rivet heads and at panel seams. • Vehicle surfaces should be cleaned using a soft bristle brush, then thoroughly rinsed with water. Residual grease, soot or tar should be further cleaned with a solvent such as DuPont's 3919S Prep Sol. Complete the vehicle cleaning with denatured alcohol or IPA, drying the surface with lint-free paper towels before the solvent evaporates. To avoid adhesion problems, be sure that the surface is completely dry.
Planning Your Installation	• Carefully study your installation diagram. Measure the location of each graphic element and tape them into position. Taking this step will ensure that all of the elements fit properly within the design space. For vehicle graphics, multiple panel graphics with vertical overlaps must be wind-lapped with the front panel overlapping the rear one. Graphic panels with horizontal overlaps must be rain-lapped with the top section overlapping the bottom one. • In planning the installation sequence of vehicle graphics, you will usually work from the rear to the front, from the bottom to the top.

2.11 Applying Cast Vinyl

These instructions are intended only as guidelines.

Tape the graphic into position with small pieces of masking tape. After rechecking your measurements, draw registration marks from the application tape to the sign substrate. To facilitate the installation of large graphics use a "top hinge". With this method, you can remove the liner from the graphic in one piece before proceeding with the application.

To make a center hinge, apply masking tape across the middle of the graphic. Using this technique, remove the liner from one half of the graphic, cutting the liner near the tape hinge. After you squeegee this section of the graphic, working from the hinge to the outer edge, remove the hinge and the remaining liner. Complete the application, starting at the initial squeegee stroke and working to the outer edge.

To produce the necessary squeegee pressure for successful application, remember to push with your thumb on the bottom of the up stroke and on the down stroke, push with your fingers on the top. Failure to maintain firm pressure often results in wrinkles and bubbles. Tiny bubbles are usually the result of inadequate squeegee pressure, a squeegee that is too soft or doesn't have a flat edge. Each stroke must overlap the previous one. Angle your squeegee slightly away from the center line to push the air out from under the vinyl. Never angle the squeegee toward the center line as this produces bubbles.

To reposition the vinyl graphic on the substrate, give the material a sharp jerk with a snap of your wrist. This movement should be perpendicular to the substrate. Never use a slow pulling movement to reposition the graphic. This will stretch the material causing more problems.

To remove the application tape from the graphic, pull the tape against itself at an angle of 180°. After removing the application tape, be sure to re-squeegee all edges and overlaps. For certain applications seal the edges of the graphic panel. To achieve a neat finished appearance without drips, use a fine-tipped brush to apply edge sealer. Never varnish coat applied vinyl graphics. Varnishes contain very hot solvents that will attack the vinyl and the adhesive system. Varnished graphics typically peel away from the substrate.

Panel to panel seams should be matched to ensure color consistency for daytime appearance and night illumination. Common edges on the roll should be overlapped, if possible, during application to avoid potential color shift. In addition to checking the appearance of seams, it is also a prudent practice to check light transmissions before sign installation. You will need to back up some colors with a white diffuser film or a sprayed background.

To overlap sections, the overlap should be at least 0.8mm. To cut a uniform overlap, you will first need to tape a cutting strip onto the substrate, squeegee both pieces of vinyl over the cutting strip, place a metal straight edge where the two pieces of film cover the cutting strip and cut with a sharp utility knife.

2.12 Corrugated and Riveted Substrates

Corrugations can be described as a series of parallel ridges running across a substrate, typically a metal substrate such as a semi truck trailer. The distance between ridges can vary from narrow to wide. Ridges can also be horizontal or vertical.

A rivet is a fastener that can be used in a variety of ways. Rivets are available in a variety of shapes and sizes ranging in diameter from 13 mm to 45mm. When applying vinyl over a rivet, heat and a rivet brush must be used to ensure good conformability and adhesion. If stainless steel rivets are used, the vinyl must be cut around the base of the rivet.

2.13 Applying Cast Vinyl to Riveted Surfaces

Squeegee the vinyl graphic over the riveted surface as described in the section covering flat applications.

Puncture the vinyl with a pin in several places around each rivet head. A "Wartenberg" pinwheel will accomplish the same result. Just roll the pinwheel on either side of the rivet row. Holding the rivet brush in your fist, move the brush horizontally back and forth over the head of the rivet with short, choppy, firm strokes. What starts as a large pucker will be compressed to a much smaller bubble around the rivet head.

