



PLASTICS REFERENCE HANDBOOK

REGAL PLASTIC SUPPLY COMPANY

PLASTICS REFERENCE HANDBOOK

regal

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Regal Plastic Supply Company,
a division of Regal Supply Company

Established in 1954, Regal Plastic Supply Company is considered one of the foremost pioneers in the plastic distribution industry. Throughout the years, the innovative “customer-oriented plan for success” thinking has become a credible trademark our customers rely on. Fortifying that philosophy, Regal introduced its Plastic Materials Reference Guide in 1984. As products and industries continue to evolve, so does this compilation of technical data. We view providing our customers with tools for effective planning and purchasing as important as meeting product “supply and demand”. You will find this guide an invaluable reference source for researching or finding the answer pertaining to your plastic application. The product information contained herein covers the most commonly used materials; it does not reflect our total capacity.

True customer service is a thought process not developed overnight. Our experience and stability in the industry gives Regal the opportunity to assist you in your plastics endeavors as you utilize staff who are accessible, knowledgeable and resourceful with regard to all inquiries.

We invite you to visit the Regal Plastic Supply Company location in your vicinity. All locations maintain generous inventories of plastic sheet, rod, tube, film, and numerous finished products.

Regal Plastic Supply Company thanks all of our customers for their patronage over the years. We will continue in our efforts to provide the best in JIT inventory and personal service. Plastic is in your future and Regal Plastic Supply Company is your best source.

Sincerely yours,

Regal Plastic Supply Company

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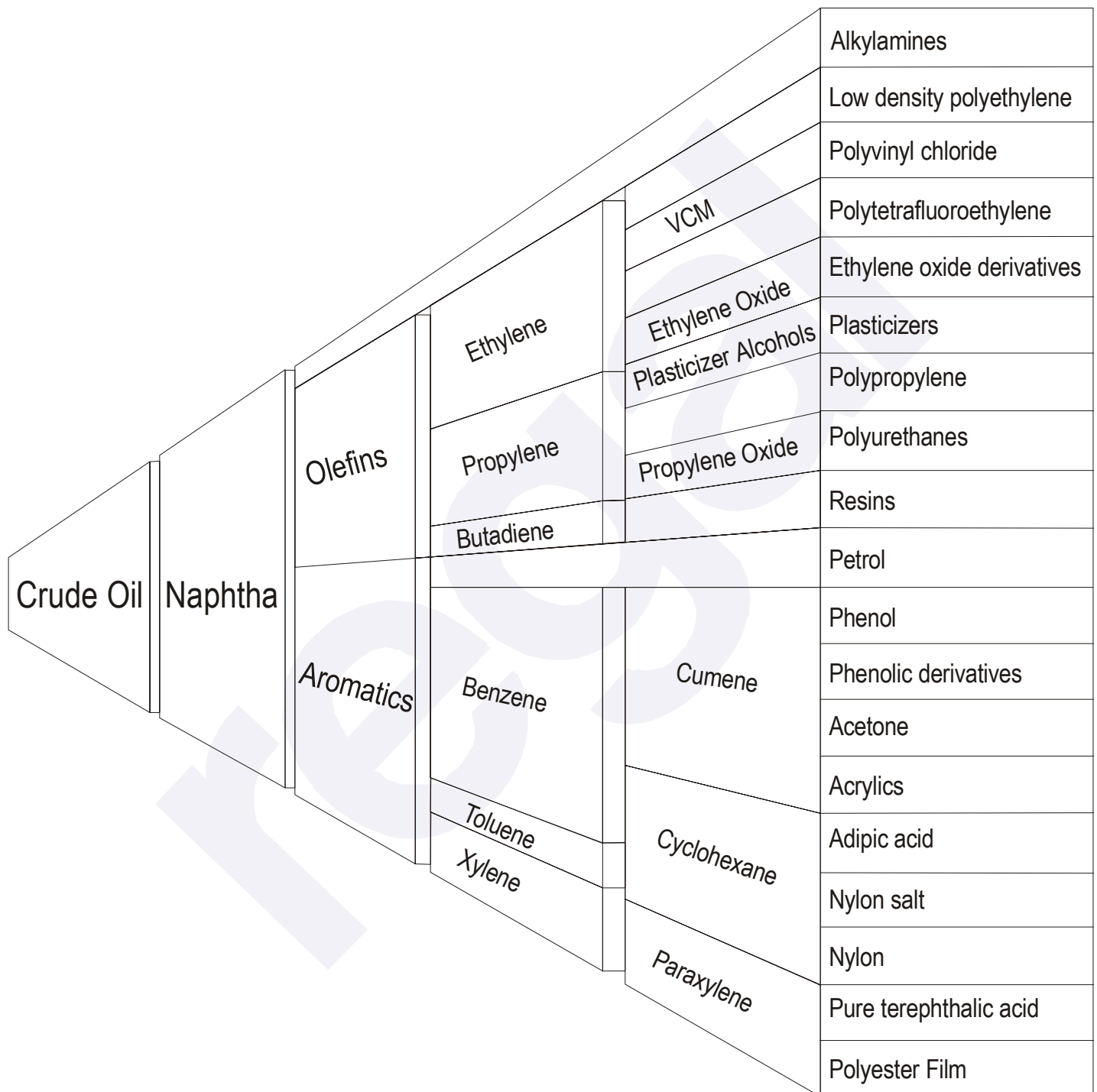
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INTRODUCTION

The Origins of Plastic Materials



INTRODUCTION

Preface

Introduction

PLASTIC-(per Webster)- “Any numerous organic, synthetic, or processed materials that are high molecular weight polymers.”

Polymers are a tribute to man’s creativity and inventiveness. They are truly man-made materials. Like any other material, they have their origins in nature, in such basic chemical elements as carbon, oxygen, hydrogen, nitrogen, chlorine, and sulfur. These elements in turn are extracted from the air, water, gas, oil, coal, or even plant life.

It was man’s inspiration to take these elements and combine them, via various chemical reactions, in an almost unending series of combinations, to produce the rich variety of materials we know today as plastics.

The possibilities of combining chemical elements to create plastics with different properties are almost endless. It is this diversity that has made plastics so applicable to such a broad range of end uses and products today.

In the Beginning

Given this kind of versatility and the role that plastics play in modern living, it’s surprising to realize that a little over a century ago there was no such thing as commercial plastic in the United States. During the 1850's and 60's, developmental work was going on with hard rubbers and cellulose materials, but the U.S. plastics industry officially dates its beginnings back to 1868, when a product called Celluloid was created as the first commercial plastic in the U.S. The development was in response to a competition sponsored by a manufacturer of billiard balls. It came about when a shortage developed in ivory from which the billiard balls were made, and the manufacturer sought another production method. Celluloid was one of the materials considered, and the U.S. plastics industry was born.

As has been typical of new plastic materials ever since, Celluloid quickly moved into other markets. The first photographic film used by Eastman was made of celluloid: producing the first motion picture film in 1882. The material is still in use today under its chemical name Cellulose nitrate, for making products like eyeglass frames.

Forty years were to pass before the plastics industry took its second major step forward. In 1909, Dr. Leo Hendrik Baekeland introduced Phenol formaldehyde plastics (or Phenolics as they are more popularly known), the first plastic to achieve world wide acceptance.

The third big thrust in plastics development took place in the 1920's with the introduction of Cellulose acetate, ureaformaldehyde, polyvinyl chloride, or Vinyl, and Nylon.

Evolution

In the World War II years of the 1940's, the demand for plastics accelerated, as did research into new plastics that could aid in the defense effort.

By the start of the 1950's plastics were on their way to being accepted by designers and engineers as basic materials, along with the more conventional ones.

Nylon, Teflon, Acetal, and Polycarbonate became the nucleus of a group in the plastics family known as the engineering thermoplastics. Their outstanding impact strength and thermal and dimensional stability enabled them to compete directly with metals. This group has grown since then to include a number of new plastics, as well as improved variations of older plastics that could similarly qualify for inclusion.

The Monomers & Polymers

Many plastics are derived from fractions of petroleum or gases that are recovered during the refining process. For example: ethylene monomer, one of the more important feedstocks, or starting materials for plastics, is derived in a gaseous form from petroleum refinery gas, liquefied petroleum gases, or liquid hydrocarbons. Although petroleum gas derivatives are not the only basic source used in making feedstocks for plastics, they are among the most popular and economical in use today. Coal is another excellent source in the manufacturing of feedstocks for plastics.

From these basic sources come the feedstocks we call monomers. The monomer is subjected to a chemical reaction known as polymerization; it causes the small molecules to link together into ever increasingly long molecules. Chemically, the polymerization reaction gas turns the monomer into a polymer, and thus a given type of plastic resin.

The Product as We See It

The polymer or plastic resin must next be prepared for use by the processor, who will turn it into a finished product. In some instances, it is possible to use the plastic resin as it comes out of the polymerization reaction. More often, however, it goes through other steps which turn it into a form that can be more easily handled by the processor and processing equipment. The more popular forms of resin for processing are pellet, granule, flake, and powder.

In the hands of the processor, these solids are generally subjected to heat and pressure. They are melted, forced into the desired shape (sheets, rods, and tubes) and then allowed to cure into a finished product. Resins are most readily available in their natural color, but by adding coloring agents, most any color can be achieved during the processing.

Plastics are a family of materials, not a single material. Each has its own distinct and special advantages.

Each day brings new plastic compounds, and new uses for the old compounds.

INTRODUCTION

Chronology of Plastic

DATE	MATERIAL	ORIGINAL TYPICAL USE
1868	Cellulose Nitrate	Eye Glass Frames
1909	Phenol-Formaldehyde	Telephone Handsets
1926	Alkyd	Electrical Bases
1926	Analine-Formaldehyde	Terminal Boards
1927	Cellulose Acetate	Tooth Brushes, Packaging
1927	Polyvinyl Chloride	Raincoats
1929	Urea-Formaldehyde	Lighting Fixtures
1935	Ethyl Cellulose	Flashlight Cases
1936	Acrylic	Brush Backs, Displays
1936	Polyvinyl Acetate	Flash Bulb Lining
1938	Cellulose Acetate Butyrate	Irrigation Pipe
1938	Polystyrene or Styrene	Kitchen Housewares
1938	Nylon (Polyamide)	Gears
1938	Polyvinyl Acetal	Safety Glass Interlayer
1939	Polyvinylidene Chloride	Auto Seat Covers
1939	Melamine-Formaldehyde	Tableware
1942	Polyester	Boat Hulls
1942	Polyethylene	Squeezable Bottles
1943	Fluorocarbon	Industrial Gaskets
1943	Silicone	Motor Insulation
1945	Cellulose Propionate	Automatic Pens and Pencils
1947	Epoxy	Tools and Jigs
1948	Acrylonitrile-Butadiene-Styrene	Luggage
1949	Allylic	Electrical Connectors
1954	Polyurethane or Urethane	Foam Cushions
1956	Acetal	Automotive Parts
1957	Polypropylene	Safety Helmets
1957	Polycarbonate	Appliance Parts
1959	Chlorinated Polyether	Valves and Fittings
1962	Phenoxy	Bottles
1962	Polyallomer	Typewriter Cases
1964	Ionomer	Skin Packages
1964	Polyphenylene Oxide	Battery Cases
1964	Polymide	Bearings
1964	Ethylene-Vinyl Acetate	Heavy Gauge Flexible Sheeting
1965	Parylene	Insulating Coatings
1965	Polysulfone	Electrical/Electronic Parts
1970	Thermoplastic Polyester	Electrical/Electronic Parts
1973	Polybutylene	Piping
1975	Nitrile Barrier Resins	Containers

The information contained herein provides product data, suggestions, and guidelines we believe to be reliable. They are offered in good faith but without any guarantee, as conditions, type of product, and methods of product use are beyond our control.

Regal Plastic Supply Company makes no warranties either expressed or implied and expressly disclaims any implied warranty of fitness for a particular purpose or procedure.

Sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein, is strongly recommended.

GRAPHIC ARTS PRODUCTS

Reel Materials for Sign Market

Plexiglas® Q Acrylic Sheet

Plexiglas® Q Acrylic Sheet, is produced by Elf Atochem North America, Inc., atoglas™ division. Plexiglas® is a registered trademark and atoglas™ is a trademark of Elf Atochem S.A. Designed primarily for use in the sign market, Plexiglas® Q acrylic sheet is made by the same proprietary continuous process used to make original Plexiglas® MC acrylic sheet. This process ensures exceptional surface finish, optical quality and thickness uniformity. Plexiglas® Q acrylic sheet has all the attributes of original Plexiglas® MC acrylic sheet. In addition, it offers enhanced solvent craze resistance.

Plexiglas® Q acrylic sheet is available on reels and as palletized sheet stock, in colorless and sign white in the following thicknesses and sizes:

Thicknesses - .118, .150, .177, .220

Palletized sheet stock - from 30" to 108" (9')

[For additional information on acrylic products and availabilities see pages 10 - 41.](#)

Implex® Impact Acrylic Sheet

Implex® impact acrylic sheet, is produced by Elf Atochem North America, Inc., atoglas™ division. Implex® impact acrylic sheet is a registered trademark and atoglas™ is a trademark of Elf Atochem S.A. Offering good impact resistance along with excellent weatherability, clarity, and processing characteristics, Implex® impact acrylic sheet was developed primarily for the sign industry. Implex® impact acrylic sheet combines the well-known weatherability of acrylic with proprietary impact-resistant chemistry. Implex® impact acrylic sheet eliminates haze, surface dullness, and progressive yellowing.

