



ACRILMIR® Acrylic Mirror Sheets

ACRILMIR Mirror offers a combination of the lightweight, excellent shatter-resistant qualities of acrylic plastic with reflectance. Because acrylic has a relatively soft surface and is flexible, some imperfections or distortion may occur. ACRILMIR Mirror should not be used where precise image reflectance is required, except in relatively small components. An appropriate thickness should be determined prior to cutting. ACRILMIR Mirror is also recommended for outdoor use and can not be hollow punched, but can be router, saw or laser cut.

Some adhesives attack the mirrored surface, therefore we recommend testing expendable pieces at least 84 hours in advance to determine suitability. Moreover, solvent gluing at edges may cause crazing.

ACRILMIR Mirror is a combustible thermoplastic. Precautions should be used to protect the material from flames and high heat sources. Any significant coverage of interior wall or ceiling areas will be subject to approval under local building and/or fire codes governing interior finish applications.

Material should be stored in a cool, dry area. The change in humidity levels causes the biggest variation in thickness and size. The material should be stored flat and overwrapped with plastic to minimize absorption of water vapour.

Protective film should not be removed until manufacturing is complete. Handle with care during manufacturing and handling of both sided of mirror sheet.

ACRILMIR Mirror is intended primarily for relatively small areas like interior fittings for decoration, display, visual merchandising, store design, and/or where safety requires the shatter resistance of acrylic plastic sheet.

Availability: Standard normal sizes: 1220x2440 mm – 2050x3050 mm
Standard colours: silver, gold, bronze, blue, and red
Standard thickness: from 1,5 mm to 20 mm

Advantages

- ü Lightweight;
- ü Break resistance: can be 10 times more break resistant and has 17 times greater impact resistance than glass of equal thickness;
- ü Cold formable: simple curves of not less than 1.150 mm radius for a thickness of 3 mm and 2.300 mm radius for a thickness of 6 mm;
- ü Thermoformable: limited to straight line strip heating and bending;
- ü Easily fabricated: scribe and break, cut with power saw using veneer type blades, and drill with soft metal bits or special bits. Mirrored acrylic can be cold bent for curved shapes or strip heated for a sharp bend;
- ü Edge cementable;
- ü Surface decoration: painting, stencilling, appliqués, engraving, hot stamping;
- ü Cleaning: ACRILMIR Mirror should be cleaned by applying a spray a spray wax to the front surface of the mirror and wiping with a soft cloth;

Physical Properties

Weatherability

Acrylic plastic alone has an excellent outdoor weatherability. However, the mirrorizing backcoat may develop pinholes and/or oxidation spots in exterior applications. This can occur on either the front or back surfaces exposed to the elements. Service life is not really definable and will vary widely with the severity of exposure to weather conditions.

Rigidity

ACRILMIR Mirror sheet is a flexible material with roughly 1/20 the stiffness of the glass of the same thickness. This characteristic is generally advantageous, but due consideration must be given to deflection of unsupported areas because of the weight of the sheet or other imposed loads. The result is some image distortion which becomes more noticeable as the area of coverage increases. Distortion can be minimized but not entirely eliminated (except in relatively small panels) with increased ACRILMIR Mirror thickness and proper installation on a rigid substrate.

Temperature and Humidity

Linear dimension changes in ACRILMIR Mirror panels due to changes in ambient temperature and humidity will be greater those that will occur in other common building materials to which ACRILMIR Mirror is fitted. Install ACRILMIR Mirror at normal room temperatures to keep subsequent temperature change to a minimum. Avoid installation of ACRILMIR Mirror near sources of high heat or humidity that could warp the panels

INSTALLATION, FABRICATION, FORMING AND SURFACE DECORATION TECHNIQUES ...

... FOR ACRILMIR[®] MIRROR SHEETS

HANDLING

All ACRILMIR sheets are supplied with a protective masking on the topside of the sheet. Do not slide the sheets when transporting. The masking should be left on the sheet during storage and fabrication to prevent damage. The materials should be stored in a clean, dry and warm 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 mirror sheets are to be stored on end, care must be taken to avoid warping. Sheets must be stand with an angle of no more than 10° from the vertical.
- Horizontal storage: If the acrylic mirrors are to be stored flat, care must be take to avoid warping, slipping and scratching. If different sizes are to be stored together, make sure the largest panels are at 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 packages with a heavy cardboard sheet and four save-corner, which protect the sheets from dirt and blows.