With the heat gun or propane torch several inches from the head of the rivet, heat the vinyl (without burning or melting it). Heating breaks the memory of the cast vinyl, allowing it to conform to the rivet head without shrinking back. After heating, burnish the vinyl to the rivet head using a circular motion with a rivet brush. Firm pressure with the rivet brush will ensure good ultimate adhesion. The bristles of the rivet brush should be at a 45° angle to the edge of the rivet.

The last step in any installation should be a final inspection. Be sure all material conforms tightly to the rivet heads. If the graphic has air bubbles, puncture the bubbles at one end with a pin. Using your fingers, push the air toward the pin hole. Never slit a bubble with a knife.

If the substrate is comprised of panels, the vinyl must be cut along the seams. The seams of roll-up truck doors must be double-cut at a 45° angle along both edges of the joining door panels. All cuts must be re-squeegeed to ensure proper adhesion. We also recommend that you edge seal the graphic at the door panel seam.

2.14 Removal of Cast Vinyl Vehicle Wraps

Many factors make removal of vinyl film difficult. As vinyl ages, it becomes brittle. In the removal process, brittle film often cracks into small pieces. This can make film removal tedious and frustrating. In addition, the adhesive frequently delaminates from the face. Removing the adhesive can be time consuming and messy. What follows are guidelines and tips on film and adhesive removal.

- Have an assortment of adhesive removers handy such as isopropyl alcohol, Pres Sol@, lacquer thinner, xylene, and a citron-based remover. Before using any chemicals, read and follow the manufacturer's safety precautions and check compatibility with the substrate. For scraping the softened adhesive off the substrate, you will need squeegees. Old rivet brushes are also handy for scrubbing adhesive off rivet heads.

- First warm up the vinyl with a heat source. Be sure to keep the flame moving to prevent burning the vinyl or the substrate. This heating process softens the film and the adhesive. Pick at an edge and pull the film from the surface. If the temperature is just right, the adhesive often will come off with the film. If the temperature is too hot, the film will stretch too easily and snap. This is a trial and error process.

- Adhesive Removal Procedure. Xerox self adhesive vinyls are developed to have good adhesive anchorage. This means that the adhesive should adhere better to the face vinyl than to the substrate. In many cases, the film and adhesive will come off perfectly with heat. In other instances, as the environment acts on the laminate and substrate bond continues to build, you could be left with adhesive residue.

- Removing adhesive involves the use of chemicals. When using chemicals, always exercise caution. Read and follow the manufacturer's instructions. The first step in using an adhesive remover is to test the remover on an inconspicuous spot on the substrate or vehicle to see if the remover reacts with the paint. Next, test the adhesive remover on the adhesive. What worked on the last removal may not work this time. Start with the mildest adhesive remover if that does not work, try a stronger one.

- After selecting a remover, saturate the adhesive with it. Apply the remover by using a rag, a spray bottle or a pressurized sprayer. Let the remover soften the adhesive to a jelly-like state. Then scrape the gel from the surface with a squeegee. Use your old rivet brushes to scrub the adhesive off the rivet heads.

2.15 Care of Cast Vinyl Vehicle Wraps

Proper care of vinyl graphics is critical to achieving ultimate life and appearance. In cleaning vinyl graphics, always use a wet non-abrasive cleaner. The cleaner selected should also be free of strong solvents such as MEK, alcohol's, acetone and perchloroethane, and free of highly acidic and alkaline chemicals. When you prepare the cleaning solution, always follow the manufacturer's instructions for proper dilution and safe use.

- Using clean water, wash the graphics to remove loose dirt. If you are using a pressure wash system, use special care. The nozzle must be at least 12" away from and no shallower than 60° from perpendicular to the graphic. Water temperature should not exceed 60°C, and water pressure should not exceed 1300 PSI. Otherwise a pressure wash system can cause edge lifting of the vinyl.

- Wash the graphic with mild detergent and a soft brush, rag or sponge. Never use a hard bristle brush.

- Rinse the graphic with clean water. Allow to air dry.

- If tar or oil remains on the graphic, clean the stains with a rag moistened with mineral spirits, kerosene or a household cleaner. Wash again with soapy water to remove the solvent, then rinse with water.

- To remove mold and fungus, use a solution of one part bleach and 30 parts water. After cleaning, rinse the graphic with clean water.