Processing advantages include:

- Shorter thermoforming cycles
- Lower forming temperatures
- Wider forming temperature windows

PRODUCT AVAILABILITY

	.093	.118	.150	.177	.220	.236	.354
48" x 96"	✓	✓	✓	✓	✓	✓	✓
60" x 96"			✓	✓	✓	✓	✓
72" x 96"			✓	✓	✓	✓	✓
51" x 100"			✓	✓	✓	✓	
63" x 100"		✓	✓	✓		✓	
75" x 100"			✓	✓		✓	

[For additional Implex® product information see page 20.](#)

LEXAN® Sheet for Signs

LEXAN® sheet for signage offers a large selection of colors, sizes, finishes and weights. Designed for backlit pole signs, groundmounts, canopies, and fascias, LEXAN sheet has 30 times the impact strength of acrylic and 10 times the impact strength of modified acrylic.

LEXAN® ColorQuik™ Sheet

This product is a pre-laminated sign material offering durable 3M™ Scotchcal™ translucent film applied to impact-resistant LEXAN sign white polycarbonate sheet. Providing enhanced color consistency and durability, this product reduces the need to paint sign blanks and can eliminate the manual application of color film as the key base color.

LEXAN® S-100 Sheet

The LEXAN S-100 sheet has a polished surface on both sides with a glossy finish. Compatible with most decorating and forming methods, it is available in transparent, translucent and opaque custom colors.

LEXAN® S-300 Sheet

This extruded polycarbonate sheet differs from the S-100 sheet only in the surface texture. The S-300 sheet has a matte first surface and a polished second surface.

Note: LEXAN S-100 and S-300 sheets are not recommended for applications requiring high abrasion resistance or for outdoor signs that are predominantly white or where color shift is objectionable.

LEXAN® SGC-100 Sheet

Available in clear only, this co-extruded polycarbonate sheet is polished on both sides with a glossy surface and UV resistant on one side.

LEXAN® SG-300 Sheet

This extruded polycarbonate sheet has polished / matte sides with UV resistant surface treatment on one side. Available in clear, transparent, translucent and opaque custom colors, the recommended applications are the same as the SGC-100 sheet.

GRAPHIC ARTS PRODUCTS

Reel Materials for Sign Market

LEXAN® SG-404 Sheet

A pigmented sheet, UV resistant on one side, glossy on both, LEXAN® SG-404 sheet can be easily formed and decorated. UL recognized as an electrical enclosure material in channel letter diffuser applications, the sheet is available in nine standard and custom colors.

Note: LEXAN SGC-100, SG-300, and SG-404 sheets are not recommended for applications requiring high abrasion resistance. The solar grade treated surface must face outward.

Lexan® Sheet for Signs PRODUCT AVAILABILITY

PRODUCTS	SPOOL THICKNESS	SPOOL WIDTHS	SPOOL LENGTHS	SHEET GAUGES (inches)	SHEET WIDTHS (inches)	SHEET LENGTHS	COLORS
LEXAN ColorQuik™ Sheet	.118", .150", .177"	52"	.118 - 504' .150 - 400' .177 - 304'	.118, .150, .177	52	36" - 150"	Sunflower Yellow, Green, Red, Cardinal Red, Blue, Bright Blue
LEXAN S-100 Sheet	.093", .118", .150", .177"	4', 5', 6', 8'	304', 392', 400', 504', 624', 800', 1000'	.060, .080, .093, .118, .125, .150, .177, .236	52, 64, 76, 86, 100**	36" - 150"	Clear *
LEXAN S-300 Sheet	.093", .118", .150", .177"	4', 5', 6', 8'	304', 392', 400', 504', 624', 800', 1000'	.093, .118, .125, .150, .177, .236	52, 64, 76, 100**	36" - 150"	Clear *
LEXAN SGC-100 Sheet	.093", .118", .150", .177"	4', 5', 6', 8'	304', 392', 400', 504', 624', 800', 1000'	.093, .118, .125, .150, .177, .236	52, 64, 76, 100**	36" - 150"	Clear *
LEXAN SG-300 Sheet	.093", .118", .150", .177"	4', 5', 6', 8'	304', 392', 400', 504', 624', 800', 1000'	.093, .118, .125, .150, .177, .236	52, 64, 76, 100**	36" - 150"	Transparent * Texture
LEXAN SG-404 Sheet	.093", .118", .150", .177"	4', 5', 6', 8'	304', 392', 400', 504', 624', 800', 1000'	.093, .118, .125, .150, .177, .236	52, 64, 76, 100**	36" - 150"	Two shades of red, two shades of blue, yellow, orange, black, white and green.

* = Custom colors upon request

** = 100" wide roll / sheets only available in gauges .125 and higher

[For additional product information, see pages 49 - 51.](#)

GRAPHIC ARTS PRODUCTS

Sheet Material ■ Acrylic

ACRYLIC

There are four manufacturing processes that produce acrylic sheeting: cell cast, continuous cast, continuously manufactured, and extruded.

Each process yields acrylic sheet products with specific characteristics at varying costs. In addition, all types are available with value-added features such as ultraviolet filtering or glare reduction.

Cell Cast

This type of acrylic sheet is made by pouring a methyl methacrylate mixture between two lites (plates) of glass, giving the sheet a smooth, glass-like surface. Cell cast sheets are made one by one and cured in ovens.

There can be slight inconsistencies in the thickness of the sheet from one end to the other because of the contraction and weight of the material during the curing process. Cell cast acrylic provides the clarity of glass at half the weight and four times the impact resistance.

Continuous Cast

The manufacturing method for continuous cast utilizes the same material as cell cast, with the material poured between two stainless steel conveyor belts. Less expensive than cell cast, it offers more uniform thickness, but less clarity.

Continuously Manufactured

An economically priced acrylic sheet with optical properties close to cell cast and uniform thickness.

The manufacturing process involves feeding polymethyl methacrylate pellets into one end of an extruder. The pellets are heated to liquid, extruded through a die for an exact thickness, then laid on highly polished rolls to change from a liquid to a solid state. The polished rolls simulate the smoothness of glass, resulting in its high-grade optical properties.

Continuously manufactured acrylic also offers an excellent surface quality, free of pitting and internal contaminants.

Extruded

The manufacturing method is like continuously manufactured sheeting, except the melted liquid is pulled out of the die at a given rate. The combination of pulling and die opening determines the sheet's thickness. The least expensive of the acrylic sheets, optics and thickness are not as consistent as in other methods of manufacturing.

Thickness of acrylic sheet ranges from 0.060 inches up, depending on formulation. Cell cast sheet is produced in sizes as large as 72 inches by 96 inches; continuous process sheet is available on reels in widths up to 100 inches and lengths up to 500 feet.

Acrylic sheet is supplied either as preshrunk or unshrunk sheet. Unshrunk sheet will shrink about 2% in length and width, and will increase in thickness by about 4% when heated to forming temperatures and cooled unrestrained. This shrinkage factor must be considered when cutting sheet blanks for thermoforming. Preshrunk sheets undergo little or no shrinkage on heating and cooling.

With any of these types of acrylic sheet you can specify ultraviolet filtering, glare-free / matte finish or abrasion-resistant coating. Ultraviolet filtering will help keep UV light from harming any materials subject to fading or aging. UV radiation, water and oxygen are key components in a chain reaction that causes color breakdown and material deterioration. The biggest advancement in acrylic technology has been ultraviolet-filtering additives which block the harmful UV rays.

None of these value added features cause loss of light transmission or a shift in color. In fact, these are only two of the many misconceptions about acrylic. While some plastics will yellow over time when exposed to the weather, acrylic sheet will not. It is inherently a weather-resistant plastic.

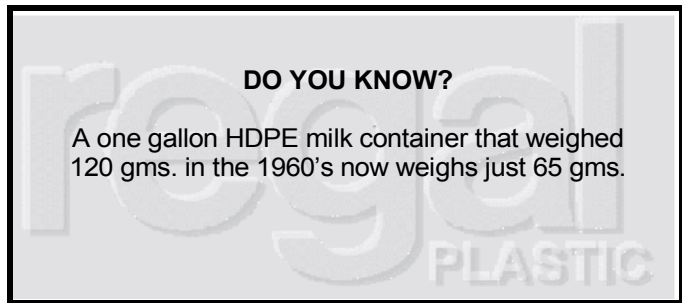
While handling can dull acrylic sheet, the material itself does not haze or film over. Dulling is created by abrasion from constant, improper cleaning or touching, which produces tiny hairline scratches. However, if you use proper cleaning techniques and materials, acrylic will retain its clarity for life.

Knowing which manufacturing process and value-added features to request, you can order the acrylic sheeting that suits your application best which saves time and money.

[For detailed information on acrylic products and availabilities see Acrylic Section, pages 10 - 41.](#)

DO YOU KNOW?

A one gallon HDPE milk container that weighed 120 gms. in the 1960's now weighs just 65 gms.



POLYCARBONATE

Polycarbonates are tough, transparent, engineering thermoplastics with high molecular weight and impact strength. They have good electrical and insulating characteristics, and are normally not affected by greases, oils or acids. They can, in unreinforced states, withstand temperatures as low as -65°F, and once molded, be exposed to boiling water without dimensional changes of more than 0.001 in. / in. after being returned to room temperature.

Polycarbonate resins are available in a variety of formulas including those for molding, extruding and blow molding. Grades with improved chemical resistance and those with special coatings are also available, as well as structural-foam, glass-reinforced, flame-retardant, and FDA approved grades.

Polycarbonate extruded sheets are used for a wide variety of applications. These sheets can be tinted and cold-formed to tight radii or thermo-formed to complex shapes.

Polycarbonate sheets have 250 times the impact strength of glass, and 30 times the impact of acrylic. They have 40% better thermal efficiency than glass, and lower maintenance costs than both glass and acrylic.

[For detailed product information and availabilities see Polycarbonate Section, pages 47 - 65.](#)

ABS

ABS is an amorphous resin and a terpolymer. It is manufactured by combining three different compounds: acrylonitrile, butadiene and styrene. It has good tensile strength, dimensional stability, surface hardness, rigidity, electrical characteristics, and it is heat, chemical and abrasion resistant. In addition, it has good impact strength even at temperatures as low as -40° with some special grades.

Other grades are available, including those which are platable, heat resistant and flame retardant. There are also grades for injection molding, extrusion, blow molding, foam molding, and thermoforming.

[For detailed product information and availabilities see ABS Section, page 84.](#)

DO YOU KNOW?

The number of plastics recycling businesses has nearly tripled over the past several years, with more than 1,700 businesses handling and reclaiming post-consumer plastics.

PLASTIC

GRAPHIC ARTS PRODUCTS

PVC Sheet ■ Gatorcel® ■ Kömmerling Products

Gatorcel® is manufactured by and a registered trademark of International Paper Company.

Gatorcel®

This board, which is all rigid PVC foam, is designed for photomounting, signs, exhibits and displays. It has a scratch and fade resistant surface, and it can be heat bent, blow-formed, molded and vacuum-formed. It can be sawed, punched, drilled, sanded, or die-cut using standard tools. It can be laminated using common adhesives or hot-air and heated-tool welding methods. It can be screen printed and will accept acrylic and vinyl paint and vinyl lettering. It is available in white plus six colors, in 4' x 8' sheets and thicknesses from 1mm to 6mm.

Kömmerling has been manufacturing rigid PVC sheets for more than 30 years. Their PVC sheet products include Kömacel®, and Kömatex®.

Kömacel®

An integral skin-foam sheet made of rigid PVC that has a sandwich-like structure, it has a cellular core and a smooth, solid skin with a silk gloss finish up to 2mm thick that can be printed and bonded. Used outside with no pre-treatment, Kömacel® is weather, light, chemical, rot and corrosion resistant. Meeting UL94-VO standards for flammability, this product has a low rate of water absorption, is light weight, and has high flexural strength and insulation resistance. Available in white only.

Typical Applications:

Advertising

- Signs
- Displays
- Shop window decorations
- Exhibition stands

Building Sector

- Shop fitting
- Interior decorating for humid rooms, like bathrooms
- Heat and sound insulation
- Cladding
- Window and parapet elements
- Roller shutter boxes
- Door panels

Electrical Industry

- Control cabinets
- Cable and wire channels
- Control panels

Miscellaneous

- Containers
- Apparatus
- Models
- Equipment for photographic laboratories
- Electroplating

Kömatex®

This sheet has a fine-celled foam structure and a closed-cell matt surface. It conducts very little heat, provides excellent insulation, and has a low flammability, UL94-VO rating. White sheets can be used outdoors. Applications include displays, exhibition stands, cladding, and advertising. Other colors available are: light grey, grey, beige, red, green, dark yellow, yellow, dark blue, blue, black, teal and purple.

PRODUCT AVAILABILITY

Product	Sheet Gauge	Sheet Sizes
Kömacel®	5/32" - 1/4" 3/8"	4' x 8'
	3/4"	3' x 10'
	5/32" - 1/4" 5/16" 3/8" 1/2" 3/4" 13/16" 1"	4' x 10'
	3/8"	5' x 10'
white		
Kömatex®	3/8" (density 0.5 g/cm ³)	4' x 10'
	5/16" - 3/8" (density 0.5 g/cm ³)	5' x 10'
	5/128" - 1/4" (density 0.7 g/cm ³)	4' x 8'
	5/128" - 1/4" (density 0.7 g/cm ³)	4' x 10'
	5/46" - 1/4" (density 0.7 g/cm ³)	5' x 10'
white		
	1/8", 1/4"	4' x 8' 4' x 10'
light grey, grey, beige, red, green, dark yellow, yellow, dark blue, blue, black, teal and purple		

GRAPHIC ARTS PRODUCTS

PVC Sheet ■ SINTRA®

Sintra® material is a registered trademark of and manufactured by Alusuisse Composites, Inc.

