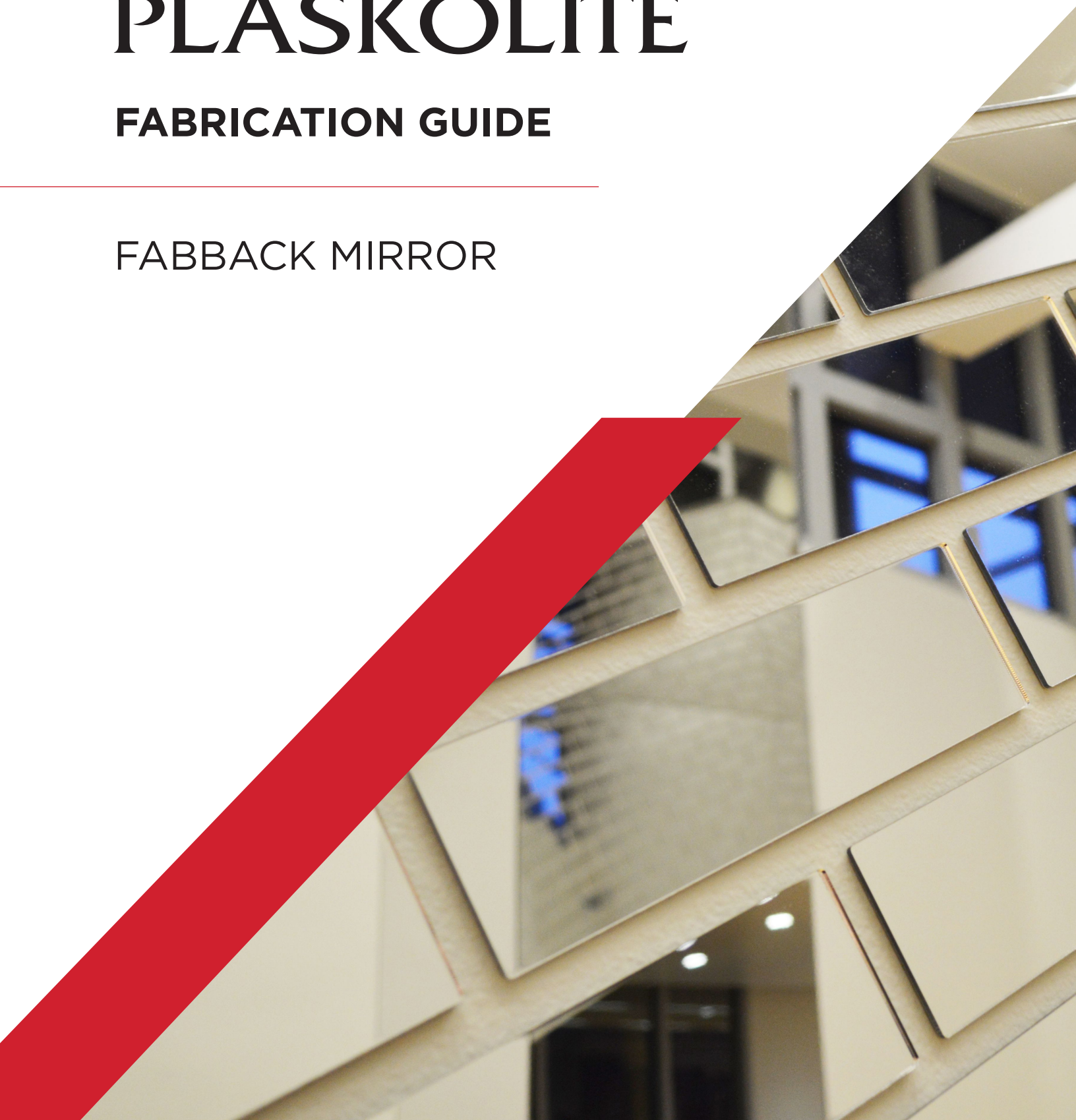


# PLASKOLITE

## FABRICATION GUIDE

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### FABBACK MIRROR



# INTRODUCTION

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Plaskolite FABBACK® mirror sheet products are comprised of acrylic, polycarbonate and PETG. These sheets are strong, lightweight thermoplastic materials used as a replacement for glass mirror. This is especially important where the risk of glass breakage is a safety concern. FABBACK mirrored sheets can be used for merchandising, store design, and decoration. Using FABBACK mirror sheet products frees creativity from the limitations of ordinary glass mirror products.

