



CAST ACRYLIC SHEET

Physical properties, tolerances, chemical resistance and fabrication guidance

Canal Plastics Center cast acrylic is cell-cast PMMA sheet in clear, transparent, translucent, opaque and specialty colors. Cast sheet machines, laser cuts, bonds and thermoforms cleanly, with lower internal stress than extruded sheet. The values below are typical for our cast lines, compiled from published manufacturer data; where sources differ, the more conservative figure is shown. Extruded and mirror products have their own data sheet.

PHYSICAL PROPERTIES

PROPERTY	TYPICAL VALUE	TEST METHOD
OPTICAL		
Specific gravity	1.19	ASTM D792
Refractive index	1.49	ASTM D542
Light transmission, clear	92%	ASTM D1003
Haze, clear	2% or less	ASTM D1003
MECHANICAL		
Tensile strength	9,600 psi (66 MPa)	ASTM D638
Elongation at rupture	4.2%	ASTM D638
Tensile modulus	400,000 psi (2,760 MPa)	ASTM D638
Flexural strength	15,000 psi (103 MPa)	ASTM D790
Izod impact, notched	0.4 ft-lb/in (21 J/m)	ASTM D256
Rockwell hardness	M-90	ASTM D785
Barcol hardness	49	ASTM D2583
THERMAL		
Deflection temperature, 264 psi	196°F (91°C)	ASTM D648
Softening point	above 212°F (100°C)	ASTM D1525
Max continuous service temperature	176°F (80°C)	
Thermoforming temperature	290 to 380°F (140 to 190°C)	
Coefficient of linear thermal expansion	0.000040 in/in/°F	ASTM D696
Thermal conductivity	0.19 W/m-K	
OTHER		
Water absorption, 24 hr at 73°F	0.3%	ASTM D570
Minimum cold bending radius	330 × sheet thickness	

Values are for clear sheet, 1/8" to 1/4" (3 to 6 mm), and are typical, not specifications. Some change with thickness and color. A 48" panel moves about 0.002" per 1°F, so allow for expansion in frames and channels; keep continuous loads under 1,500 psi to avoid crazing.

THICKNESS AND CUTTING TOLERANCE

THICKNESS, ALL GAUGES

+/- 10 to 15%

Per ASTM D4802, Category A-1, Finish 1

PRE-CUT SIZES

+/- 1/8"

Width and length are nominal. Urban Exotics and Urban Alchemy: +/- 1/4"

CUSTOM CUT TO SIZE

+/- 1/32"

Cut in our New York shop to your dimensions

CHEMICAL RESISTANCE

Cast acrylic resists water, dilute alkalis, most salts and aliphatic hydrocarbons, but is attacked by ketones, aromatic and chlorinated solvents and strong alcohols. Cutting, laser work and bending add stress and lower resistance, so test critical exposures on a fabricated part.

■ RESISTANT

Long exposure up to 120°F (49°C)

Water, mild soap and detergent solutions, sodium chloride, calcium chloride, ammonium chloride, ammonium hydroxide, sodium hydroxide, sodium hypochlorite (bleach), hydrochloric acid, nitric acid (10%), hydrogen peroxide (3%), glycerin, hexane, heptane, kerosene, VM&P naphtha, mineral oil, diesel oil

■ LIMITED

Short exposure at room temperature only

Isopropyl alcohol (up to 50%), methyl alcohol (up to 30%), acetic acid (10%), gasoline, turpentine

■ NOT RESISTANT

Swells, crazes, dissolves or weakens

Acetone, methyl ethyl ketone (MEK), lacquer thinner, toluene, xylene, benzene, methylene chloride, chloroform, carbon tetrachloride, ethylene dichloride, trichloroethylene, ethyl alcohol (30% and stronger), methyl alcohol (100%), glacial acetic acid, chromic acid, concentrated sulfuric and nitric acid, phenol, ethyl and butyl acetate, ether, dioctyl phthalate

CARE, CLEANING AND STORAGE

Clean with mild soap and lukewarm water on a soft cloth, then blot dry. Never wipe acrylic dry: it scratches the surface and builds static.