CHEMICAL RESISTANCE

SINTRA® Material

A rigid, foamed, closed-cell polyvinyl chloride (PVC) material, this product has a high strength-to-weight ratio, is chemical resistant, and has a UL 94 V-0 rating. Used extensively in the screen printing, display and exhibit, and signage industries, this product requires no special tools or equipment for fabrication. In most cases painting or screenprinting does not require priming.

Note: Extremely hot temperatures will soften the material which lends it to easy fabrication by industrial hot blowers. Cold temperatures cause brittleness, a typical characteristic of PVC materials.

Substance	Effect
Weak Acids	None
Strong Acids	None
Weak Alkalies	None
Strong Alkalies	None
Organic Solvents	Resists Some
Oils and Greases	None

Property	ASTM Test (If Applicable)	Unit of Measure	Values			
			1-6mm*		10 and 13mm**	
Density and Hardness:						
Specific gravity	ASTM D-792	g/cc	0.70		0.50	
Apparent density	ASTM D-1622	lb/ft ³	44		31	
Shore hardness	ASTM D-2240	"D"	66		78	
Stress-Strain/Flexural:			Machine Direction	Transverse Direction	Machine Direction	Transverse Direction
Tensile strength	ASTM D-792	PSI	2,850	2,070	1,460	1,450
Elongation at break	ASTM D-638	%	38	37	36	45
Flexural modulus	ASTM D-790	PSI	235,000	190,000	160,000	115,000
Flexural strength	ASTM D-790	PSI	5,000	3,900	3,550	2,570
Performance at Elevated Temperature:						
A. Dimensional change 120 min. at 158° F. 75 min. at 284° F.	ASTM D-1042	%	+0.2	+0.4	+0.3	+0.3
		%	+6.3	+2.0	+1.3	-2.1
B. Deflection temperature under load (HDT)	ASTM D-648	F @ 264 PSI	160		162	
Electrical Properties:						
Dielectric strength	ASTM D-149	KV/CM	112			
Surface resistivity	ASTM D-257	ohms	10 ¹⁴			
Volume resistivity	ASTM D-257	ohms cm	2.4 x 10 ¹⁵			
Dielectric constant 50 cps	ASTM D-150		1.9			
Dissipation factor 50 cps TAN	ASTM D-150		0.013			
Water Absorption	ASTM D-2842	% by WT	1.0		1.0	
* Values in table are typical for 4mm						
** Values in table are typical for 10mm						

GRAPHIC ARTS PRODUCTS

Foam Boards Basic Information ■ Bienfang®

The largest part of the styrenics family is polystyrene, which includes both general purpose styrene and high-impact styrene.

Polystyrene is characterized by hardness, excellent dielectric properties, and ease of processing. It is dimensionally stable under normal use and is unaffected by food, drinks and everyday household solutions including acids, oils, alcohol and vinegar. It is, however, effected by citrus fruit rind oil, cleaning fluids, gasoline, turpentine, lacquer thinner, nail polish and remover.

Special grades of general purpose polystyrene are used to make extruded foam sheets and boards for various applications, including graphics. These foam boards can be made entirely of polystyrene, or can have styrene cores coated with materials such as PVC or high grade, poly-coated paper. They come in a variety of densities, thicknesses, finishes and colors, and have different levels of stiffness. While some are bendable, others are not. Although most foam boards are warp and dent resistant, there are varieties which are flame resistant, moisture resistant, and waterproof. Other foam boards are also available in acid-free grades or pre-coated with self or heat-activated adhesive on one side for mounting artwork. Most foam boards can be painted, laminated, screenprinted, and easily cut-to-shape with a variety of tools.

Typical Applications:

- Picture framing and mounting
- P.O.Ps
- Displays
- Exhibits
- Presentations
- Models and prototypes
- Advertising and commercial art
- Decorating
- Signs and graphics
- Temporary outdoor signs
- Theater props and sets
- Window displays
- Trade show exhibit booths
- 3 dimensional shapes
- Letters

Bienfang®

Bienfang® Foam Boards are manufactured by and registered trademarks of the Hunt Corporation. The Bienfang® line of foam boards includes grades that are moisture resistant and chlorofluorocarbon (CFC) free. With a recommended heat range of 180°F - 220°F, they are paintable with acrylics, markers, India inks, water soluble, UV, gloss vinyl and enamel paints as well as screen printing inks. They are available in a variety of sizes and a very large assortment of colors.

Bienfang® Acid-Free Foam Board

Totally acid-free with a chemically inert core, this foam board is faced on both sides with paper having a pH of 7.3 - 8.5 in accordance with the Library of Congress cold extraction methods specifications for non-photographic materials. It is available in 1/8" and 1/16" thicknesses and a variety of sheet sizes.

Bienfang® Black on Black Foam Board

With a black polystyrene foam core and black double-clay-coated surface on both sides, this board is available in 3/16" and 1/2" thicknesses and a variety of sheet sizes.

Bienfang® Colored Foam Board

Colored on one side, this foam board has a polystyrene foam core and double-clay-coated surfaces. Available in 3/16" thickness only, it is available in many colors and a variety of sheet sizes.

Bienfang® 100% Cotton Rag Foam Board

With a 100% cotton rag surface, this sheet is naturally white, acid-free, and contains no lignin, alum, or harsh chemicals. Buffered with calcium carbonate to a pH of 8.2+/- .5, with an alkaline reserve of 2-3%, this sheet is bonded to a chemically inert and non-acidic polystyrene core. Available in 3/16" thickness and a range of sheet sizes.

Bienfang® Pillocore®

This polystyrene core, between white clay-coated surfaces, is designed especially for die cutting. The core resists denting and crushing while compressing to a uniform, closed edge every time it is cut, giving it a "pillowed" look. Other applications include signs, screen printing, and mounting. This material can also be embossed and debossed. Available in 3/16" thickness, a variety of sheet sizes, and in black with a solid black compressible core.

Bienfang® White Foam Board

This has a polystyrene foam core with a white a double-clay-coated surface on both sides, this foam board is available in 1/8", 3/16", and 1/2" thicknesses, and a variety of sheet sizes.

MightyCore®

This rigid core foam board has a smooth paper surface with an underlamine of polyethylene which acts as a moisture barrier to the base paper. Resistant to denting, bending and crushing, it is also free of chloroflourocarbons (CFCs) and formaldehyde. This product is available in white and black on black in 1/4" and 1/2" thicknesses and in a variety of sheet sizes.

Quick Stik® Self-Adhesive Foam Board

This board has a pressure-sensitive, self-adhesive surface on one side for mounting pictures and prints. Once the peel away protective liner is removed the adhesive allows repositioning of the artwork, while firm, uniform pressure will ensure a permanent bond. Available in 3/16" thickness, a full range of sheet sizes, and medium or high tack. Black on Black is available with a medium tack.

Single Step®

This foam board is pre-coated on one side with an adhesive that is activated by the heat of a dry mounting press, eliminating the need for drymounting tissue. The adhesive is compatible with posters, photographs, newspapers and many fabrics.

Note: Not recommended for resin-coated (RC) photographs.

Fome-Cor® is manufactured by and a registered trademark of International Paper Company.

Fome-Cor®

Polystyrene bonded between a variety of sheets of high-quality papers, this foam board can be painted, laminated, screenprinted, dry or cold vacuum mounted, embossed, debossed and knife or die-cut. Applications include photomounting, framing, signs, displays and exhibits. It is available in a wide range of colors and sizes.

Fome-Cor® Xtra

The heavy duty version of Fome-Cor®, it is 1/2" thick and available in sheet sizes of 4' x 8', 5' x 8', and 4'x10'. White only.

Acid-Free Fome-Cor®

An extruded polystyrene foam board bonded between high-quality papers, this product meets the photo-activity tests required by the Library of Congress. Available in 3/16" and 1/8" thicknesses, cream color, and a variety of sheet sizes.

Heat-Activated and Self-Adhesive Fome-Cor®

Both of these products are extruded polystyrene bonded between high-quality papers that can be used for mounting and laminating without additional backing. The Heat-Activated Fome-Cor® is designed to be used with a heated mechanical or vacuum dry mount press or heated roller laminator. The Self-Adhesive Fome-Cor® is used by merely peeling back the release paper and positioning the print on the sticky surface. Heat-Activated Fome-Cor® is available in 3/16" and 1/8" thicknesses. Self-Adhesive Fome-Cor® is available in 3/16" thickness. Both products are available in a wide range of sheet sizes.

JetMount® Board

Designed to meet the specific needs of the digital printing industry, JetMount® consists of a thicker, 1/4", extruded polystyrene foam laminated between 12-point clay-coated white paper liners. Dent and warp resistant, this product is available in black with black core, 1/4" thickness, and sheet sizes of 32" x 40", 48" x 96" and 60" x 96".

GRAPHIC ARTS PRODUCTS

Foam Boards ■ Gatorfoam®

Gatorfoam® is manufactured by and a registered trademark of International Paper Company.

Gatorfoam®

Made of polystyrene foam bonded between sheets of Luxell® wood fiber veneers, this product can be cut with standard saws, laminated, screenprinted and painted with latex, oil base and acrylic paints. Applications include picture mounting, signs, displays and exhibits. Available in 4' x 8' sheets and six thicknesses up to 2". Colors include white or natural with a white core, or black with a black core. Self-adhesive black Gatorfoam® is available in a 3/16" thickness and 48" x 96" sheet size.

Gatorblanks®

Designed for signs, exhibits, displays, and dimensional cut-out lettering, this all polystyrene foam board has a smooth surface that accepts non-solvent inks and water-based paints with a brush, spray gun, or roller. It can be cut and formed with hot-wire cutters, knifeblade saws, Cutawls®, high speed routers, or fine-tooth band saws. Mounting and laminating can be achieved with pressure-sensitive or latex water-based adhesives. Available in white, 48" x 96" sheets in 1" and 2" thicknesses.

Gatorplast®

This board has a polystyrene core bonded between two layers of high-impact, white matte finish sheets of polystyrene. Warp resistant with an optional UV resistant coating, it accepts solvent-based and UV curable inks developed for polystyrene, water-based paints, many acrylics and lacquers with brush, spray gun or roller. Screenprintable without a primer, this product takes vinyl lettering well, and can be cut with routers, table saws, utility knives and matt or glass cutters. Thinner boards can be guillotined or die-cut. Applications include signs, exhibits and displays. Available in white with a white core or black with a black core in 4' x 8' sheets in thicknesses of 3/16" to 2".

FOAM BOARDS AVAILABILITIES

The following availability information is intended as a general reference only. Most foam boards may be purchased in these sizes, however, availability varies with manufacturer. Custom sizes are available.

- Lengths 20" to 144"
- Widths 16" to 48"
- Thickness 1/16" to 4"

Rigid styrene is available in white or colors and in sheet sizes of 48" x 72" or 96".

DO YOU KNOW?

In the 1940s plastic putty was developed. Impervious to rot and unable to maintain its shape for more than a short period of time, it could be stretched many times its length without tearing. It later was sold under the name Silly Putty® and became one of the most popular toys in history.

Corrugated twin-wall sheet, made from a polypropylene copolymer resin, is lightweight, strong, durable, and outlasts corrugated fiberboard by 20 - 40 times. It is reusable, chemical, stain, mildew, tear and puncture resistant, weatherproof, waterproof and easy to fabricate. Available grades include flame retardant, UV resistant, FDA approved, anti-static and conductive. It is available in 12 standard colors and gauges from 2mm to 10mm with custom colors, gauges and densities available upon request.

Typical Applications:

- Retail, real estate, election, agricultural and yard signs
- P.O. P. displays
- Trade displays
- Greenhouses
- Closet and under-bed boxes
- Mail boxes
- Toys
- Tote boxes
- Special containers
- Models
- Packaging for food, chemicals and flowers
- Ring binders
- Dividers
- Cold frames
- Factory windows
- Shower partitions
- Decorator panels
- Awnings
- Light enclosures
- Pet houses
- Shelf bins
- Presentation cases

10mm Sheet

An extruded, thin wall, fluted sheet, UV stabilized and corona treated, this product is designed for temporary construction signs, reusable pallet sleeves, billboards and slip sheets. It is enamel and vinyl letter receptive and screen printable on both sides. Available in standard colors and the standard size of 48" x 96", as well as custom sizes up to a 104" width.

Packaging Grade

Developed as packaging or storage material for electronics, this grade protects against corrosive gases, electrostatic damage, and benign environmental effects. It is also used to store and protect silver, bronze, tin, copper, brass and ferrous metals. Recyclable, it will break down into polymer dust in anaerobic environments.

Static Dissipative

In addition to the qualities found in the packaging grade, this sheet provides permanent static dissipation, shielding from static electricity pulses, and the most desired range of humidity-independent surface resistivity.

Coroplast®, a registered trademark of the Coroplast Division of Great Pacific Enterprises, is also their tradename for the twin-wall product line they manufacture and market. A sampling of the available grades are listed below.

Coroplast® Archival Grade

This fluted sheet has no coloring agents, anti-static or ultraviolet inhibitors. It is resistant to water, oils, and solvents at room temperature, and it can be used on a long-term basis with no out-gassing. It should not, however, be used outdoors, as it is not UV resistant. Applications include backing, mounting, and fabricating containment enclosures.