MAINTENANCE

- Masking: Each mirrored sheet is well protected by a durable paint backing and a removable masking on the front. This mask should remain in place in place to protect the sheets during all phases of fabrication and installation. ACRILMIR Mirror sheets should be handled mirror side down, with the making left on. Care should be taken not to slide sheets against each other.
- Removing Masking: If there is any difficulty in removing the masking, use aliphatic naphtha, kerosene, or distilled alcohol to moisten the adhesives. Do not use other chemicals or sharp objects to remove the masking.

CLEANING

- Washing: Use a mild dish soap, water and soft cloth to wipe the surface, apply only light pressure. To remove grease, oil or tar deposit on the material, use hexane, kerosene or aliphatic naphtha to remove them. Do not use any chemicals on a painted print design. Do not use window-cleaning sprays, kitchen scouring compounds or other chemical to clean mirrorized sheets.
- Polishing: A surface gloss can be maintained by occasionally using a flannel cloth and a good plastic cleaner or polish. Follow the instructions for polishing on the container.
- Removing Scratches: Fine scratches can be removed by hand polishing with a plastic scratch remover or compound cleaner. Remove all residues and polish with a flannel cloth. Deep scratches need to be lightly sanded.

CUTTING

- Scribing and Breaking:** This method is used to achieve a quick, straight line cut of single sheets of ACRILMIR mirror thinner than 3 mm thick. Mark the line to be scored on the mirror with a commercial scribe. Firmly place a straight edge along the line and use it as a guideline for the scribe or knife. Scribe the mirror along the line using several firms, evenly pressured strokes. Then, overhang the end of the mirror off the work table.
- Circular Table and Panels Saw Cutting:** These saws are used to achieve a precise, straight line cut of one or more sheets of ACRILMIR 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 the saw blade diameter and mount it against the outside of the blade. To prevent back cutting, the saw arbor, the saw table and the table fence must be properly aligned. Also, the throat plate (table kerf) must be kept to a minimum.
- Saber Saw Cutting:** Use enough power to make the needy cuts, using a smooth and even feed rate. Uneven feed rates may produce gumming or chipping of the ACRILMIR Mirror. 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 ACRILMIR Mirror. Without feeding too fast, press the saw shoe firmly against the mirror while cutting (*)
- 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 tends to soften and fuse the ACRILMIR Mirror. To avoid this, use a fast and steady feed rate (*)
- Bend Saw Cutting:** Band saws are used for cutting curved sections or trimming thermoformed parts (*)
- Laser Cutting:** Lasers may be used to cut virtually any image on an ACRILMIR Mirror with a minimal material waste. The CO₂ laser operates by focusing a large amount of energy on a small defined area and melting and vaporizing the material. It produces a clean, polished edge without any saw chips. Annealing the sheet is recommended after cutting, especially when cementing is anticipated. Caution: laser can create stresses along cut areas. But sure to use a test piece before fabrication.

ROUTING

Many routers are available for use in the fabrication process. The router should have a minimum of 1 horse power and a no load speed of about 20,000 RPM. Routers are normally used with a single or double fluted bit, but may consist of 1 to 4 flutes. Router bits can be carbide tipped, high-speed steel, solid carbide, or diamond-tipped. They may be one piece, piloted, not-piloted, straight cutting, multiple part, forming or speciality bits(*).

- Hand Routing:** An hand router is generally used when making a prototype or a replacement part. By using a pre-cut template pattern clamped to the ACRILMIR Mirror, the hand held router may be smoothly guided around the pattern. Move clamps whenever necessary (*).
- Circle Routing:** A circle router would be used when a 360° piece of ACRILMIR Mirror is needed (*).
- Pin Routing:** Pin routers are very flexible. A double-backed tape or vacuum holds the mirror in place. Using the mounted overarm router to hold the cutter over a guide pin in the table, feed the mirror and pattern into the cutter and rotate 360° to form finished product (*).
- 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 ACRILMIR Mirrors at one time, clamps should be mounted on the top of the

work. Be sure to raise and lower clamp holders as necessary when the jig is rotated (*)

(*) *CAUTION: A cool air mist should be in contact with the blades of all cutting devices before during penetration of the plastic*

Computerised CNC routers are used in the manufacture of high volume production. This type of Numerical Control router is designed for maximum use of the ACRILMIR Mirror. Mirrors may be (CNC) Routing designed for stacking which eliminates much of the waste normally produced (*). Direction of Travel: This router is designed to rotate counter-clockwise for external cuts, and clockwise for routing the inside edges of the ACRILMIR Mirror. 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 ACRILMIR Mirror or the tool in use.