Caution: Commercial drive through brush type car washes are not recommended. Dirt and debris on unlaminated vinyl surfaces can not be removed

3. Banners

3.1 Application Definition

Banners display short messages in a large format for viewing from a distance. The success of this application largely depends on the design element used as well as the physical placement of the banner. Banners can be installed virtually anywhere from ceilings in shopping outlets to table fronts for exhibit halls. Durable materials make for the best choice when creating a banner because of the extreme amount of post print finishing necessary for this application, and because of the heavy stresses placed on large area banners by wind and weathering. In outdoor applications, heavyweight fabrics and vinyls are used because of their ease of use and durability. In less demanding conditions paper and lightweight fabric banners can be considered.

3.2 Banner Vinyls

A wide variety of vinyl is available for banner production with a wide variety of print and application performance capabilities. Banner vinyl construction for solvent inkjet printing needs to take account of the need for media to be heated during the imaging process. It must easily and reliably withstand the necessary heat without distorting. Finished vinyl banners also need to have appropriate properties to allow hemming or joining by welding or stitching, application of eyelets and fixing components, and of course they must withstand a level of weathering depending on the display environment. Strength is less determined by overall weight but is more a function of the way in which the vinyl is constructed and the reinforcing textile which forms the core of the material. Banner vinyls are available with various surface finishes and some have light blocking properties to enable double sided prints to be produced.

3.3 Fabrics

The high strength and range of finishing options for fabrics make them ideal for use in banner, flag, drapery, and paneled backdrop applications, also for stretching over a wood frame for fine art reproductions. Fire retardant properties are a consideration when a graphic is to be displayed in environments with the most stringent regulations.

3.4 Fabric Application Tips

- Avoid overly heavy ink coverage on fabrics or images may rub off easily. Color enhancement to the digital file before RIP processing (such as altering single color blacks to 4 color blacks, etc.) may help to increase color intensity.

- Fabric is coated across a porous, uneven surface. Some of the coating layer, sitting on the peaks of the weave may tend to rub off unless handled carefully.

- Double stitch fabric hems with a maximum of 5 stitches per inch. Take care that sewing machine foot contact does not mark the face side of the banner.

Lamination Overview

Introduction

Lamination can be the most critical portion of graphics construction. Finishing the print offers a value-added service by the print provider that can produce higher revenues per print. Lamination protects the print from mechanical damage that may be caused by contact, handling or abrasion, but an over-laminate also protects prints from color deterioration preventing reaction of atmospheric components with colorants over time.

- Laminate a graphic if it is to be exposed to extreme conditions or abrasion.

- Lamination adds a gloss or luster finish, as well as enhancing colors (without altering the color) depending on the laminate used.

- If the print is displayed under harsh lighting, use a matte finish to reduce glare.

- Use heavier grades of laminate to add bulk and stiffen prints or add a high gloss appearance.

Inappropriate lamination techniques are the leading cause of material waste. This information is intended to be a starting point. Each laminator has its own characteristics, which vary depending upon ambient conditions, laminator model, settings and adjustments, age and condition of the laminator, etc. Temperature, pressure, speed and tension adjustments may need to be made to optimize laminate bond and to obtain flat graphics.

Understanding Laminates

IMPORTANT: Use the appropriate laminate for your media and your application. Check the appropriate media specification sheet to verify if certain laminates are not appropriate, e.g., some media must only be over-laminated with cold laminates.