Coro-Gard®

A conductive sheet designed for the packaging and transportation of sensitive electronic devices that need to be protected from electrostatic damage, this product meets DOD-HDBK-263 for material conductivity and decay time. Meeting the guidelines of the Electronics Industries Association standard IS-5-A, and USAF criteria for MIL-P-83668 for physical properties of corrugated plastic sheet, it is chemical resistant, moisture proof, and has a surface resistivity of 10^{10} Ohm / sq.

GRAPHIC ARTS PRODUCTS

Coroplast® ■ PETG

PRODUCT AVAILABILITY

Product	Gauge	Sheet Size	Color
Coroplast® Archival Grade	*2mm - 6mm	54" - 104" width	
Coro-Gard®	See Distributor for Current Availability		
Coroplast® 10mm	10mm	48" x 96" Custom widths to 104"	**All Standard Colors
Coroplast® CI	See Distributor for Current Availability		
Coroplast® SI	*2mm - 10mm	54" x 96" 80" x 96"	Black

* 2mm is available in 54" width only.

** White, Natural, Ivory, Yellow, Brown, Red, Orange, Blue, Gray, Green, Black, Dark Blue

PETG or Copolyester, is a clear amorphous thermoplastic material with high impact strength. A very stiff, hard, and tough material, it is easily die, saw, or laser cut, drilled or fabricated. PETG is available as extruded sheet, film, rod, tubing, and profile shapes. Extruding PETG with additives provides a tinted, translucent, or opaque product. Co-extruding with similar or compatible copolymers brings a variety of value-added materials to the PETG market.

PETG can be blow or injection molded, thermoformed at low temperatures with reduced cycle times, and cold-formed without crease whitening. In medical applications it can be sterilized by gamma radiation, E-beam and ethylene oxide methods without discoloration. This material is FDA certified for food industries, and a variety of PETG sheet and film products have obtained other regulatory ratings such as those tested by Underwriters Laboratories (UL). Flammability testing has yielded a UL94 V-2 rating in .118" thickness and UL94 HB in .045" thickness.

PETG is widely used for the following types of applications:

- Packaging for shampoos, detergents, toiletries, mineral oil, food products, electronics, etc.
- Blister packaging
- P.O.P. displays
- Channel letter faces
- Canopies
- Indoor and outdoor signs
- Tote bins, covers, and trays
- Store Fixtures
- Face shields

[See PETG Section, pages 42 - 46 for specific product information and availabilities.](#)

DO YOU KNOW?

1950 - Bachmann Bros. of Philadelphia coins the trademark 'Plasticville USA' for their line of injection-molded styrene homes, building and accessories for Lionel and American Flyer trains.

Regal Graphics, a division of Regal Supply Company, custom converts film for a variety of applications and offers custom laminating and pre-masking upon request.

Low Density Polyethylene Banner Films

These thin gauge films are used primarily for banners, pennant flags, and general P.O.P. signage.

Poly-Print I Grade: 103.24

This solid white, single-sided film is an economical polyethylene banner film providing outstanding lay-flat quality, and corona treatment allowing excellent ink adhesion. Although designed primarily for interior use, this material may be used for temporary exterior applications.

Poly-Print Colors

The colored version of Poly-Print I available in Goldenrod Yellow, Barn Red, True Blue and Coal Black.

Poly-Print Plus Grade 604.14

A value-added version of Poly-Print I, this film was designed primarily for tight tolerance printing. It has low shrink (no preshrinking needed), better lay-flat performance, a lower slip level of less than .5 COF, and a high treat (surface) level not to be lower than 40 dynes.

Strata-Print II Grade: 9022W0

A 100% opaque, shadow-free material, this film is the premium of the polyethylene banner films. Manufactured of three film layers, this product offers high tear strength and two-sided corona treatment.

Corona Treating and Dyne Level

The corona treating process transforms the surface molecules of the sheet, oxidizing them (adding electrons). This increases the surface tension (also known as surface energy, wetting tension, or wettability) of the substrate.

There are three common methods to test surface tension or wettability of plastics.

- **Dyne Pen or Marker Method.** This method is the easiest to use and the least accurate. If the surface tension of the material is compatible with the ink, in the pen, the pen can "write" on the plastic. In the process of this writing, however, the pen picks up contaminants from the surface of the plastic, such as dust and oils. These pens can quickly dry out, concentrating the ink and changing its surface tension.

- **Calibrated Solution Method.** This method involves applying a calibrated solution to the material with a sterile applicator. If the solution beads upon two seconds, the surface tension of the material matches that of the solution. The surface tension reading can be affected by contamination of the fluid, caused by not using a new applicator for each fluid application and the fluid can quickly evaporate if the cap is left off or is not tightly closed. There is a high potential for inaccuracy in the use of this method. In recent testing conducted by the Flexible Packaging Association technical committee, the range of dyne solution measurements of identical material taken by different labs varied by as much as 15 dyne/sq. cm.

- **Contact Angle Meter Method.** This method was designed to eliminate the vagaries of the dyne pen and the calibrated solution methods. A drop of double-distilled, ultrapure water is applied in a very precise amount by pipettor to the surface of the sheet. Using the half-angle measurement methods, the angle from the apex of the drop to the surface of the material is the contact angle with the material. A lower contact angle means that the drop is flatter, indicating a higher surface tension on the surface of the material. Surface tension on a substrate can be determined to within +/- dyne/cm. The benefits of the contact angle meter method include a high level of repeatability and accuracy, easy correlation with dynes/cm., data for statistical process control, and the elimination of judgement calls.

GRAPHIC ARTS PRODUCTS

Film ■ Banner

BANNER FILMS PHYSICAL PROPERTIES

Properties	ASTM Test Method	Unit of Measure	103.23 Poly-Print I @ 1.25 mil	604.14 Poly-Print Plus @ 1.0 mil	9022W0 Strata-Print II @ 7.7 mil
Optical Properties					
Gloss 45 deg.	D-2457	%	73	75	24.6
Haze	D-1003	%	5	4	0
Physical Properties					
Impact, Dart Drop F50	D-1709	gms/mil	70	52	620
Retention after crease		%	50		
Tensile Strength - Ultimate	D-882	psi			
MD			3500	3900	3720
TD			2600	2700	3265
Elongation - Ultimate	D-882	%			
MD			380	340	1080
TD			600	650	1650
1% Secant Modulus	D-882	psi			
MD			22000	29300	34975
TD			22800	36200	38335
COF (Slip)	D-1894		.2 - .5	> .5	.40 - .425
Corona Treatment		Dynes/cm	Over 40 Dynes	Over 40 Dynes	Over 40 Dynes

PRODUCT AVAILABILITY

Film	Gauges (inches)	Standard Roll Widths	Colors
Poly-Print I	.008	39" and 54"	White
Poly-Print Colors	.008	50"	Goldenrod Yellow Barn Red True Blue Coal Black
Poly-Print Plus	.010	39", 50", 51", 54"	White
Strata-Print II	.008	39" or 54"	White

GRAPHIC ARTS PRODUCTS

Film ■ Cellulose Acetate ■ Cellulose Acetate Butyrate

Cellulosics are semi-synthetic plastics made from the natural fiber cellulose which comes from dried wood, jute, flax and hemp. Two of the resins used for plastic production are cellulose acetate and cellulose acetate butyrate (CAB). The plastics produced from them are commonly referred to as acetate and butyrate.

Cellulose acetate is designed for applications which require optical clarity and good rigidity. It is available in cast and extruded clear sheets and film including adhesive-backed film for laminating jobs.

Acetate sheet has good impact resistance over a wide range of temperatures, and does not craze or crack under normal stresses. Acetate responds to forming by all conventional thermoforming methods. Printable by gravure, letterpress, flexography or screenprinting, it can also be die-cut, beaded, punched, stitched, embossed, laminated and cemented.

Typical Applications

- Cable wrap
- Index tabs
- Report covers
- Book covers
- Page protectors
- Playing cards
- Window envelopes
- Face shields
- Flashlight lens
- Photo albums
- Campaign buttons
- Shims
- Release films
- Toys and games
- See-thru containers
- Blister packaging
- Laminating jobs
- Artist layouts
- Magnetic tape industry
- Motion picture industry

Because cellulose acetate decomposes under ultraviolet rays, it has been modified by using butyric and acetic acids to created cellulose acetate butyrate (CAB). CAB is not only more resistant to ultraviolet rays, but is also less moisture absorbing and has extremely high impact strength.

Typical CAB Applications

- Data-processor and cash register keys
- Transparent dial covers
- Tool handles
- Covers for instrument panel lights
- Architectural drafting templates (green tinted, thin gauge butyrate sheet)
- Pens, switch covers and knobs (opaque formulas of butyrate)

PRODUCT AVAILABILITY

Product	Sheet				Roll		
	20" x 50"	22" x 51"	25" x 40"	50" x 76"	40" x 50'	40" x 100'	40" x 200'
Acetate - Cast	.003		.003		.003	.003	.003
	.005		.005		.005	.005	.005
	.0075		.0075		.0075	.0075	.0075
	.010		.010		.010	.010	.010
	.015		.015			.015	
	.020		.020			.020	
Acetate - Extruded	.020	.015					
	.030	.020					
	.040	.030					
	.050	.040					
	.060	.050					
		.060					
Acetate - Adhesive Backed	.005		.005				
Also available in a range of smaller pre-cut sheets.							
CAB - Clear		.010		.060*		.003	
		.015		.080		.005	
		.020		.100		.0075	
		.030		.125*		.010	
		.040		.150			
				.187*			
			.250*				
CAB - Pressed Polished Clear	.003						
	.005						
	.0075						
	.010						
	.015						
	.020						
CAB - Matte Finish						.003	
						.005	
						.0075	
						.010	

*Also available in 50" x 100" sheet.

GRAPHIC ARTS PRODUCTS

Film ■ Polycarbonate ■ LEXAN® Film Basic Information

GE Plastics' Structured Products Division manufactures engineered film products for a wide range of industries. Included are graphic (uncoated), colored, coated, flame-retardant and specialty films.

LEXAN® polycarbonate films offer a wide range of features including clarity, dimensional stability, toughness, flexibility, heat resistance, and excellent dielectric performance. The versatile performance and fabricating features of these GE products suggest a variety of applications including nameplates, packaging, cable wrapping, automotive instrument clusters, membrane switch overlays, metallized films, and in-mold decorating, to name only a few. In addition, LEXAN films are more economical, simple to process and significantly more versatile than metal. With a wide availability range of standard and high-performance grades in a variety of surface finishes and textures, LEXAN films offer numerous design options.

PROCESSING OPTIONS

- Selective texturing provides enhanced mar resistance, low glare and design flexibility.
- Embossing in a variety of configurations for tactile identifications or decoration.
- Dead-front graphics for crisp, clean and highly readable displays.
- Transparent colors for design flexibility and cost-effective production of LED/LCD windows and backlit displays.
- Sharp, high-precision die-cutting.
- Deep-draw thermoformable.

SURFACE TEXTURES

Polished - Particularly good for LED / LCD windows, this is designed to have a defect-free surface with true-ink-color fidelity and optics. It also provides a primary substrate finish for screen printed applied selective textures.

Matte - Good for dead-front graphics, this has reduced surface reflection and gloss to hide filaments and eliminate hot spots in back-lit applications.

Fine Matte - Designed to eliminate pinholing, this has an optional texture for light diffusion and printability (while providing more uniform cut sheets.)

Velvet - For heavy-use applications, this hides scratches, fingerprints and marring while acting as a diffuser for windowed or back-lit applications.

Suede - Abrasion resistant, this was designed for very heavy-wear applications.

LEXAN Film Features	Screen Printer Benefits	End-User Benefits
Clarity	Virtually haze-free, regardless of thickness. Shows true color in reverse printing regardless of gauge.	Excellent for LED/LCD windows. Protects second-surface printing, even in heavy gauges.
Printability	Easily screen printed with no surface preparation or special inks required. Compatible with many UV and conventional solvent-based inks.	Offers unlimited possibilities to achieve a variety of graphic effects. Allows intricate graphic designs.
Heat Stability	Allows close-tolerance registration after repeated heat and drying cycles.	Permits close proximity to illumination sources. Excellent in-use performance to 270°F (Continuous Use Temperature of 185°F).
Textures	Abrasion-resistant and anti-reflective textures resist scratching during processing and help reduce static-related problems.	Prevents marring and excessive glare.
Flammability	LEXAN graphic films have various UL ratings and FR rated (UL94* V-0 and VTM-0) films are available.	Compliance with UL and other flammability codes.

LEXAN® Uncoated Graphic Films

Meeting or exceeding industry performance specifications, LEXAN uncoated graphic films exhibit the following properties:

Gauge Tolerance:	0.020" and up	+/-3%
	0.010" - 0.015"	+/-5%
	0.007" and below	+/- 10%

Color Consistency: Reduced yellow variability by 30%

Texture: Improved RMS variability by 20%

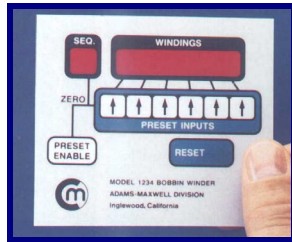
The following products provide high heat and dimensional stability, two-sided printability, and are easily embossed, formed, die-cut, and decorated by hot stamping, flexography, offset lithography, rotogravure, and letterpress technology.

