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- Sheet Plastics
- Cut to size & shape
- CNC Router cutting
- Fabrication
- Vacuum Forming
- Boat Screens & windows
- Signs & Displays
- Engineering Plastics
- Ecoscreen Plastic Lattice
- C/S Acrovyn
- Bld/Lic RL155051

modified: 1/8/05

ACRYLIC TECHNICAL DATA AND INFORMATION SHEET

Characteristics of the material
Acrylic is half the weight of glass, Impact resistant, Unaffected by sun or salt spray
Temperature range of -10°C to +55°C for continuous service.

Cleaning
Wash with mild soap or detergent, with plenty of lukewarm water, dry with soft cloth or chamois. Grease, oil or tar can be removed with hexane or kerosene. Solvent residue should be removed by washing immediately. Do not use window cleaning sprays, scouring compounds, acetone, petrol, benzene, carbon tetrachloride or lacquer thinner.

Masking
When working with the material, leave the paper masking film on the sheet as long as possible. Except for intricate detail work you should remove the masking only when your project is completed. Never leave the masking exposed to sunlight or water.

Working with acrylic sheet
DO
Keep masking on as long as possible. Use metal cutting saw blades and drills which are ground and sharpened specifically for acrylic sheet. Make sure all tools are sharp. Use water or drilling oil as a coolant when cutting sheets over 3.0mm thick or drilling sheets over 4.5mm thick. Wet the material before cleaning.

DON'T
Use saw blades with side-set teeth. Saw teeth ideally should be ground with 0° of rake and be of uniform height and shape.

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Cutting Acrylic Sheet

Cutting with a knife or scriber

Acrylic sheet up to 4.5 mm thick may be cut by a method similar to that used to cut glass. Use a scribing knife, a metal scriber, an awl, or a utility knife to score the sheet. Draw the scriber several times (7 or 8 times for a 4.5 mm sheet) along a straight edge held firmly in place. Then clamp the sheet or hold it rigidly under a straight edge with the scribe mark hanging just over the edge of a table. Apply a sharp downward pressure to break the sheet along the scribe line. Scrape the edges to smooth any sharp corners. This method is not recommended for long breaks or thick material.

Cutting with power saws

Special blades are available to cut acrylic. Otherwise use blades designed to cut aluminium or copper. Teeth should be fine, of the same height, evenly spaced, with little or no set.

Table and circular saws

Use hollow ground high speed blades with no set and at least 5 teeth per inch. Carbide tipped blades with a triple chip tooth will give the smoothest cuts. Set the blade height about 3.0 mm above the height of the material. This will reduce edge chipping.
When using a hand held circular saw, clamp the sheet to the work surface and use a length of 25 x 75 wood to distribute the clamping pressure and act as a guide for the saw. Feed the work slowly and smoothly. Lubricate the blade with soap or beeswax to minimise gumming from the masking adhesive. Be sure the saw is up to full speed before beginning the cut. Water cooling the blade is suggested for thicknesses over 6 mm, especially if edge cementing will be performed.

Jig saws

Use metal or plastic cutting blades. The blades you use to cut acrylic should never be used for any other material. Cut at high speed and be sure the saw is at full speed before beginning the cut.

Hand saws

Good results are possible, but very difficult. Be sure the acrylic is clamped to prevent flexing. Flexing at the cut may cause cracking.

Routers and shapers

Use single fluted bits for inside circle routing and double fluted bits for edge routing. At the high speeds at which routers operate it is critical to avoid all vibration. Even small vibrations can cause crazing and fractures during routing.

Drilling

For best results, use drill bits designed specifically for acrylic.
Regular twist drills can be used, but need modification to keep the blade from grabbing and fracturing the plastic. Modify the bit by grinding small flats onto both cutting edges, so the bit cuts with a scraping action. If the drill is correctly sharpened and operated at the correct speed, two continuous spiral ribbons will emerge from the hole.

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Finishing Acrylic

Scraping

The first step in getting a finished edge is scraping. The back of a hacksaw blade is perfect for scraping. Simply draw the corner of the square edge of the blade along the edge of the acrylic.

Filing

A 300 mm smooth cut file is recommended for filing edges and removing tool marks.
File only in one direction. Keep the teeth flat on the surface, but let the file slide at an angle to avoid putting grooves in the work.