Laminate Types	**THERMAL** laminates consist of a polyester (PET) face film with a heat-activated adhesive on one side. With heat applied to the adhesive via the laminator the adhesive melts (activates). Once the heat source is removed it sets within a few seconds.
	PRESSURE SENSITIVE laminates have a pressure sensitive adhesive applied to one side. This type of lamination does not use heat to activate the adhesive. Adhesive is activated by pressure alone.
	PET based laminates are durable and tough, with high tear and impact strength, excellent scratch resistance, and flexibility once applied. Since PET laminates do not contain plasticisers, they do not become brittle with age under normal conditions
Laminate "Looks"	**GLOSS**: provides maximum clarity and color enhancement and is used when the customer desires a 'photo-glossy' look.
	SATIN/LUSTER: gives a less glossy finish while maintaining excellent clarity and color enhancement – should be used when there is concern about light reflections (glare) but the image benefits from some degree of gloss.
	MATTE: least glossy finish while maintaining good clarity and color enhancement and should be used to eliminate or minimize glare.
Laminate Composition	A lamination film is a post-printing material made of two parts: polyester and adhesive. "Construction" refers to the film and glue relationship. Construction is typically described by micron or mil thickness, e.g., 5mil laminate will be described as a having a 3/2 construction (3 mil polyester/2 mil adhesive). 1 mil = 25 microns
	It is the polyester that affects color saturation and gives you rigidity. The greater the ratio of polyester to adhesive, the better the quality of film. A 5 mil laminate with a 3/2 construction is higher quality than a 5 mil laminate with a 1/4 construction.
	All laminates are not the same. Typically laminates that have thinner face films (economy construction) will be more problematic then those with a thicker polyester layer. Thinner face films will stretch and distort more easily creating wrinkles and other image defects.

Premium Construction	Economy Construction
3mils Polyester + 2mils Adhesive	1mil Polyester + 4mils Adhesive
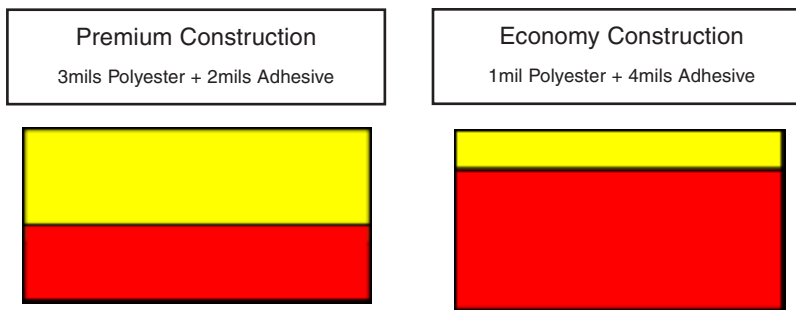
Lamination Production Notes

This information is intended to be a starting point. Each laminator has its own characteristics that may vary depending upon ambient conditions, laminator adjustments, age and condition of the laminator, etc. Temperature, pressure, speed and tension adjustments may need to be made to optimize laminate adhesion to the base material and to obtain flat, wrinkle-free prints.

- Make certain that ink in high saturation areas of the print has completely dried before laminating.

- Encapsulate prints intended for outdoor applications.

- Hot melt adhesives generally give greater adhesion. Use pressure laminates where print media requires. De-lamination could occur if heat and pressure settings are not correct for the media.

- Keep the laminator supplies, media and all work areas clean. Any debris trapped under laminates cannot be removed.

- Static charges build on laminator and supply rolls. This might attract dust. A static elimination device may help.

- Use temperature tape to verify nip temperature before laminating prints, especially prior to beginning multiple quantities or oversized projects. Some laminators may have to be set higher in order for the nip to reach optimal temperature.

- Grommets may be added to laminated or vinyl prints to aid in display. To avoid tearing, strengthen the print prior to setting the grommets by adding a 2" triangle of heavy laminate between the grommet and the back of the print.

- If laminated prints curl up, the top laminate tension is too high. Likewise, if the print curls downward, the bottom laminate tension is too high.

- Boat waking can occur when the nip pressure is too high or too low or pull tensions are too low.

- Improper cooling after lamination can result in wavy finishes or other defects.

- Uneven waves or wrinkles can indicate a misaligned roller. Do not attempt to adjust a laminator roller without proper instructions from the manufacturer.

- Silvering can occur if heat or pressure is too low or speed is too high. This can also happen if there is too much moisture in the media prior to lamination. Heating or pre-drying before laminating the prints may help correct this problem.

- Refer to the Supplies Data Sheets section of this guide for instructions regarding lamination requirements for specific media.

Glossary of Terms

A

3-Color black	Area of solid Cyan, Magenta, and Yellow combining to form a black.
Accelerated Light Testing	Equipment is used to expose materials to light, at elevated energy levels, more concentrated then the actual light source.
Adhesion	Bond between two surfaces. A substance capable of holding materials together by surface attachment.
Adhesion, Initial	Force required to remove a pressure sensitive material from a substrate (Important: this force can only be measured under specific, standard conditions to obtain reliable and comparable results.)
Adhesion, Peel	Peel adhesion, measured 20 minutes after the self-adhesive material has been applied.
Adhesion, Ultimate	Peel adhesion, measured 24 hours after application of the material.
Adhesive Permanent	Adhesive that provides permanent bond to a wide variety of surfaces.
Adhesive Removable	Adhesive giving low ultimate adhesion to a variety of surfaces.
Adhesive Repositionable	Adhesive that permits removal and re-positioning shortly after application, prior to development of ultimate adhesion.
Application	A method for creating a graphic for a specific purpose. This can include materials, printing, finishing and construction methods.