Use: mild soap or detergent, a plastic cleaner and polish; hexane, kerosene or VM&P naphtha for grease, tar or masking residue.

Scratches: light scratches come out with a plastic scratch remover; wet sand deeper ones at 400 grit, then buff.

Storage: store vertically on A-frames below 104°F (40°C), away from heat. Leave the masking on until fabrication is finished; aged masking adhesive exposed to heat or moisture can leave haze.

Avoid: ammonia window sprays, scouring powders, acetone, alcohol, gasoline, benzene and lacquer thinner.

Static: wipe with a damp cloth, or use an ionizing air gun before painting, printing or forming.

FABRICATION

Heat and stress cause most acrylic failures: keep tools sharp and cool, and anneal before solvents touch a cut or polished edge.

LASER CUTTING	CO2 lasers leave a polished edge with stress 0.010" to 0.050" deep. More power adds gloss and stress; a faster feed with a higher pulse rate lowers both. Keep masking flat and run gas assist and extraction. Anneal before cementing or cleaning.
ANNEALING	Heat to 176 to 180°F (80 to 82°C) for one hour per millimeter of thickness (2 hours minimum, 6 hours is enough for any gauge), then cool slowly for the same time.
CEMENTING	Work at 60 to 100°F, ideally 70 to 75°F, on a square machined edge, never a polished one. The joint grabs in 5 to 10 seconds, can be handled after 3 hours and reaches high strength in 24 to 48 hours. Two-part polymerizable cements give the strongest joints; epoxies bond poorly.
SAWING, ROUTING	Carbide triple-chip blades with 0° to +5° rake, sheet fully supported. Route at 18,000 to 28,000 RPM with a 1/2" or larger cutter, feeding just under the speed where chipping starts.
DRILLING	Use a 0° to 4° rake bit over a scrap acrylic or MDF backer. Add air or water coolant once the hole is deeper than the bit is wide, and peck drill. Chipping: feed too fast. Melting: feed too slow or RPM too high.
LINE BENDING	Keep a strip heater at least 1/8" from the sheet (1/2" for rod or quartz heaters), bend away from the heated side and cool in a jig. Flip sheet over 1/8" thick halfway through heating; bend long parts across the manufacturing direction.
THERMOFORMING	Form at 290 to 380°F (140 to 190°C) by thickness and draw; expect about 1.5% shrinkage. Cool evenly below 140°F (60°C) before release. A formed part reheated past 210°F (99°C) may flatten.
EDGE FINISHING	Wet sand 180 to 320 grit, then 400 and 600, and buff with bleached muslin wheels. Flame polish with an oxygen-hydrogen torch, then anneal.

SAFETY AND FLAMMABILITY

Low toxicity in normal handling, but cast acrylic is a combustible thermoplastic and burns readily once lit. Keep it from open flame and hot lamps, and follow local building codes for architectural use.

FLAMMABILITY UL 94 HB	BURNING RATE, 3 MM 1.2 in/min ASTM D635	SMOKE DENSITY 11.4% ASTM D2843	SELF-IGNITION 910°F (488°C) ASTM D1929
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These are small-scale laboratory tests. They do not reproduce real fire conditions and are not a building-code fire rating.

Fumes: laser cutting and overheating release methyl methacrylate vapor. Extract at the cutting head; never heat above 392°F (200°C).

Fire: use water spray, foam, CO2 or dry chemical. Burning acrylic can release carbon monoxide.

Dust and edges: wear eye protection and gloves; cut edges are sharp. Use a dust mask when sanding without extraction.

SDS: the CPC Cast Acrylic Safety Data Sheet is linked on each product page, or ask us for a copy.

Values are typical and reflect current knowledge; they are guidance, not a specification or a warranty of performance. Test the material under your own fabrication and service conditions before use.