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# ABOUT OUR PRODUCTS

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## **OPTIX® ACRYLIC MIRROR SHEETS**

The most popular, lightweight, and flexible mirror substrate is available in an extensive range of thicknesses, colors and sizes. Acrylic mirror may be saw, routed or laser cut.

## **TUFFAK® POLYCARBONATE MIRROR SHEETS**

Superior impact strength is recommended for applications where polycarbonate mirror is approved, such as mental healthcare facilities, airline bathrooms, and detention centers.

## **VIVAK® PETG MIRROR SHEETS**

Higher impact strength than acrylic mirror. PETG mirror can be easily cold formed, die cut or punched. These processes are suitable for high volume. Available in thinner gauges than acrylic or polycarbonate.

## **SCRATCH RESISTANT (SR) COATING**

In-house processing offers a mirror surface with scratch, solvent, and stain resistant coating on acrylic or polycarbonate. Scratch resistant coating can also be applied to one or two sides of non-mirror sheets to dramatically improve scratch resistance, and enhance the versatility of the material.

## **SEE-THRU MIRROR (TWO-WAY MIRROR)**

A semi-transparent reflective coating for monitoring, surveillance or unique signage. Available in clear and colors, in acrylic and polycarbonate.

## **FIRST SURFACE MIRROR (TWO-SIDED MIRROR)**

An opaque, two-sided mirror used where a reflection in two directions is desired.

## **ABM: ADHESIVE BACKED MIRROR**

This is used to mount mirror sheet to another smooth substrate or surface. It is a two-sided tape with a white release liner that is applied to the paint side. Peel off the release liner and stick mirror to the other surface. If the other surface is rough, a mastic or contact cement is recommended. ABM can replace adhesives applied by hand that can cause messy edges and non-uniform adhesive coverage.

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# ADVANTAGES

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## **ADVANTAGES OF PLASKOLITE OPTIX MIRRORING ACRYLIC**

**Reflectivity:** Approximately 85-90% over 400-700 nanometers of visual light spectrum

**Lightweight:** Half the weight of glass in the same size and thickness

**Break resistant:** Acrylic is 5 times more break resistant than glass of equal thickness

**Heat:** Tolerates continuous service up to 160°F, and withstand occasional short-term exposure up to 190°F

**Ease of Fabrication:** Mirrored acrylic can be fabricated using conventional saws and routers with proper blades and cutters. It can be gently cold bent for curved shapes or strip heated for a tighter bend. State-of-the-art laser systems produce accurate, complex designs. It is economical with low fabrication and installation costs

**Quality:** Highly reflective surfaces for use in display, decoration or other mirror applications

**Extensive Product Line:** Available in 0.060" – 0.236" thickness and 20 standard colors. Custom colors, see-thru, first surface and textures are available.

## **ADVANTAGES OF PLASKOLITE TUFFAK MIRRORED POLYCARBONATE**

Mirrored polycarbonate is a virtually unbreakable mirror that improves safety and eliminates the hazards associated with broken glass. The high optical quality polycarbonate substrate provides clear mirror images and outstanding strength and impact resistance. The product is lightweight (half the weight of mirrored glass). An AR coating can be applied to the mirror for a significant improvement in scratch resistance, making it easy to fabricate and install. Mirrored polycarbonate sheet has a five (5) year Limited Product Warranty against breakage. The terms of the warranty are available on request.