LEXAN® 8010 Film

LEXAN® 8010 film is a polished both sides, transparent film providing clarity and distortion-free optics in all gauges. (C.U.T. of 185°F)

Typical Applications:

- Graphic arts
- Control panel overlays
- Remote control overlays
- LED / LCD and backlit windows
- Labels / nameplates
- Automotive instrument clusters
- HV / AC overlays
- In-mold decorating

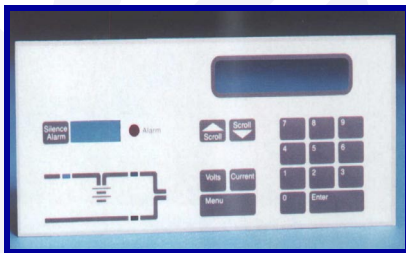


LEXAN® 8020 Film

Polished both sides, this colored transparent film provides clarity and distortion-free optics in all gauges. (C.U.T. of 185°F)

Typical Applications:

- Appliances
- Membrane switch overlays
- In-mold decorating
- Thermoformed parts
- Business equipment
- Automotive applications



LEXAN® 8A13 Film

LEXAN 8A13 film is a one-side matte, one-side polished, transparent film with excellent clarity in all gauges and a use performance temperature to 270°F (C.U.T. of 185°F).

Typical Applications:

- Floor graphics
- Labels / Nameplates
- Control panel and remote control overlays
- Multi-layer printing
- LEDs
- HVAC overlays

LEXAN® 8A13F Film

This transparent film is fine matte one-side, polished one-side, with excellent clarity in all gauges. The mar-resistant, fine matte texture helps prevent excessive glare and eliminate pinholes in backlit applications. Like LEXAN 8A13 film, this film has a working temperature up to 270°F (C.U.T. of 185°F).

Typical Applications:

- Automotive instrument clusters
- Labels/nameplates
- Control panel, remote control, HVAC, and appliance overlays
- LEDs
- Office environments
- Backlit windows
- In-mold decoration
- Floor graphics

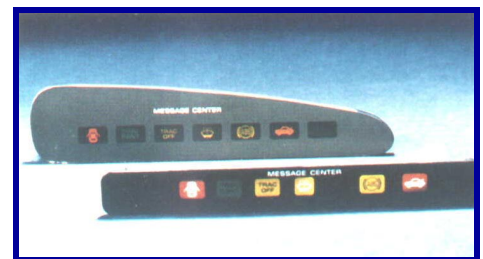


LEXAN® 8A35 Film

This uncoated film has a polished one-side, velvet one-side surface that acts as a diffuser for windowed or back-lit applications and helps prevent excessive glare. (C.U.T. of 185°F).

Typical Applications:

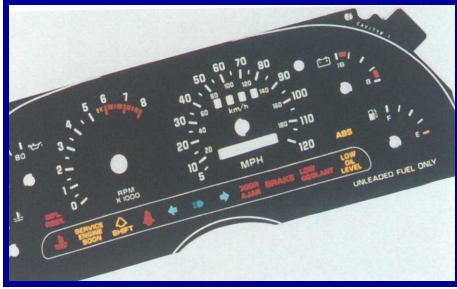
- Office environments
- HVAC, control panel and remote control overlays
- High performance labels
- LEDs
- In-mold decoration
- Automotive instrument clusters



GRAPHIC ARTS PRODUCTS

Film

■ LEXAN® Film



The following products provide two-sided printability, are easily embossed, formed, and die-cut, and allow decoration by hot stamping, flexography, offset lithography, rotogravure, and letterpress technology with no special inks required.

LEXAN® 8B35 Film

LEXAN® 8B35 film is a one-side velvet, one-side matte film offering consistent surface resistance after coating. The velvet texture provides a mar-resistant surface and prevents excessive glare.

Typical Applications:

- Labels and nameplates
- LEDs
- Automotive applications
- In-mold decoration

LEXAN® 8B35F

LEXAN 8B35F film, velvet / fine matte finished, is widely used in the architectural sign industry. Meeting ADA requirements for Americans with Disabilities Act compliant signage incorporating Grade 2 Braille and tactile lettering, this film can be screenprinted, embossed and second surface decorated with graphics subsurfaced and protected from wear behind the clear LEXAN film. Once decorated and embossed, the film can be laminated via transfer adhesive to thin-gauge sheet, styrene or other substrate for depth and rigidity.

LEXAN® 8B36 Film

This film is one-side suede, one-side matte with excellent clarity and properties for embossing and die-cutting. Recommended for heavy wear appliances, this film resists abrasion.

Typical Applications:

- Overlays
- LEDs
- Backlit windows
- In-mold decoration
- Labels / nameplates

LEXAN® High-Performance Coated Films

Designed for the most demanding applications, these hard-coated films are manufactured in grades that provide chemical and abrasion resistance. They are available in four gloss levels that range from matte to glass-like. LEXAN HP12X film is low gloss and matte/polished surfaced; LEXAN HP40X film has a medium gloss and a fine matte/polished surface; LEXAN HP60X film is medium-high gloss with ultra fine matte/polished surface; LEXAN HP92X film has a high gloss and is polished/polished surfaced.

LEXAN® HPXXH Films (HP12H, HP40H, HP60H, HP92H)

These high performance, coated films offers the highest chemical and abrasion resistance in the GE graphic film line. They have extreme coating durability, chemical resistance to most household cleaners including Wisk and Formula 409, and excellent clarity and gloss.

Note: This film cannot be first surface printed with graphics or textures.

Typical Applications:

- Appliances
- Medical diagnostic equipment
- Communication and business equipment

LEXAN® HPXXS Films (HP12S, HP40S, HP60S, HP92S)

These are high-performance coated films. Along with high durability, they are abrasion resistant and can withstand chemicals such as Wisk* and Formula 409*. Offering first and second-surface printability, they can be decorated through hot stamping, flexography, offset lithography, screenprinting, rotogravure and letterpress technology.



Typical Applications:

- Appliances
- Industrial nameplates
- Business and communication equipment
- Medical and diagnostic equipment
- Automotive interior overlays
- LCD lenses

LEXAN® HPXXW Films (HP12W, HP92W)

Chemical, abrasion, and UV resistant, these high-performance, coated films are designed for outdoor applications. Second surface printable, they can be easily formed and die cut as well as decorated.

Typical Applications:

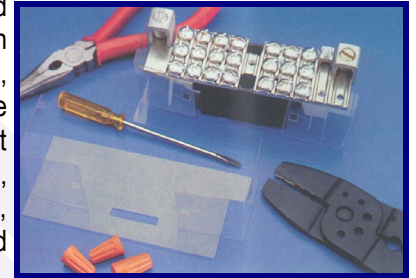
- Warning labels on outdoor equipment
- Gasoline pumps
- Marine graphics
- Outdoor menus and lenses.

First surface printability is available with HP92WP.



LEXAN® Flame Retardant Films

LEXAN® flame retardant films have UL94 V-0 or VTM-0 ratings, are chemical resistant, with excellent dielectric strength, low moisture absorption and high dimensional stability. Printable and available in a selection of textures and gauges, these films can be decorated by hot stamping, flexography, offset lithography, rotogravure and letterpress technology.



Typical Applications:

- Displays
- Nameplates
- Electrical insulation
- Circuitry substrates
- Film based EMI / RFI shields

LEXAN® FR-60 Film

With a two-sided polished surface, this film has a high working temperature range, good puncture resistance and is flame retardant with a UL94-V-0 rating.

Typical Applications:

- Power supply insulation
- Electrical/electronic insulation
- Business equipment insulation
- EMI/RFI shielding with metal foil laminate

LEXAN® FR-63 Film

This film has a one-side matte, one-side polished surface and has the identical properties and recommended applications of LEXAN FR-60 film.

LEXAN® FR-65 Film

This film also has all of the qualities listed for LEXAN FR-60 film, with a one-side velvet, one-side matte surface.

Typical Applications:

- Power supply insulation
- Electrical/electronic insulation
- Business equipment insulation

GRAPHIC ARTS PRODUCTS

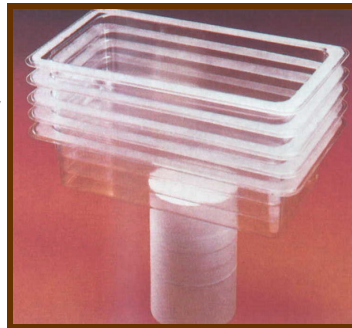
Film ■ LEXAN® Film

LEXAN® FR-66 Film

A one-side suede, one-side matte surfaced film providing all the characteristics listed for LEXAN® FR-60 film.

Typical Applications:

- Power supply insulation
- Electrical/electronic insulation
- Business equipment insulation



LEXAN® FR-83 Film

With a rating of UL94 VTM-0 and all of the listed properties of LEXAN FR-60 film, this film has a one-side smooth, one-side ultra fine matte surface.

Typical Applications:

- Electrical/electronic insulation
- Business equipment insulation
- Power supply insulation
- Disc drive insulation

LEXAN® FR-700 Film

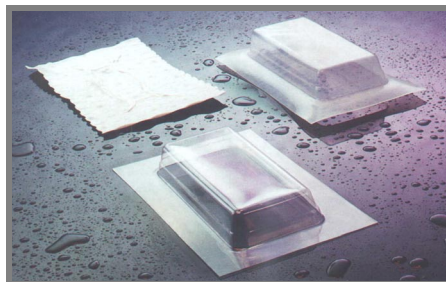
Flame resistant with excellent electrical and thermal properties, this black opaque film has high dielectric strength, with good puncture and tear resistance. Available with a UL94 V-0 rating and one-side velvet, one-side fine matte surface.

Typical Applications:

- Electrical/electronic insulation
- EMI/RFI shielding with metal foil laminate
- Business equipment insulation
- Power supply insulation
- Disc drive insulation

LEXAN® Specialty Films

UV-stabilized and FDA-compliant grades of LEXAN films are available for the wide variety of applications where clarity, impact strength, and high-temperature performance is required. These films have good dimensional stability, heat resistance, are easily die-cut, two-side printable, and thermoformable.



LEXAN® 8030 Film

Offering deep draw thermoformability and distortion-free optics, Lexan® 8030 film is UV stabilized and available in clear and custom colors.

Typical Applications:

- Industrial thermoforming
- Embossing for decoration and function
- LED /LCD and backlit windows

LEXAN® 8040 Film

Offering deep draw thermoformability and distortion-free optics, LEXAN 8040 film is FDA compliant, non-UV stabilized, and can withstand steam, EtO and gamma sterilizations.

Typical Applications:

- Industrial thermoforming
- Medical packaging
- Medical diagnostic strip
- Embossing for decoration and function
- In-mold decoration

PRODUCT AVAILABILITY

PRODUCT	SURFACE FINISH	GAUGE (INCHES)	ROLL WIDTHS
8010	Polished / Polished	.005 .007 and .010 .015 and .030	36" 36" and 48" 36", 48", 60"
8020	Polished / Polished	.010 .015 - .030	36" and 48" 36", 48", 60"
8A13	Matte / Polished	.005 - .025	36" and 48"
8A13F	Fine Matte / Polished	.010 - .020	36" and 48"
8A35	Velvet / Polished	.005 - .007 .010 - .030	36" 36" and 48"
8A37	Polished / Brushed		contact distributor for current availabilities
8A73	Polished / Matte		contact distributor for current availabilities
8B35	Velvet / Matte	.003 .005 - .020 .025 - .030	36", 48", 55" 36", 48", 60" 36" and 48"
8B35F	Velvet / Fine Matte	.007 and .010 - .030	36" 36" and 48"
8B36	Suede / Matte	.010 - .020	36" and 48"
8030	Polished / Polished	.007 and .010 .015 - .030	36" and 48" 36", 48", 60"
8040 (masking optional)	Polished / Polished	.015 - .030	36", 48", 60"
8040 (with masking)	Polished / Polished	.007 and .010	36" and 48"
HP12 S,H,W HP40 S or H HP60 S or H HP92 S, H, W, WP	Matte / Polished Fine Matte / Polished Ultra Fine Matte / Polished Polished / Polished	.007-.030 .007-.030 .007-.030 .007-.030	48"
FR60	Polished / Polished	.010 .015-.030	36" and 48" 36", 48", 60"
FR63	Matte / Polished	.010-.025	36" and 48"
FR65	Velvet / Matte	.010 .015-.020	36" and 48" 36", 48", 60"
FR66	Suede / Matte	.010-.020	36" and 48"
FR83	Polished/Ultra Fine Matte	.002-.007	36"
FR 700	Velvet / Fine Matte (black)	.010, .017, .020, .030	36" and 48"

PHYSICAL PROPERTIES

SPECIFIC GRAVITY/AREA FACTOR

Specific gravity is related to the density of the film. The values for standard LEXAN® film and flame-retardant FR60 film are 1.20 and 1.32, respectively.

LIGHT TRANSMISSION

Most LEXAN films transmit 90% of visible light and are somewhat opaque to ultraviolet light.

Long term, direct solar exposure, is not recommended without additional protection to reduce chalking of the film surface.

Where ultraviolet transmission is desired, LEXAN 8040 film should be specified. For maximum ultraviolet opacity use LEXAN 8030 film.

LEXAN HP "S" and "H" films do not contain UV absorbers. This allows some curing of UV inks through the film. Exposure of the film to excessive high-energy UV light may result in yellowing of the "S" and "H" series films. LEXAN HP92W film is UV stabilized and resists yellowing.

MECHANICAL PROPERTIES

TENSILE PROPERTIES

Tensile strength, elongation and modulus are properties that describe the behavior of the film in tension. At room temperature, typical values for LEXAN film are:

- Tensile Yield Strength 8,500 psi
- Tensile Strength at Break 9,000 psi
- Elongation (strain) 100%
- Tensile Modulus 300,000 psi

Since LEXAN film is isotropic, these values are similar in both machine and transverse directions.