- 1) Routers are designed with a small diameter and must be operated at high speeds. Avoid vibrations, even the slightest vibration can cause crazing and fractures in the ACRILMIR Mirror during routing.
- 2) Watch RMP speeds, higher RPM rates for faster feeding of the ACRILMIR Mirror, resulting in a smoother finish. Recommended RPM speeds are 18.000 to 28.000 RPM.
- 3) For maximum production, operate the feed rate just below chipping speed. Do not overload the motor.
- 4) Maintaining a sharp cutter is very important to avoid chipping and decreased production.
- 5) Use the largest diameter cutter whenever possible, in order to provide a better surface with less tendency to chip.

DRILLING

ACRILMIR Mirror may be easily drilled with any commercial power-driven drill available.

Before drilling an hole in an ACRILMIR Mirror, it is recommended to use a bit offered especially for plastics. If a drill bit for plastic is not available, a metal-working drill bit with a high-speed twist may be used with some modification.

Since metal-working drill bits are designed to push through metal the following modifications must be made to ensure no chipping or other damage of the ACRILMIR Mirror:

- 1) The tip angle is usually about 120°, this is too flat to cut through ACRILMIR Mirror 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 ACRILMIR Mirror 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.

When drilling the actual ACRILMIR Mirror it would be wise to back up the surface with a durable surface, such as plywood, so the drill bit will continue into a solid material, this will prevent chipping the opposite side of the ACRILMIR Mirror. A slow feed rate should be used when the bit enters or exists the ACRILMIR Mirror.

Holes of 25 mm or larger may be cut with a circle cutter. To accommodate the material properties of ACRILMIR Mirror, the cutter bit must be modified so the tip scrapes the material without gouging it. Use a cool air mist system to avoid heat build up, leaving the walls of the hole with a smoother cutting edge. Use a drill press for uniform pressure and constant vertical positioning.

(*) *CAUTION: A cool air mist should be in contact with the blades of all cutting devices before during penetration of the plastic.*

EDGE AND SURFACE FINISHING

The extent of finishing 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 also reduced when a spray coolant 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 sharpened from a saw-cut, sanding is not necessary when there is a well milled edge. A jointer, sharper, 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 200 mm to 355 mm with bias strips.

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

Polishing: Prior sanding is not necessary when the scratches or machining marks are not too deep. A surface polishing wheel should be from 150 mm to 300 mm in diameter, built up to a width for 40 mm to 100 mm. For the initial polish, use a soft, bleached muslin wheel, followed by soft flannel wheel for the finishing.

Depending on the depth of the scratches, use a medium-course polishing compound or a fine compound.

ACRILMIR mirror sheets may soften when over-heating is a result of excessive pressure, also be sure to keep the ACRILMIR mirror in motion at all times during the polishing procedure.

CHEMICAL RESISTANCE

Like all plastic materials, ACRILMIR Mirrors will react when exposed to many chemicals. Below is a partial list of chemicals known to react with ACRILMIR Mirror, exposure to them should be avoided. Factors such as fabrication stresses, exposure to loads or changing temperatures and the method of application can all influence the possible reaction. In all cases, care should be taken with dry chemicals or solvents used near ACRILMIR Mirrors.

Chemicals that affect ACRILMIR Mirrored acrylic:

- Benzene
- Carbon Tetrachloride
- Ethers
- Ethyl Alcohol
- Esterstoluene
- Ketones
- Lacquer Thinners
- Methyl Alcohol

CEMENTING

Mirrored acrylic, like mirrored glass, is a reflective film applied to a substrate. When the substrate is affixed to another surface, both of these materials will conform to all the irregularities of the supporting surface. A non-smooth, nonplanar surface will cause localised bending of the mirrored sheet and distortion in the reflected image.