B

Backlit	A print illuminated from behind. These prints may also be viewed from the front with the back lighting off.
Bleed	Amount an image extends past the desired size of a print. This extra image area allows for errors in sizing and positioning during finishing. External bleed is measure outside the final trim dimension of the print. An external bleed of 0.5" will create a print 1" larger than required. Internal bleeds is the amount an individual panel extends over a seam between panels. An internal bleed of 10 mm will give 20 mm overlap between adjacent panels.
Boat-waking	During lamination, uneven tension can cause ripples in the prints. Boat waking is when ripples originating at the center of the print extend diagonally out towards the edges.

C

Calendered PVC	PVC (poly vinyl chloride) sheet formed by means of system of cylinders, distributing and pressing the PVC into a sheet of the required caliper.
Caliper	Distance between the 2 surfaces of a material, measured in microns.
Cast Coated PVC	PVC sheet manufactured by coating PVC onto a web of coated paper. This technique allows the production of PVC sheeting with low caliper, high flexibility and improved dimensional stability.
Chemical Resistance	The resistance of a material to the deterioration effects resulting from exposure to chemicals under specified conditions.
Cohesive Strength	The internal strength of an adhesive, often determined by the force required to split or separate it internally.
Conformability	Ability of a material to adjust itself to the contours of a surface.
Curl	Tendency of a paper or laminate to bend around the axis of one of its main directions.
Cyan, magenta, yellow	The subtractive (process) primaries.

D _____

DPI	Dots per inch.
Decal	Decals are laminated prints with some adhesive applied to the back.
Dimensional Stability	Ability of a material to retain its original dimensions when subjected to specific exposure conditions.
Dither	The process of distributing dots to create the appearance of a solid hue and tint. The dither patterns used in inkjet printing will determine the sharpness, color, contrast and saturation of a print.
Durability	The time period a graphic will retain an acceptable appearance for it's intended use under the specific exposure conditions (eg: indoor, moderate = normal office environment with limited window exposure and outdoor, moderate = climate with mild temperature ranges, low humidity, and minimal ambient UV and pollution exposure).

E _____

Elongation	Increase in length of material brought on by extending it to breaking point.
Emulsion	A dispersion of fine particles or globule of a liquid normally incompatible.
Encapsulate	When the top and bottom laminates extend past the edge of a print, they form a bond that seals out dirt and moisture. This aids in outdoor durability. Proper temperature and pressure required for an even, permanent seal.

F _____

Face Material	Any paper, film, fabric, etc. adhesive coated on the backside. In laminates, it is the material to display image.
Fading	The process of degradation of color brilliancy.
Failure Rate	Actual number of prints or "Finishing Material" destroyed during the production process. The print provider can have a print failure without a "Finishing Material" failure. But a "Finishing Material" failure always results in a destroyed print.
Final trim	Final trim is the actual size of the finished print, usually as displayed.
Finish	Surface property of a material determined by its surface contour and gloss.
Finishing Material	Generic term representing any number of materials in post-print production for application assembly. An example of a "Finishing Material" would be banner vinyl used in the assembly of the application Indoor Vinyl Banner.
Fleet Markings	General term applied to decals (for promotion) or pressure sensitive applications designed and produced for customers having more than one-company owned vehicle for business use, delivery transport use, etc.

G _____

Gloss	Light-reflective property of a surface measured in gloss units.

H _____

Haze	Property of transparent film that appears as a reduced look-through.
Heat Resistance	The ability of a material to resist physical or chemical changes caused by exposure or elevated temperatures.
Hue	A color's name.

I _____

Ink Coverage	The coverage at a particular point on the surface of the media (i.e., 0-400% ink) and varies throughout an image.

J ───

Job Orientation   Print Dimensions for width and height of a file as it is going to be printed. Height could also be referred to as length.