## **ADVANTAGES OF PLASKOLITE VIVAK MIRRORED PETG**

Mirrored PETG has higher impact strength and is more cost effective than acrylic mirror. It is considered "general purpose" mirror, and is typically used in children's toys and POP displays. It is usually cut with a steel rule die ("cookie cutter"), shear cutter or slitter knife. Thin gauge PETG can even be cut with a strong pair of scissors.

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# **HANDLING, MAINTENANCE AND CLEANING**

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All FABBACK mirrored sheets are furnished with a protective masking on the top side of the sheet. The masking should be left on the sheet during storage and fabrication to prevent damage. Plaskolite mirrored sheet is shipped in ready-to-store condition. Keep away from excessive heat, paint overspray and vapors from solvents and other chemicals. The materials should be stored in a clean, dry, and environmentally controlled area with the original packing intact. However, this is not always practical as all or part of the shipment must be unpackaged for the customer to use. In these cases, the following guidelines should be followed:

**Vertical Storage:** If the FABBACK mirror sheets are to be stored on end, care must be taken to avoid warping. Sheets must stand with an angle of no more than 10 degrees from the vertical. A-frame racks made of plywood can be constructed to give full support to the sheets.

**Horizontal Storage:** If the FABBACK mirror sheets are to be stored flat, care must be taken to avoid warping, slipping and scratching. If different sizes are to be stored together, make sure the largest pieces are on the bottom and the smallest on top. This will prevent overhang which can lead to warping and slipping during movement. Preventing chips or dirt from settling between the sheets will reduce the risk of scratching if a slip occurs or while unpacking. Pallets are packaged with a heavy poly overwrap which protects the sheet from dirt and moisture. The overwrap should remain intact during storage.

## **MAINTENANCE**

**Masking:** Each FABBACK mirror sheet is protected by a durable paint backing and a removable masking on the front. For all mirror sheets, the masking should remain in place to protect the sheets during fabrication and installation. The mirrored sheet should be handled mirror side down, with the masking on. Care should be taken not to slide sheets against each other or slide on rough table tops or surfaces.

**Removing Masking:** If there is difficulty in removing the masking, use aliphatic naphtha, kerosene or distilled alcohol to moisten the adhesive. Do not use other chemicals or sharp objects to remove the masking.

## CLEANING

**Washing:** Use a mild soap and damp soft cloth or microfiber cloth to wipe the surface of the sheet with light pressure, avoiding the edges of the sheet. To remove grease, oil, or other deposits on the material (first surface), use hexane or kerosene. Do not use any chemicals on a paint backcoat. Do not use window cleaning sprays, kitchen scouring compounds or other chemicals to clean the mirrorized sheets.

**Polishing:** A surface gloss can be maintained by occasionally using a soft cloth and good plastic cleaner such as Johnson's Pledge®. Follow the manufacturers instruction on the container.

**Removing scratches:** Fine scratches can be removed by hand polishing with a plastic scratch remover or compound cleaner. Remove all residue and polish with a soft cloth. Not applicable to polycarbonate mirrored sheet.

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## CUTTING

**Scribing and Breaking:** This method is used to achieve a quick, straight line cut of single acrylic mirror sheets less than 0.118" (3 mm) thick. Mark the line to be scribed (scored) on the sheet with a commercial scribe. Firmly place a straight edge along the line, and use it as a guide to scribe the acrylic mirror along the same line using several firm, evenly pressured strokes. Then place the scribed section over the edge of the table and break the acrylic mirror sheet with sharp downward pressure.

**Circular, Table, and Panel Saw Cutting:** These saws are used to achieve a precise, straight line cut of one or more sheets of FABBACK mirror. Because vibration is minimal, this method of cutting is recommended. The best way to avoid vibration and unwanted runout is to install a stiffener 1/2 to 2/3 of the saw blade diameter, and mount it against the outside of the blade. To prevent back cutting, the saw arbor, saw, and table fence must be kept to a minimum. A 10-inch, 80-small tooth carbide tipped blade is recommended for all-purpose cutting. The blade's teeth should be the triple-chip design, where every other tooth has a beveled cutting edge to help clear saw chips. For best results, the teeth should have a clearance angle of 10° to 15°. Material should be cut with masked side down. Any paper interleaf should be kept intact between sheets to protect the paint backcoat during cutting. Use enough power to make the needed cuts, using a smooth and even feed rate. Uneven feed rates may produce gumming or chipping of FABBACK mirror sheet.