TEAR STRENGTH

Values for tear initiation (ASTM D1004) for LEXAN film are in the 1.4 to 1.8 lbs/mil range. For tear propagation (Elmendorf Tear Test), the values are 30-55 grams/mil. Consult your nearest Regal Plastic Supply Company distribution center for specific product properties.

FOLD ENDURANCE

When tested on the M.I.T. fold endurance tests (ASTM 643*), LEXAN film varies widely with gauge. One-mil film will survive about 12,000 double folds; 5 mil, 500; and 10 mil, 200 double folds. Consult your nearest Regal Plastic Supply Company distribution center for specific product properties.

*Discontinued ATM.

THERMAL PROPERTIES

THERMAL STABILITY

All thermoplastics undergo mechanical property changes with changing temperature. As an amorphous material, LEXAN film changes slowly and in linear fashion with increasing temperatures up to 300°F (150°C), where the material begins to soften. Softening continues until it melts at about 420°F (215°C).

LEXAN films show relatively little increase in elongation with increasing temperature. The extruded film has an average elongation of 93% at room temperature. This increases to the 120% range at 257°F (125°C).

SHRINKAGE

LEXAN film is non-oriented and amorphous, and very dimensionally stable at elevated temperatures. Exposure to temperatures as high as 275°F (135°C) for short periods (30 min.) result in a negligible change in dimension. Lexan® 8010 film will shrink 1-2% at 300°F (150°C) depending on gauge. Over 300°F (softening temperature), dimensional changes become more pronounced. Dimensional changes due to temperatures may vary from lot to lot.

EFFECTS OF HEAT AGING

LEXAN films exhibit polycarbonate's excellent resistance to oxidative embrittlement. After six months at 167°F (75°C), LEXAN films showed no measurable change in tensile yield and ultimate tensile strength. The tensile yield point and the ultimate tensile strength of the samples tested increased some 10% during six months at 257°F (125°C). Elongation of the same films dropped from an initial average of 97% to a final elongation of 9%. After the six months' aging period none of the film samples tested were brittle enough to crack by creasing. Degradation of optical properties (decreased light transmission, increased haze and yellowness) can also occur after long-term exposure to high temperatures.

LEXAN film should not be exposed on a continuous basis to temperatures exceeding 185°F (85°C).

Low temperatures have little effect on LEXAN film, which remains ductile down to at least -150°F (-101°C).

The effect of high temperatures on LEXAN HP films are similar to those listed above with the exception that a small amount of curl toward the coated side might be evident after high temperature exposure.

Note: LEXAN HP92W film is coated rather than laminated thus avoiding the problems of delamination.

GRAPHIC ARTS PRODUCTS

Film ■ LEXAN® Film

ELECTRICAL PROPERTIES

DIELECTRIC STRENGTH

LEXAN® film provides excellent resistance to breakdown in the presence of high voltage AC stress. All LEXAN films are virtually unaffected by humidity and heat aging. Absolute resistance to high voltage can be determined by multiplying the dielectric strength in volts/mil by the material thickness in mils.

DIELECTRIC CONSTANT

Dielectric constant at 60 Hz ranges from about 2.95 to 3.05 over the range of 32-257°F (0-25°C) for all LEXAN films. Water absorption to equilibrium does not affect this value appreciably.

DISSIPATION FACTOR

Values for dielectric loss, i.e. dissipation and power factors, are essentially the same with LEXAN film. From room temperature to 212°F (100°C), the power factor is approximately 0.001 (0.1%). It increases gradually to 0.002 at 284°F (140°C) and increases sharply beyond 300°F (150°C).

VOLUME/SURFACE RESISTIVITY

LEXAN films exhibit high resistance to DC current both through and across the surface of the film. Both water absorption to equilibrium and heat aging have a negligible effect on these properties.

ARC RESISTANCE

Resistance to high voltage arcing across the film surface varies somewhat with the type of film. Non-flame-retardant grades such as LEXAN 8010 film generally have better resistance to arc breakdown than the flame-retardant grades.

ENVIRONMENTAL PROPERTIES

CHEMICAL RESISTANCE

At moderate temperatures and low stress levels, non-coated LEXAN film is generally compatible with most substances. When stressed in some manner as by cold-forming, flexing or embossing, some substances will cause the film to craze or stress-crack. Elevated temperatures can initiate or accelerate this type of degradation.

Some organic chemicals such as acetone, toluene and halogenated hydrocarbons will act as solvents to LEXAN film. Methylene chloride, for example, is often used to solvent-bond LEXAN films.

In most cases, the coatings on LEXAN HP films will protect the LEXAN film against attack by aggressive chemicals. The edges and uncoated side should not be exposed to the chemicals, particularly in higher-stressed or high-temperature applications.

CHEMICAL EXPOSURE COATED AND UNCOATED FILM

Chemical Class	Effects
Acids (Mineral)	No effect under most common conditions of concentration and temperature.
Alcohols	Generally compatible.
Alkalis	Acceptable at low concentration and temperature. High concentrations and temperatures result in etching and attack as evidenced by decomposition.
Aliphatic Hydrocarbons	Generally compatible.
Amines	Surface crystallization and chemical attack.
Aromatic Hydrocarbons	Solvents and severe stress-cracking agents. Detergents and Sprays Mild soap solutions are compatible. Strongly alkaline materials should be avoided.
Esters	Cause severe crystallization. Partial solvents.
Fruit Juices and Soft Drinks	Compatible at low stress levels. Some concentrates not recommended.
Gasoline	Not compatible at elevated temperatures and stress levels.
Greases and Oils	Pure petroleum types generally compatible. Many additives used with them are not. Thus materials containing additives should be tested.
Halogenated Hydrocarbons	Solvents and severe stress-cracking agents.
Ketones	Cause severe crystallization and stress-cracking. Solvents
Silicone Oils and Greases	Generally compatible up to 185°F.

CHEMICAL RESISTANCE COATED FILM

Chemical	LEXAN HPXXS Film Results		LEXAN HP92W Film Results		LEXAN HPXXH Film Results	
	As Manufactured	Post Cured*	As Manufactured		Continuous Surface Contact @ 73°F (23°C)	
	Continuous Surface Contact @ 73°F (23°C)		Continuous Surface Contact @ 73°F (23°C)		One Hour	Three Hours
Acetone	Failed	Passed	Failed (40 - 45 minutes)		Passed	**
MEK	Failed	Passed	Failed (45 minutes)		Passed	**
Toluene	Failed	Passed	Passed		Passed	**
Methylene Chloride	Failed	Passed	Failed		Passed	**
Isopropyl Alcohol	Passed	Passed	Passed		Passed	Passed
Cyclohexanone	Failed	Passed	Passed		Passed	Passed
Ethyl Acetate	Failed	Passed	Passed		Passed	**
Xylene	Failed	Passed	Passed		Passed	Passed
40% NaOH	Failed	Passed	Passed		Passed	Passed
Concentrated HCl	Passed	Passed	Passed		Passed	Passed
Gasoline (Regular)	Passed	Passed	Passed		Passed	Passed
Gasoline (Unleaded)	Passed	Passed	Passed		Passed	Passed
Butyl Cellulose	Passed	Passed	Passed		Passed	Passed
24-Hour Continuous Surface Contact at 120°F (49°C)						
Coffee	Failed	Passed	Failed (40 - 45 minutes)		Passed	
Top Job ²	Failed	Passed	Passed		Passed	
Fantastik ³	Passed	Passed	Passed		Passed	
Formula 409 ⁴	Failed	Passed	Passed		Passed	
Windex with Ammonia D ¹	Failed	Passed	Passed		Passed	
Wisk ¹	Failed	Passed	Passed		Passed	
Downy ²	Passed	Passed	Passed		Passed	
Spray 'N Wash ²	Passed	Passed	Passed		Passed	
Clorox ⁴	Failed	Passed	Failed		Passed	
Mustard	Failed	Passed	Passed		Passed	
Mr. Clean ²	Passed	Passed	Passed		Passed	
Ketchup	Passed	Passed	Passed		Passed	
Tea	Passed	Passed	Passed		Passed	
Tomato Juice	Passed	Passed	Passed		Passed	
Lemon Juice	Passed	Passed	Passed		Passed	
Grape Juice	Passed	Passed	Passed		Passed	
Vinegar	Passed	Passed	Passed		Passed	
Milk	Passed	Passed	Passed		Passed	

*Post cure conditions: one elliptical focused medium pressure mercury vapor lamp at 300 watts/inch and a conveyor speed of 20 feet/minute.

**A few small coating blisters.

¹ Registered Trademarks of Drackett Products Company.

² Registered Trademarks of Procter & Gamble.

³ Registered Trademarks of Texize, Division of Norton Norwich Products, Inc.

⁴ Registered Trademarks of the Clorox Company.

GRAPHIC ARTS PRODUCTS

Film ■ LEXAN® Film ■ Polycarbonate/PET

EFFECTS OF WATER

No significant changes have been noted in tensile and elongation properties measured on films immersed in water for several weeks. However, boiling water immersion seriously and rapidly affects the elongation of LEXAN® films. The elongation drops from an initial 100% to 50% within a period of four hours. Thereafter, changes are very gradual. The tensile yield and ultimate tensile strength values do not change in any marked degree by film samples being immersed in boiling water for periods up to one week. Long-term immersion in sea water at normal temperatures has no effect on LEXAN film.

PERMEABILITY

Plastic films often have specific resistance to gas and moisture vapor passage important in various packaging applications. Permeability is a function of the diffusion rate, the solubility of the gas in the barrier and the barrier thickness.

PERMEABILITY TO GAS AND MOISTURE

	ml/mil/100 in ² /24 hr/atm
Air	85
Nitrogen	50
Oxygen	300
Carbon Dioxide	1.075
Moisture Vapor (1 mil film)	8 g/100 in ² /24 hr

WEATHERABILITY

Long-term exposure to direct sunlight will cause unprotected LEXAN film to surface chalk (removable) and yellow. The length of time before a noticeable change occurs can be anywhere from several months to several years depending on severity of exposure and thickness of film.

Unprotected LEXAN film is not recommended for outdoor applications where retention of appearance and mechanical properties are required.

For intermittent outdoor exposure or long-term exposure to fluorescent lighting, UV-stabilized grades such as LEXAN 8030 and 8B35 films are recommended.

Polycarbonate/PET Film Regal Tempet

Regal Graphics' proprietary polycarbonate / PET blend film was designed for In-Mold Decorated (IMD)* processing. It has excellent temperature qualities and chemical resistance.

Tempet benefits include:

- Low forming temperature
- Little to no stress created during the forming process
- Better chemical and abrasion resistance than polycarbonate

CHEMICAL RESISTANCE

Chemical Reagent	Appearance	% Change Break Strength	% Change Elongation
None (Control)	No Change	-1	-
Acetic Acid (5%)	Slight Swelling	-66	+34
Acetone	Strongly Swollen	-100	-100
Alpha Butyrolactone	Almost Soluble	-100	-100
Benzyl Alcohol	Soluble	-100	-100
Chlorox Bleach (5%)	No Noticeable Effect	-6	-12
Cyclohexanone	Soluble	-100	-100
Ethanol	No Noticeable Effect	-3	+4
Ethanol/Water (50/50)	No Noticeable Effect	+4	+9
Ethyl Acetate	Strongly Swollen	-100	-100
Gasoline	Slight Swelling	-39	-15
Heptane	No Noticeable Effect	-	-10
Hydraulic Fluid	No Noticeable Effect	-5	-5
Methanol	No Noticeable Effect	-28	-15
Methyl Cellosolve	Slightly Swollen	-45	-1
Methyl Isobutyl Carbinol	No Noticeable Effect	-1	-13
Methyl Isobutyl Ketone	Strongly Swollen	-100	-100
Motor Oil 10W30	No Noticeable Effect	+7	-4
Nitromethane	Strongly Swollen	-100	-100
Prestone Anti-Freeze	No Noticeable Effect	-4	-9
Sodium Hydroxide (10%)	No Noticeable Effect	-8	-14
Sulfuric Acid (20%)	No Noticeable Effect	-	-3
Toluene	Strongly Swollen	-100	-100
Transmission Fluid	No Noticeable Effect	-1	-4
Water	No Noticeable Effect	-3	-5

PRODUCT AVAILABILITY

Film	Surface Finish	Gauge (inches)	Std. Roll Width	Color
Regal Tempet	Matte / Velvet	.007, .010, .015, .020	33"	Natural

*IMD is the process by which an injected or compressed molded part can be decorated during the molding cycle. The decoration is accomplished by the insertion of a decorated film into the cavity of the molding tool and then the plastic resin is injected behind the film. IMD is an accepted alternative method to create injection molded parts with design flexibility, consumer appeal, and style.

GRAPHIC ARTS PRODUCTS

Film ■ Polyester Basic Information ■ VALOX® Film

Polyester Film

Manufactured from polyethylene terephthalate, polyester film is chemical and moisture resistance, with high tensile strength, dimensional stability, and working temperatures to 400°F. It can be coated with heat-sealable, friction or abrasive materials, metalized, punched, dyed and laminated. Heavier gauges of polyester can be stamped or vacuum formed, and lighter gauges can be wound into spiral tubes.

Polyester films come in a variety of opacities such as clear, very clear, slightly hazy, matte, translucent white, opaque white, and black. Produced in several grades, characteristics include UV, oxygen, and static resistant, one or two-side pretreatment for better ink adhesion, heat stabilized, slip treated, and fire retardant.