L ───

Laminate   Any protective, transparent material applied to either side of a print. Available in many thicknesses, finishes, with anti-graffiti treatments and scratch resistance. Laminates with heat-activated adhesives are known as hot laminates. Pressure activated laminates are known as cold laminates.

Laminate bead   When the top and bottom laminates extend past the edge of a print, they form a bond that seals out dirt and moisture. This aids in outdoor durability. Proper temperature and pressure is required for an even, permanent seal.

Lay-Flatness   The ability of a self-adhesive laminate to remain flat under changing temperature/ humidity conditions.

Lightfast   The ability to withstand a predetermined amount of light with minimal or acceptable change.

M ───

Migration   Movement of one or more components from one material into another (e.g., plasticiser from film to ink, plasticizer from film to adhesive, etc.).

Mottle   Random blotchy irregular pattern in solid fill areas giving loss of density.

Mounting   The process of adhering a digital print to a substrate using an adhesive, either on the back of the laminated print or coating the substrate.

N ───

Nip   The gap between the heat or pressure rollers of a laminator.

Normal Observer   Person whose visual acuity and color perception fall within normal limits

O ───

Opacity   The degree to which a material can prevent the transmission of light.

Overlaminate   Typically a pressure sensitive (cold) laminate that is applied on top of a finished print (usually vinyl) to add durability, special finishes, increased thickness or other characteristics.

Over saturation   Excessive amount of ink placed onto media causing image to bleed through or across the media.

P ───

Plasticizer   Component of plastic materials that provides flexibility.

R ───

Red, Green, Blue   The additive (display) primaries.

Referral   The state in which a print is being handled and/or viewed.

Reflective   Colors that are seen after they bounce off an object's surface.

Release   The force required to separate a pressure sensitive laminate. This force varies with test conditions – peel speed, temperature and peel angle, etc.

Release Coat   The coating applied to the backing paper, which enables the latter to separate readily from pressure sensitive adhesives.

Rough trim   Prior to final trim, it may be necessary to trim the print to approximate size for ease in handling. When final trim is not known until at the display site, rough trim may be used.

S _____

Saturation	The relative colorfulness or chromaticity of a color.
Secondary Color	The color that results when two primaries are added or mixed together.
Shade	The result of adding black to a pure hue.
Silvering	A problem occurring during lamination. It is seen as a silver sheen or discoloration in dark areas. The silvering is produced by very small bubbles in the adhesive layer of the laminate, usually indicating separation due to low pressure, low heat, or high speed.
Solvent Resistance	The resistance of a pressure sensitive material to the action of specific organic liquids.
Stiffness	The property of a material that enables it to resist bending forces.
Substrate	The surface to which a self-adhesive material is to be adhered.

T _____

Tack	The property of a pressure sensitive material that causes it to adhere to a surface under conditions of low pressure and short contact.
Tear Strength	Property measured by the force required to tear a specimen under specified test conditions.
Tensile Strength	The force required to break a material under specified test conditions.
Tint	The result of adding white to a pure hue.
Translucent	Transmitting light in a diffuse manner so that the object beyond cannot be clearly distinguished. partly transparent.
Transparency	The light transmission rate of a clear film.
Transmitted	Colors that are seen through a transparent or translucent object.
Trim	The final size of a finished graphic. Usually the final trim is the size of the print as it is displayed.

U _____

| UV light | An invisible light radiation. This may change properties of paper, plastics or inks after prolonged exposure. |
| UV Stabilizer | A chemical compound which absorbs UV – radiation selectively, preventing or delaying a change in characteristics of a plastic material or adhesive. |

V _____

| Value | A color's lightness, darkness, or brightness. |
| Voids | Small circular non-imaged areas with or without dark centers. Voids can be partially colored with one or more colors. |

W _____

Water Fast/ Water Resistant	Ability to withstand the effects of water with minimal or acceptable change.
Water Proof	The ability to be unaffected by water.
Weather-ability	The ability of a material to withstand the effects of exposure to weather conditions, without significant change in physical or chemical properties.
Weather Testing	Material is subjected to the actual environments that they need to be used in (accelerated weathering is not possible).
White, Black and Gray	Colors that have no hue, only value.
Worms	Wiggly colored streaks in image, which can show in many ways. For example, could appear to look like trails of water droplets or a finger painting.
Wrinkle	Folds, wrinkles, or stretch marks in media.