For best results, mirrored acrylic should be mounted to a smooth, rigid, sturdy, flat backing such as 5 to 7 ply, 16 mm or 19 mm plywood. The surface should be coated with a good paint or sealant to cover pockets and seal out moisture. The entire surface should then be covered with a mastic or another type of pressure sensitive adhesive.

Another option is to drill oversized holes in the mirrored acrylic and hold it to the wall using screw fasteners. Do not overtightening will cause dimpling and distortion.

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

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

Some adhesives may contain strong solvent contents which can attack the backcoat. Since numerous adhesive cements, and mastic tapes are available, they should be tested on expendable pieces prior to application of the adhesive. All tests should be applied at least 84 hours in advance to determine compatibility to the backside, the reflexive coating, and the acrylic itself. Again we stress, before using any adhesives, mastics or cements, please test expendable samples for at least 84 hours to determine suitability.

MIRROR BENDING

Line or strip bending is best accomplished by applying an intense narrow band of heat approximately 3 mm away from the mirror substrate.

- Place the mirror face toward the heating element. Do not attempt to heat the paint side. Doing so will prolong heating times and cause blushing, a dulling of the mirrors reflective finish;
- Adjust your power source so that the wire becomes a medium to bright red colour;
- Peel all masking several centimetres away from the bend area. Masking left in place, either poly or paper, will increase heating time and yield poor results.
- Acrylic will become bendable at 143 ° to 163°. Bending should be done at the coldest possible temperature requiring gentle force to make the bend. 3 mm mirror 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.
- Cooling should be done as quickly as possible by air circulation.

FLAMMABILITY INFORMATION

Acrylic Mirrored 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.

IMPORTANT NOTICE Careless handling of the product can result in injury. The same precaution should be exercised when using acrylic mirror that are taken when fabricating glass, plastic or wood to Prevent accident or ingestion.

IMPORTANT: The information contained herein are not to be taken as warranty or representation for which we assume legal responsibility nor a permission, inducement or recommendation to practice any patented invention without a license. The information is offered solely for your consideration, investigation. Users should perform their own testing and verification to determine the applicability and suitability of the information and any products for their own particular purpose.

PROPERTY	TEST METHOD	UNITS	EXTRUDED MIRROR SHEETS
<u>GENERAL</u>			
Relative density	ISO 1183		1,2
Rockwell hardness (*)	ISO 2039-2	M Scale	101
Ball Indentation hardness(*)	ISO 2039-1	MPa	
Water Absorption	ISO 62	%	0,2
Flammability (*)	DIN 4102	%	B2
Flammability (*)	UL 94	%	HB
Flammability (*)	BS 476, Pt 7	Class	4
<u>MECHANICAL</u>			
Tensile strength	ISO 527 (a)	MPa	70
Elongation at break	ISO 527 (a)	%	4
Flexural strength	ISO 178 (b)	MPa	107
Flexural strength to 23°	DIN53452	MPa	120
Flexural modulus	ISO 178 (b)	MPa	3030
Charpy Impact strength	ISO 179 (c)	Kjm ⁻²	10
Coefficient of elasticity	DIN53452	MPa	3000
IZOD Impact strength	ISO 180/1A (d)	Kjm ⁻²	-
IZOD Impact strength with incision	ASTMD256A	Kl/m ²	1,3
Share D scale hardness	ISO 3868	-	80
<u>THERMAL</u>			
Vicat Softening Point	DIN51306	°C	>103
Thermic conductivity	DIN52612	W/m/°c	0,19
Specific heat	ASTMC351	l/g/°C	1,32
Coefficient K of thermal insulation	DIN4701	W/m ² /C°	5,3
Coefficient of thermal expansion	ASTM D696	x10 ⁻⁵ k ⁻¹	7,8
PROPERTY	TEST METHOD	UNITS	EXTRUDED MIRROR SHEETS
<u>ELECTRICAL</u>			
Surface resistlivity	IEC 93	Ω m ⁻²	>10 ¹⁴
Electrical strength	IEC 243	KV mm ⁻¹	
Dielectric constant to 50 Hz	DIN 53483		3,7
Dielectric constant to 1 MHz	DIN 53483		2,6
<u>PHYSICAL</u>			
Specific weight	DIN 53479	G/cm ²	1,20