Sanding

If necessary, start with 120 grit sandpaper, used dry. Then switch to a 220 grit paper, dry. Finish with a 400 grit wet/dry paper, used wet. Grits as fine as 600 may be used. Always use a wooden or rubber sanding block.
When removing scratches be sure to sand an area larger than the scratch. Sand with a circular motion, and use a light touch and plenty of water with wet/dry papers.
Almost any commercial power sander can be used with acrylic. Use light pressure and slower speeds.

Polishing

Final polishing will give acrylic a high lustre. Power-driven buffing tools are recommended without exception. Buffing wheels are available as attachments for electric drills.
A good buffing wheel for acrylic consists of layers of 5 mm carbonised felt, or layers of unbleached muslin laid together to form a wheel. Solidly stitched wheels should be avoided.
The wheel should reach a surface speed of at least 400 metres per minute. Speeds of up to 1200 metres per minute are useful for acrylic.
Acrylic should be polished using a commercial buffing compound of the type used for silver or brass, or you can use a non- silicone car polish that has no cleaning solvents in it.
First, however, tallow should be applied to the wheel as a base for the buffing compound. Just touch the tallow stick to the spinning wheel, and then quickly apply the buffing compound.
To polish, move the piece back and forth across the buffing wheel. Be careful not to apply too much pressure. Keep the work constantly moving to prevent heat build up.
Never begin polishing at the edge of the sheet. The wheel could easily catch the top edge and throw the piece across the room or at you.

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Forming Acrylic

Acrylic can be heated to make it pliable. It will become rigid again when it cools. Never heat acrylic in a kitchen oven. Explosive fumes can accumulate inside the oven, and ignite.

A strip heater is the best tool to form acrylic. This tool will only form straight line bends. The strip heater will heat just the area to be formed.

Heat the sheet until it begins to sag at the bend line. The bend should be made away from the side exposed to the heating element. Sheet thicker than 4.5 mm should be heated on both sides for a proper bend. Use forming jigs or clamps for best results, and wear heavy cotton gloves when handling heated acrylic.

Forming other than straight line bends will generally require specialised equipment and jigs.

Capillary cementing Acrylic

This is the most popular method for joining acrylic. However, this method will not work at all unless the parts to be joined fit together PERFECTLY.
Make sure the parts fit properly. Then join them with masking tape or clamp them in a form to hold them firmly in place. It is important that the joint be in a horizontal plane, or the cement will run out of the joint.
Apply the cement carefully along the entire joint. Apply from the inside of a box-corner joint, and on both sides of a flat joint. A needle-nosed applicator bottle is recommended. The thin cement will flow into the joint through capillary action and form a strong bond. Maximum bond strength will not be reached for 24 to 48 hours.

Viscous cementing

Viscous cements are used for joints that can't be cemented with capillary or soak cementing, either because the joint is difficult to reach or because the parts don't fit properly. Viscous cement is thick and will fill small gaps. It can make strong transparent joints where solvent can't.
You can make your own viscous cement by dissolving chips of clear acrylic sheet in a small amount of solvent.
Apply a small bead of cement to one side of the joint, join the pieces, and tape or clamp in place until cured.

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The data sheet below describes General Purpose (GP) cast acrylic, High Impact (HI) and Ultra High Impact (UHI) acrylic sheet.

PROPERTIES	ASTM	UNIT	GP	HI	UHI
General					
Specific Gravity	D-792	g/cm³	1.19	1.18	1.17
Water Absorption	D-570	% @ 24 hrs	0.3-0.4	0.3-0.4	0.3-0.4
Light Transmission	D-1003	%	92	91	90
Dielectric Strength	D-149	Volts/Mil	450-550	450-550	450-550
Mechanical					
Notched Impact	D-256	J/m	22	50	64
Tensile Strength	D-638	Mpa	74	54	38
Flexural Strength	D-790	MPa	112	84	60
Hardness Rockwell	D-785	M or R	M80-100		
Thermal					
Cont. Working Temp.		°C	77-86	76-82	75-80
Vacforming Temp		°C	135-190	135-190	135-190
Thermal Expansion	D-696	10^5/°C	7.7	9.4	11.3

These values are representative of those obtained under standard ASTM conditions and should not be used to design parts which function under different conditions