Typical Applications:

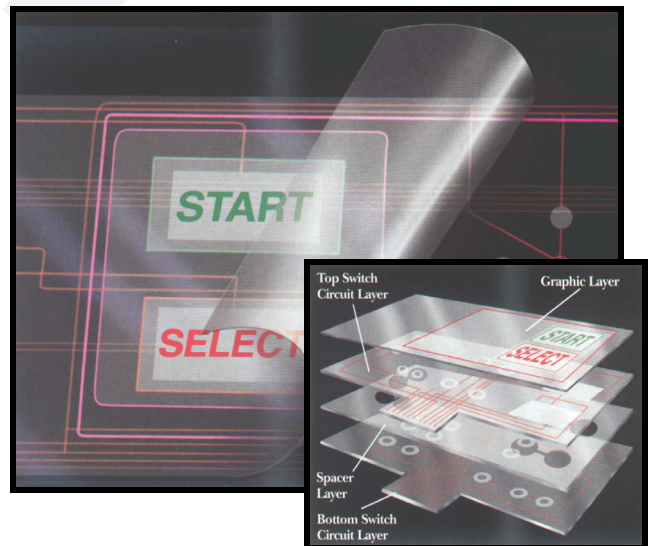
- Insulation
- Film based EMI / RFI shields
- ID cards
- Holograms
- Decorative laminates
- Labels
- Masking
- Color proofing
- Membrane touch switches
- Contactless / Smart / Access
- Prepaid phone cards
- Metal lamination
- Cable wrap
- Release liners
- Support sheets in silk screening
- Engineering and architectural reproduction materials
- Decals
- Surfacing material for acoustical tile and wall panels
- Layout base for lithographic printing plates and color separations
- Apparel stays
- Duplicated and blank video cassettes
- Book jacket covers
- Sheet protectors
- Stationary supplies

VALOX PTX® Polyester Films

For membrane switches and other graphic applications, these films are designed to have excellent chemical resistance and flex life, optimum optical clarity, and high tensile strength. They are available with one or both sides pretreated for better ink adhesion, and in a heat stabilized grade. They are biaxially-oriented and can be specified in thicknesses from 0.003" to 0.010".

Note: The thermal shrinkage of VALOX PTX 820 film is less than 0.15% after 30 minutes at 150°C.

Grade	Features	Applications
VALOX PTX 100 Film	<ul style="list-style-type: none"> • High Optical Clarity • High Gloss • Slip Treated for Improved Handling 	<ul style="list-style-type: none"> • Membrane Switch • Flexible Circuits • Labels
VALOX PTX 120 Film	<ul style="list-style-type: none"> • High Optical Clarity • High Gloss • Two Side Adhesion Pre-treatment 	<ul style="list-style-type: none"> • Membrane Switch • Flexible Circuits • Labels
VALOX PTX 820 Film	<ul style="list-style-type: none"> • Heat Stabilized • Low Shrinkage • High Optical Clarity 	<ul style="list-style-type: none"> • Membrane Switch • Printed Circuits



GRAPHIC ARTS PRODUCTS

Film ■ Vinyl

Vinyl film can either be rigid or flexible. Rigid film is available either as calendered or planished. Calendering is a manufacturing process by which sheets are produced in .005 - .040" thicknesses, and in a full range of colors. Calendered sheet is more brittle than planished and less expensive, yet it can be used in the place of the latter if further laminating and processing is required.

Planished sheet is calendered sheet that has been laminated using plates to give the finished sheet a polished or matte surface finish. It comes in a full range of colors with standard thicknesses of .010" to .125" and in special order thicknesses. It is also available in transparent, translucent, and opaque.

Rigid vinyl films are characterized by clarity, excellent chemical resistance and electrical properties, easy fabrication, good dimensional stability and flexural strength, and low moisture absorption. They are also self-extinguishing and have a forming temperature of 280° to 300° F.

Computer vinyl is used in the sign and banner markets. This vinyl has a pressure sensitive adhesive on one side to affix the cut vinyl to a substrate. Available in a wide range of colors, gauges, and sizes.

Typical Applications:

- Face shields
- Drawing instruments
- Dial covers and faces
- Lighting diffusers
- Shims
- Airline seat pocket cards
- Safety shields
- Lamp shades
- Scales
- Menus
- Insulating spacers
- Decorative applications
- Transportation Advertising
- Plotter Cutting

ORACAL®

ISO 9001 certified, Oracal® supplies to the industry a large selection of graphic arts films, with a variety of adhesive types, and numerous colors. For specific product information contact your nearest Regal Plastic Supply distribution center.

SPAR-CAL®

Providing an array of colors, special effects, adhesives, and liners, Spar-Cal® supplies complete lines of calendered and cast vinyl films. A wide selection of stock solid and multi-color stripes are also available through Spar-Cal®. For current availabilities and specific product information contact your nearest Regal Plastic Supply distribution center.

Magnetic Vinyl

Vinyl coated magnets are available in 24" x 50' rolls with gauges of 15, 20, or 30mil. Available in white only.

DO YOU KNOW?

1949 - the Nash automobile has a three-piece decorative plastic instrument panel overlay.



Application tapes are used primarily, but not exclusively, for the short term transfer of vinyl from its carrier sheet to the final substrate, so that the graphics stay in perfect registration during application. Numerous formulations supply the physical properties for a wide range of uses. Grades are available in paper or plastic, with a range of adhesive tack levels, and in widths up to 48". Application tapes are widely used in the graphic arts' industries.

R Tape manufactures pressure sensitive tapes and films for signmaking, surface, protection, vinyl converting, decals, screen printing, roll labels, and digital imaging.

Paper Application Tapes

Available in two grades, Standard and Premium Paper, these tapes are designed for signmaking and screenprinting applications.

STANDARD PAPER GRADES

Economical, this grade of application tape features white, translucent, standard weight saturated paper, with medium or high tack adhesives.

4050

A white, translucent, standard weight saturated paper, with medium tack adhesive, this economical tape is recommended for clean pick-up and transfer of medium and large size plotter and die cut lettering and graphics, fleet graphics, and wet method applications.

4075 "All Purpose" High Tack

An economical, all purpose high tack, white, translucent, standard weight saturated paper tape, recommended for clean pick-up and transfer of small and medium size plotter and die cut lettering and graphics, hard-to-lift vinyls, and wet method applications.

4076

This white, translucent, standard weight saturated paper tape, with high tack adhesive, is designed only for immediate transfers of very small and difficult to lift plotter die cut and thermal die cut lettering and graphics.

PREMIUM PAPER GRADE

These white, translucent, heavyweight paper tapes, are moisture resistant, conform to irregular surfaces, and provide excellent lay flat. They are available with medium, high or ultra high tack adhesives for different applications.

4750

A white, translucent, heavyweight saturated paper tape, with medium tack adhesive, this product conforms to uneven surfaces, exhibits high elongation, and exceptional resistance to abrasion and moisture. Recommended for use on medium and large size plotter and die cut lettering and graphics, fleet graphics, and humid and wet method applications.

GRAPHIC ARTS PRODUCTS

Application Tape ■ R Tape

This tape can be successfully applied over rivets, corrugations, and corner posts and aids in long term storage, transport and handling.

4775

This white, translucent, heavyweight saturated paper tape, with high tack adhesive, is used for consistent transfer of small and medium size plotter and die cut lettering and graphics. With resistance to abrasion and moisture, high elongation, and the ability to conform to uneven surfaces, it is recommended for humid environment and wet method applications, hard-to-lift vinyls, fleet graphics, and applications over rivets and corrugations. It also is recognized for aiding in long term storage, transport, and handling,

4885

This white, translucent, heavyweight saturated paper tape, with ultra high tack adhesive, is used to transfer very small, fine, plotter and die cut lettering and graphics. Recommended for vinyls with textured, embossed, ribbed, and other irregular surfaces, hard-to-lift films such as gold leaf, and "etched glass" vinyl, urethane coated films, thermal die cut graphics, and plasticized vinyls. This tape is moisture and abrasion resistant.

Clear Application Tapes

Clear application tapes, made of polyethylene film, allow more precise registration than paper tapes, especially with light and multi-colored vinyls. They work well for wet method and humid environment applications, and can remain applied to graphics during extended storage. Two surface finishes are available.

EMBOSSSED FINISH CLEAR EZ-Tear AT-42

This transparent, heavy gauge, embossed, non-static film, has a matte, non-glare surface. It is easy to snap and tear, does not wrinkle or stretch, and sticks only when pressure is applied. Recommended for plotter and die cut lettering and graphics of all sizes, light-colored vinyls, applications requiring precise registration, humid environments, and wet method applications.

Smooth 2575

This transparent, matte finish film, is an all purpose application tape which releases from poster or foam board. Applications include retail graphics, multi colored graphics requiring precise registration, small, hard-to-lift thermal die and plotter cut graphics, and wet method applications.

CRYSTAL CLEAR All Purpose Clear 2442

This clear, thin to medium gauge, premask/ application tape, has an acrylic adhesive which sticks only when pressure is applied to it. It is used in the manufacturing of vinyl pinstriping and other vinyl graphics intended for automotive, recreational vehicle, and marine applications. It can also remain on vinyl for long term storage with no surface effects.

2442-10

Like 2442, this is a clear tape, with clear adhesive that only sticks with pressure. It can remain on graphics for extended storage. Applications include those requiring precise registration of multi-color graphics, circuit board tape, plotter and die cut lettering, graphics of all sizes, and light colored films.

Poster Board Clear 2542

This is designed to stick only to vinyl for the transferring of plotter and die cut vinyl graphics to poster board, foam board, or other fragile substrates.

Surface Protection

Available in two paper grades and a range of adhesives.

STANDARD PAPER GRADE

Standard weight saturated paper tape with low tack adhesive.

4000

A white, translucent, standard weight saturated paper, with low tack natural latex adhesive, this tape has smooth lamination by hand or machine, and no build-up of tack level over time. Recommended for protection of sign faces, metal, plastic, wood, vinyl, glass, and most substrates, and as a premask for large vinyl graphics.

PREMIUM PAPER GRADE

Premium weight saturated paper tapes with two tack adhesive levels.

4500

This white, translucent, premium weight saturated paper tape, with low tack natural latex adhesive, has smooth lamination by hand or machine, and no build-up of tack level over time. Specifically designed for re-masking styrene and polycarbonate sheeting, it is also recommended for protection of sign faces, metal, plastic, wood, vinyl, and most substrates.

4600

With a very low adhesion property, this white, translucent, premium weight saturated paper, is recommended to protect easily damaged printed surfaces. It is removable without affecting ink or fragile surfaces. Specifically designed for re-masking styrene and polycarbonate sheeting, it is also recommended for protection of sign faces, metal, plastic, wood, vinyl, and most substrates.

PHYSICAL PROPERTIES

Product #	Tensile Strength (lbs./in.)	Elongation (%)	Tear Resistance (grams)
4050	17	3 - 4	50
4075	17	3 - 4	50
4076	17 - 18	4 - 5	50
4750	19	12	60
4775	19	12	60
4885	19	6	60
EZ-Tear AT- 42	16	150	N/A
Smooth 2575	10	100	50
All Purpose Clear 2442	N/A	200	N/A
2442-10	16	200	60
Poster Board Clear 2542	N/A	175	N/A
4000	17	3 - 4	50
4500	19	6	60
4600	19	12	60

PRODUCT AVAILABILITIES

Product #	Standard Thicknesses	Standard Widths	Standard Lengths
4050	4.0 - 4.5	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48	100 yards
4075	4.0 - 4.5	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48, 60	100 yards
4076	4.0 - 4.5	24, 30, 36, 48	100 yards
4750	5.0 - 5.5	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48, 60	100 yards
4775	5.0 - 5.5	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48, 60	100 yards
4885	5.0 - 5.5	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48	100 yards
EZ-Tear AT- 42	5.0 - 6.0	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48	100 yards
Smooth 2575	3.5	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48	100 yards
All Purpose Clear 2442	3.5 - 4.0	2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 24, 48	100 yards
2442-10	3.5 - 4.0	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48	100 yards
Poster Board Clear 2542	4.5 - 5.0	1.25, 2.25, 3.25, 4.25, 5.25, 6.5, 8.5, 10.5, 12, 14, 15, 16, 18, 20, 24, 30, 36, 48	100 yards
4000	4.0 - 4.5	24, 30, 36, 48	100 yards
4500	5.0 - 5.5	12, 18, 24, 30, 36, 48	100 yards
4600	5.0 - 5.5	24, 30, 36, 48	100 yards

DO YOU KNOW?

1957 - The Hula Hoop is introduced. The fad peaks in 1958 (over one million pounds per week of polyethylene is consumed trying to keep up with demand).

PLASTIC

GRAPHIC ARTS PRODUCTS

Digital Media

SPAR-CAL®

Spar-Cal® manufactures an extensive line of products geared to the digital media.

Industry Specific Terminology

- **Color Gamut:** The entire range of perceived color obtained under stated conditions
- **Dot Size:** Area of an Ink Jet Dot
- **Dot Shape:** The "roundness" of a dot
- **Snap:** Vivid color imagery
- **Offset:** Imager transfer to another sheet, usually due to slow ink drying
- **Coalescence:** Ink pooling or puddling
- **Mottle:** Non-uniform ink density
- **Bleed:** Unwanted ink color mixing in solids
- **Fuzz:** Ink wicking (lines)
- **Banding / Raster Lines:** Media show-through in solid areas due to insufficient dot gain

Ink Jet Printing

A digital output device heats ink to a high temperature causing microscopic bubbles to form. The bubbles are then projected onto an ink-jet receptive top-coated substrate.