**Saber Saw Cutting:** Saber saws are generally used for cuts involving a frequent change in direction. Maintaining adequate support is important to prevent vibration which may cause chipping. To achieve this, clamp a straight board on the sheet near the cutting line. This may also be used as a saw guide. Set the saw to full speed before cutting the FABBACK mirror sheet. Without feeding too fast, press the saw shoe firmly against the mirror sheet while cutting. Blades for saber saws should have at least 14 teeth per inch.

**Jig Saw Cutting:** Jig saws should be used primarily for inside cuts and intricate letters. Since the stroke is short, the blade heats up quickly and cut material can soften and fuse to the cut edge. To avoid this, use a fast and steady feed rate. Blades for jig saws should have least 14 teeth per inch.

**Band Saw Cutting:** Band saws are used for cutting curved sections or trimming parts. Blades for band saws should have at least 10 teeth per inch, and be set with a high rotational speed.

**Caution:** A cool air or water mist should be in contact with the blades of all cutting devices before and during fabrication of the sheet.

**Laser Cutting:** Lasers may be used to cut FABBACK mirrored sheet to virtually any shape or design with minimal material waste. Lasers can also be used for engraving, where the cut doesn't go all the way through the sheet. It produces a clean, polished edge without saw chips. CO2 lasers are the type mainly used to cut or engrave plastic sheet. Fumes need to be properly exhausted. Proper safety precautions



must be followed, especially wearing laser-rated safety glasses. Cutting rates and power levels need to be determined, and all laser manufacturer's guidelines should be followed. Proper focal distance is important. Papermasking can be applied to one or both sides of the sheet to "soak up" laser energy for the best cut. A laser produces a clean, polished edge without saw chips. An average of 200 inches per minute may be accomplished by using about 200 watts from a 1200-watt laser. Annealing the sheet is recommended after cutting, especially when cementing is anticipated. Lasers can create stress along cut lines, and may produce a poor or discolored cut if parameters aren't set right. Test a piece before fabrication begins.

**Water Jet Cutting:** This cutting method is not recommended as it tends to leave micro-notches along the cutting edge of the sheet. The notches can develop into cracks and compromise the FABBACK mirror integrity at the cut.

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## ROUTING

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Many routers are available for use during fabrication. The router should have a minimum of one (1) horsepower, and a no-load speed of 20,000 RPM. Routers are normally used with a single or double fluted bit, but may consist of up to four flutes. Router bits can be carbide tipped, high-speed steel, solid carbide or diamond tipped. They may be one-piece piloted, non-piloted, straight cutting, multiple part, forming or specialty bits.

**Hand Routing:** A hand router is generally used when making a prototype or replacement part, by using a precut template pattern clamped to the FABBACK mirror sheet. The hand-held router may be smoothly guided around the pattern. Move clamps as necessary.

**Circle and Pin Routing:** Use a circle router when a circular piece of FABBACK mirror sheet is needed. Pin routers are flexible. A double-backed tape or vacuum holds the mirror sheet in place. Using the mounted overarm router to hold the cutter over a guide pin in the table, feed the mirror sheet and pattern into the cutter and rotate 360° to form the finished part.

**Contour Routing:** By using a contour jig on a pin routing machine, multiple parts can be manufactured. Cut the desired pattern on the base of the jig to follow the base guide pin. To secure several sheets at one time, clamps should be mounted on the top. Be sure to raise and lower clamp holders as necessary when the jig is rotated.