Benefits:

- excellent quality for close viewing
- reduction in harmful chemical vapors
- indoor / outdoor product
- economical

Typical Applications:

- Signs / Banners
- Commercial Printing
- Board Room / Trade Show / Window Graphics
- P.O.P.
- Maps
- Presentations
- Graphic Arts
- Mock-Ups
- Textile Design
- Flags

PRINT TROUBLESHOOTING

Symptom	Cause
Pinstriping - disturbing striping patterns in image	uneven absorption of ink into media coating
Bleeding - defined edges and lines	horizontal ink spreading through poor media coating - mismatch in chemistry between ink and media coating
Cockling - waviness in image after drying	ink saturates media coating and seeps through to paper base
Strike-through - image penetrates to back-side of media	ink saturates media coating and seeps through to paper base
Mottling - unevenness in color fill area	non-uniform media coating: non-uniform absorption of ink through media coating.
Coalescing - spotted pattern	non-uniform absorption of ink through media coating - repelling of ink by media coating
Fluorescing - unintended brightening of colors	mismatch in chemistry between ink and media coating

Electrostatic Printing

A digital output device employs an electrical charge to a dielectric paper allowing toners to adhere to the paper to form an image. The image is then transferred by heat and pressure to a substrate.

Typical Applications:

- Signs / Banners
- Trade Show / Courtroom / Floor Graphics
- Fleets / Buses
- Photo Reproduction
- Posters
- Backlit Signs
- Billboards
- Proofing

GRAPHIC ARTS PRODUCTS

Digital Media

SPAR-CAL®

PRINTER COMPATIBILITY CHART

PRODUCT	Encad Nova Jet II and III	HP 650C HP 750C HP 755CM	PRO	HP 2000 CP	Roland
			PRO50 PROe Nova Jet IV Croma 24 Thermal Ink Jet Printers	HP 2500 CP HP 3000 CP HP 3500 CP	Camm Jet Piezo Ink Jet Printers
PRESSURE-SENSITIVE VINYL, FILMS, AND PAPERS					
C75816—24" Waterproof Matte Vinyl	X	X	X	X	X
†C75855—24' Cling Film—Clear	X	X	X	X	
C75807—35" Waterproof Matte Vinyl	X	X	X	X	X
†C75856—36" Cling Film—Clear	X	X	X	X	
C71110—36" Glossy Vinyl	X				
C75618—36" Matte Paper	X	X	X		
C75808—50" Waterproof Matte Vinyl	X	X	X	X	X
MATTE PAPER					
C75842—24" Matte Paper	X	X	X		X
C75801—36" Matte Paper	X	X	X		X
C75841—36" Matte Paper (HP)				X	
ARTIST CANVAS					
C75814—24" Canvas	X	X	X	X	X
C75800—36" Canvas	X	X	X	X	X
C75815—50" Canvas	X	X	X	X	X
PHOTOBASE PAPER					
C75819—24" Low Glare	X		X		X
C75811—24" Semi Gloss	X	X	X	X	
C75817—24" High Gloss	X		X		X
C75802—36" Low Glare	X				
C75820—36" Low Glare	X		X		X
C75838—36" Low Glare (HP)				X	
C75812—36" Semi Gloss	X	X	X	X	
C75803—36" High Gloss	X				
C75818—36" High Gloss	X		X		X
C75839—36" High Gloss (HP)				X	
C75809—50" Low Glare	X		X		X
C75813—50" Semi Gloss	X	X	X	X	
C75810—50" High Gloss	X		X		X

† - Clear Cling Film for use with dye-based inks.

PRODUCT AVAILABILITY

[For current product availabilities contact your nearest Regal Plastic Supply distribution center.](#)

GRAPHIC ARTS PRODUCTS

Seal®

Seal brand systems are part of Hunt Corporations' Graphics Division providing complete image finishing options for advertising, sign, and display applications.

The ProSeal™ System

The ProSeal system employs materials pre-assembled in "hinged pouches" and the ProSeal one-step laminator.

Pouch boards are made from Hunt's foamboard and Seal's adhesives and laminates. The ProSeal laminator is designed to process these easily and quickly.

The components in the ProSeal pouches are matched to deliver optimum results for applications ranging from mounted posters, rigid laminated signs, encapsulated graphics, etc. This system is compatible with a range of print media such as inkjet prints, electrostatic prints, lithographic materials, photographic prints, color copies, and other plain paper media.

Typical applications:

- Counter Cards & POP Signs
- Trade Show Graphics
- Retail and Informational Signs
- Rollable Commercial Graphics
- Business Presentations
- Mounted Posters and Signs
- Window Signs and Advertising
- Sealed Posters

PRODUCT AVAILABILITY

ProSeal Pouches come in a full range of combinations to provide finished products 28" and wider in three different categories:

- Laminating Pouch Boards
- Mounting Pouch Boards
- Flexible Laminating Pouches

The Seal Finish Line Foam Board Laminator and Finish Line Pouches are a compact design which will mount computer images up to 12" wide on 3/16" thick foam board as well as all normal pouch laminating. Features include:

- Dual Purpose Unit
- Mounts and laminates prints up to 11" x 17"
- Encapsulates
- Adjustable temperature control
- Compact
- UL listed, CSA approved

The ProSeal Laminators are available in 25" and 44" widths.

	The Seal Finish Line™ Foam Board Laminator	ProSeal™ 25 Laminator	ProSeal™ 44 Laminator
Part Number	60097	120v model: 60766 230v model: 60794	120v model: 60824 230v model: 60853
Max. Width	12 in	25 in (63.5 cm)	44 in (111.8 cm)
Max. Temp.	300°F	250—300°F (140—150°C)	250—300°F (140—150°C)
Max. Speed	1 ft/min	1.5—2.0 fpm (3.8 cm/min)	1.5—2.0 fpm (3.8 cm/min)
Max. Pressure	N/A	60—80 psi	60—80 psi
Electrical	110 VAC, Fused, 3.15 Amps	110 VAC, 13 Amp 230 VAC, 7 Amp	110 VAC, 17 Amp 230 VAC, 9 Amp
Dimensions	4 1/4h x 17 1/4w x 7d (in)	40w x 12h x 15d (in) (102 x 31 x 38 cm)	58w x 12h x 15d (in) (147 x 31 x 38 cm)
Net Weight	6 lbs (2.72 kg)	70 lbs (32 kg)	160 lbs (72 kg)
Safety Certifications	UL Listed, CSA Approved	ETL, cETL, CE	ETL, cETL, CE

SEAL LAMINATING FILMS

Laminating films are available in a full range of gauges, surfaces, and sizes for applications such as:

- Rigid Displays
- Flexible Displays
- Floor Graphics
- Rigid Backlit Displays
- Window Graphics
- Pop-Up Displays (flexible panels)
- Vinyl Banners (e-stat transfer)
- Fabric Banners (e-stat transfer)

ThermaShield™ R

A thermal polyester laminating film with thermal copolymer adhesive for electrostatic and photographic laminating and encapsulating. Available in three finishes; gloss, matte, and high-lustre (semi-reflective).

ThermaShield™ D

An economy grade polyester thermal laminating film with thermal copolymer adhesive for e-stat, photographic, and off-set prints. Available in gloss finish.

Jet Guard®

This linerless film with heat activated adhesive, bonds at low temperatures for optimum performance when encapsulating or overlaminating ink jet prints. Available in three finishes; deep crystal, crystal matte, and gloss.

Print Guard®

This laminating film provides UV protection for ink jet, photographic and plain paper media. With heat activated adhesive, this film bonds to a wide variety of substrates at low temperatures. Available in four finishes; gloss, UV lustre, UV satin matte, and UV ultra matte.

PRESSURE-SENSITIVE LAMINATING FILMS

Print Shield® Ultra

This product is a pressure-sensitive laminating film with added UV inhibitors. It provides an aggressive, permanent bond on ink jet, electrostatic, photographic, and plain paper media. Available in four finishes; gloss, lustre, matte, and satin.

Print Shield® Pro

An economy grade pressure-sensitive laminating film suitable for ink jet, electrostatic, photographic, and plain paper media. Available in three finishes; gloss, lustre, and matte.

Print Shield® Standard

An economy grade vinyl, pressure-sensitive laminating film suitable for ink jet, electrostatic, and photographic media. Available in three finishes; gloss, semi-gloss, and matte.

ADHESIVE FILMS

OptiMount®

Optically clear, this two-sided adhesive film creates a permanent bond to both graphic and substrate. With ultraviolet inhibitors and acid-free adhesive, this product is recommended for use in vented light box applications. Optimount is suitable for face mounting ink jet, photographic, electrostatic, and plain paper prints to clear acrylics, plastic, and glass.

Print Mount Adhesive Films

Five pressure-sensitive adhesive formulations are available for a variety of substrates.

BACKING FILMS

Stoplight™

A heat-activated, thick, white, opaque polyester backing film for use in pop-up and panel display applications.

ThermaShield™ MB

A heat-activated, solid white, paper-based backing film, this product is designed for use in encapsulating applications. 10 mils thick, it controls light bleed-through and offers pliable rigidity.

SPECIALTY FILMS

Floor Guard® & Floor Grip™

Floor Guard is a durable, heat-activated laminating film specifically designed for interior, promotional floor graphics applications. It meets international standards for slip resistance, is scuff-resistant, waxable, and has a non-reflective textured finish. Floor Grip comes in two permanent/removable adhesive formulations for use with floor guard.

PRODUCT AVAILABILITY

[Contact your nearest Regal Plastic Supply distribution center for current product availability options.](#)

DO YOU KNOW?

Between 1990 and 1996 the amount of waste going into landfills declined by more than 17% (by weight).

REGAL
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DSM Engineering Plastic Products

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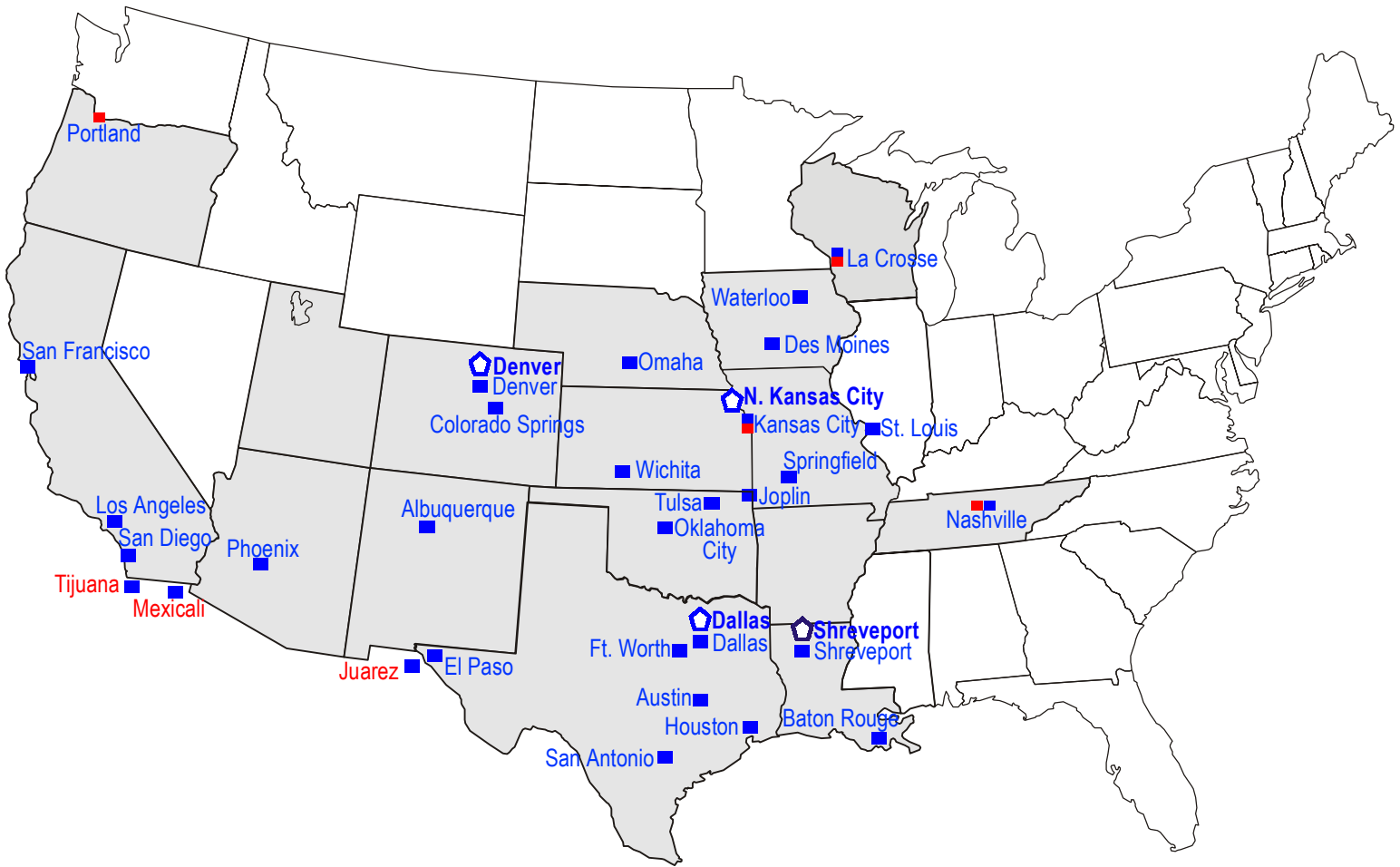
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