**CNC Routing:** CNC routers are used in the manufacture of high volume production. This type of router is designed for maximum utilization of FABBACK mirror sheet. The material may be stacked which eliminates much of the waste normally produced with cutting single sheets.

**Direction of Travel:** The router is designed to rotate counterclockwise for external cuts, and clockwise for routing the inside edges of the sheet. When properly fed in the direction necessary, a smooth cut will result.

When operating a router, several precautions are necessary to avoid mistakes to the FABBACK mirror sheet or tool.

**First:** Routers bits must be operated at high speeds. Avoid vibrations, since even the slightest vibration can cause crazing and fractures in the sheet.

**Second:** Watch RPM speeds, because higher rates allow for faster feeding of the sheet resulting in a smooth finish. Recommended speeds are 18,000 to 28,000 RPM.

**Third:** For maximum production, operate the feed rate just below chipping speed. Do not overload the motor.

**Fourth:** Maintain a sharp cutter, since this is important to avoid chips & decreased production. Finally, use a 1/2" or larger diameter cutter when possible, as it provides a better surface with less tendency to chip.

**Caution:** A cool mist should be in contact with the blades on all cutting devices before and during fabrication of the sheet.

# DRILLING

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FABBACK mirror sheet may be drilled with any commercial power drill: portable drill, drill press, lathes, or automatic multi-spindle drilling units.

Before drilling FABBACK mirror sheet, it is recommended to use a bit designed for plastics. If a drill bit for plastics is not available, a metal-working drill bit with a high-speed twist may be used with modification.

Since metal-working drill bits are designed to push through metal, the following modifications must be made to eliminate chipping or other damage to the FABBACK sheet.

1. The tip angle is typically 120°, which is too flat to cut through the sheet without damage, and must be ground to a sharp angle of 60-90° to allow the bit to enter and exit easily without chipping.
2. The cutting edge must be ground to a rake angle of 0-4°. This flat cutting edge will scrape the sheet without gouging it.
3. The surface behind the cutting edge must be ground away to clearance angles of 12-15°. This will allow back relief for reduced metal to plastic contact and heat build up.

Drill bits with tips larger than 5/8" should be ground to a point to reduce the amount of force required to start a hole. Drill bits must be sharp, or melting, burning and chipping may occur. Correctly modified drill bits, when operated at proper speeds, will create two continuous spiral strips as the bit passes evenly through the mirror sheet.

When drilling FABBACK mirror sheet, back up the surface with a durable surface such as plywood. The drill will continue into the solid material, and prevent chipping on the opposite side of the mirrored sheet. A slow feed rate should be used when the bit enters or exits the FABBACK mirror sheet.

Holes of 1" or more may be cut with a circle cutter. To accommodate the material properties of FABBACK, the cutter bit must be modified so the tip scrapes the material without gouging it. Use a cool air or water mist system to avoid heat build up, leaving the walls with a smoother cutting edge. Use a drill press for a uniform pressure and constant vertical positioning.

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## EDGE & SURFACE FINISHING

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The amount of finish needed to produce a smooth, transparent edge is based upon the quality of the cutting tool used to machine the edge. A properly designed cutting tool with a sharp cutter will reduce the amount of finishing needed. Finishing is reduced when a cool water spray or air is used along with the cutting tool to reduce excess heat build-up.

**Polishing:** A polished edge is the best possible finished edge but requires the most preparation. Prior sanding is necessary if the edge is shaped from a saw cut. Sanding is not necessary when there is a well milled edge. A jointer, shaper or hand-scraped edge can be used in place of sanding. A stationary polishing head produces the best polished surface. Bleached muslin wheels with a diameter of 8" to 14" with bias strips is recommended. This gives the buffing wheel a pleated appearance, runs cooler than a stitched buffing wheel design, and decreases the process time.

**Polishing Compounds:** The finished quality of the polished edge is determined by the polishing compound used. To produce a high luster finish, first use a fast cutting compound to remove all sanding marks, then use a high luster compound for the final buffing. To achieve a good finish in one operation, a medium cutting compound would be best.

**Polishing Surface:** Prior sanding is not necessary when the scratches or machining marks are not too deep.

A surface polishing wheel should be from 6" to 12" in diameter, built up to a width of 1-1/2" to 2". For the initial polish, use a soft bleached muslin wheel, followed by a soft flannel wheel for the finish. Depending on the depth of the scratches, use a medium-coarse polishing compound or a fine compound.

Be sure to keep FABBACK mirror sheet in motion at all times during the polishing procedure. Flame polishing edges is not recommended.

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## CHEMICAL & WEATHER RESISTANCE

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Like all plastic materials, FABBACK mirror sheets will react when exposed to many chemicals. Below is a partial list of chemicals known to react with acrylic, polycarbonate, and PETG. Exposure should be avoided. Factors such as fabrication stress, exposure to loads or changing temperatures and the method of application can all influence a possible reaction. In all cases, care should be taken with chemicals and solvents around FABBACK mirror sheet.

### Known chemicals that attack Plaskolite Sheet Products

OPTIX (Acrylic)	TUFFAK (Polycarbonate)	VIVAK (PETG)
Acetone	Acetone	Acetone
Ammonia	Ammonia	Ammonia
Benzene	Ammonium Chloride (any form)	Benzene
Carbon Tetrachloride	Benzene	Carbon Tetrachloride
Esters	Ether	Ethyl Acetate
Ethers	Hydroxides	Hydroxides
Ethyl Alcohol	Ketones	Methylene Chloride
Ketones	Methyl Ethyl Ketone (MEK)	Methyl Ethyl Ketone (MEK)
Lacquer Thinners	Phthalates	Toluene
Methyl Alcohol	Toluene	
Methylene Chloride	Xylene	
Toluene		

### WEATHER RESISTANCE

FABBACK mirror sheets are not recommended for exterior use. If used outside, seal perimeter with approved silicone sealant to keep moisture out and protect mirror paint backing. Salt spray can degrade the mirror surface and its protective paint layer. For a listing of approved silicone, please visit [plaskolite.com](http://plaskolite.com).



# ADHESIVES

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The mirrored surface is a reflective film applied to a substrate. When the substrate is affixed to another surface, both of the materials will conform to the irregularities of the supporting surface. This will cause localized bending of FABBACK mirror sheet and distortion in the reflected image.

For best results, FABBACK mirror sheets should be mounted to a smooth, rigid, flat backing such as thick gauge 1/4" hardboard or 1/2" medium density fiberboard (MDF). Some adhesives need one of the surfaces to be porous to allow for residual solvents, including water, to escape. Others can have other surface painted to keep out water and humidity. Follow adhesive manufacturers instructions.

Another option is to drill oversized holes in the sheet and secure it to the wall using screw fasteners. Do not over tighten the screws, as this will cause dimpling and distortion. For large sheets, attach a piece of trim to the wall and set bottom edge of sheet on it. This will take the load off of the screws or adhesives, and minimize bowing away from wall. Molding can be used to hold the upper section to the wall, with or without screws or adhesive.

Visual distortion is a function of viewing distance and material thickness. A thicker piece of material will be less flexible, and will maintain better optical integrity. Correct installation and sufficient material thickness can reduce visual distortion but may not eliminate it.

Ceiling and overhead installations are not recommended unless the sheet is mounted in edge-engaging frames, such as T-bar suspended ceiling frames or mechanical mounting.

Solvent cementing of FABBACK mirror sheet with a hard-coated surface is difficult due to the chemical resistance of the coating.

Some adhesives may contain solvents such as toluene, ketones and hexane that can attack the backcoat. Adhesives with solvents of 5% or more are not recommended. Since numerous adhesives, cements and mastics are available, they should be tested on expendable pieces prior to application. All tests should be applied at least 72 hours in advance to determine compatibility to the backcoat, the reflective coating and the acrylic itself. The following adhesives are suggested for use with FABBACK mirror sheet products.

## **3M**

St Paul, Minnesota  
Phone 800.362.3550

### **Products:**

3M560 Polyurethane Sealant  
3M Super 77 Clear Spray  
9500 PC Double Coated Polyester Tape  
VHB Tape

**Please note: Before using any adhesives, cements or mastics, please test sample for at least 72 hours to determine suitability.**

# MIRROR BENDING

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Line or strip bending is best accomplished by applying an intense narrow band of heat approximately 0.118" (3 mm) away from the substrate. 1.15 mm nichrome (nickle-chromium) resistance wire is a commonly used heating element.

- Place mirror face toward the heating element. Do not attempt to heat the backcoat paint side. Doing so will prolong heating times and cause blushing, which is a heat-related loss of the mirror's reflective surface.
- Adjust your power source so that the wire becomes a medium to bright red color
- Peel back masking several inches away from the bend area. Masking left in place, either poly or paper, will yield poor results.
- Acrylic will become bendable at 143°C- 163°C (290°F-325°F). Polycarbonate will become bendable between 171°C-185°C,(340°F-365°F) and PETG around 137°C (280°F). Bending should be done at the coldest possible temperature requiring gentle force to make the bend. 3-mm sheet should become pliable enough to bend within 20 to 25 seconds.
- Timing is critical. Under heating will cause warpage along the bend line and undue stress which may lead to cracking. Overheating will cause blushing.
- Hold the piece in desired position and quickly cool the bend with light air pressure.

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## HELPFUL TIPS

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- FABBACK mirror sheet has a relatively soft, flexible surface and some imperfections or distortions may occur. It should not be used for precise image reflection. An appropriate thickness should be determined in advance of cutting.
- Acrylic, Polycarbonate and PETG mirror sheets can be gently cold-formed but cannot be thermoformed.
- Some adhesives attack the mirrored surface. Test sample at least 72 hours in advance to determine suitability.
- Exterior applications are not recommended for FABBACK mirror sheets.
- FABBACK mirror sheet tends to absorb moisture. High humidity levels may cause temporary warpage to the material. The warpage is characteristic of the material and should be considered in the design of the application
- Solvent gluing at edges may cause crazing
- Plastic sheet is a combustible thermoplastic. Precautions should be used to protect the FABBACK mirror sheet from flame and high heat source
- Acrylic mirror can't be die cut, but can be routed, sawed or laser cut
- FABBACK mirror sheet should be stored in a cool, dry area. FABBACK mirror sheet may warp if exposed to variable temperatures. Changing humidity levels cause the greatest variation. Material should be stored flat and overwrapped with plastic to minimize moisture absorption.
- Overage is provided on the sheet. Check peripheral areas for suitability before cutting.
- Protective masking should not be removed until fabrication is complete. Exercise care during fabrication and handling of both sides of the FABBACK mirror sheet.
- Do not remask adhesive or paper masking on see-thru or first surface sheet. If required, mask over supplied film.
- Do not use in shower doors, window application or rooms where humidity could cause the thermoplastic sheet to expand or contract.

# IMPORTANT NOTICES

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**FLAMMABILITY:** FABBACK mirror sheet is a combustible thermoplastic. Precautions normally used to protect wood and other combustibles from flame and high heat should be observed with this material. It is recommended that appropriate building codes be followed to ensure proper and safe use.

**SAFETY:** When using FABBACK mirror sheet, use the same precautions exercised when fabricating glass, plastic or wood to prevent an accident.

**CONSULTATION:** Our toll-free number gives you access to technical service experts. We cannot guarantee that we will have a solution to every question but our working knowledge is extensive and available to you at 800.848.9124

**CUTTING TO SIZE:** Cost savings can be realized by using our in-house cutting services. We have skilled employees and the proper precision equipment to meet your needs. We can provide customers with the correctly cut materials they require. Call Customer Service today for a quote at 800.848.9124