

Acrylite[®] GAR

ABRASION RESISTANT CELL CAST ACRYLIC SHEET

PRODUCT DESCRIPTION

ACRYLITE GAR sheet is a cell cast acrylic sheet coated with 3M 906 abrasion resistant coating. ACRYLITE GAR sheet has excellent abrasion and chemical resistant properties with outstanding optical quality. It is available with coating on one or two sides. While two-side coated sheet provides maximum protection, one-side coated sheet offers economical advantages for applications where only one side of the sheet is exposed. In addition, the uncoated side of the sheet is ideal for silkscreening.

PROPERTIES

ACRYLITE GAR sheet provides the following outstanding properties:

- ◆ Optical clarity
- ◆ Abrasion resistance
- ◆ Chemical resistance
- ◆ Ease of fabrication
- ◆ Light weight – half the weight of glass
- ◆ Strength – many times the impact strength of glass

ACRYLITE GAR sheet resists marring and scratching from everyday public contact, daily cleanings and airborne dirt and dust that are found in many applications. This property significantly extends the service life of the product. Although the coating provides an extremely hard surface to resist these abuses, it is not resistant to intentional attacks with sharp tipped objects such as knives or screwdrivers.

Because ACRYLITE GAR sheet offers protection from chemical attack, many household glass cleaners can be used on the coated surfaces. Recommended cleaning agents and chemical resistance information can be found on page 3.

APPLICATIONS

ACRYLITE GAR acrylic sheet is used in a wide variety of applications including:

One-Sided Coating

- ◆ Museum Cases
- ◆ Custom Displays
- ◆ Architectural Glazing

Two-Sided Coating

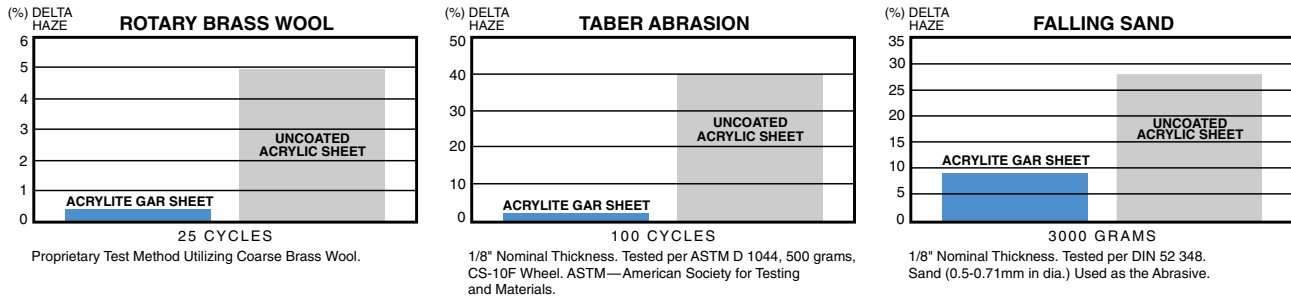
- ◆ Hockey Rinks
- ◆ Bus Windows
- ◆ Security & Architectural Glazing

AVAILABILITY

ACRYLITE GAR sheet is available in thicknesses from 0.060" – 0.591" (1.5 mm – 15.8 mm) and in standard sheet sizes of 4', 5', & 6' x 8' and custom sizes up to 72" x 120" depending upon the thickness. The abrasion resistant surface is available on either one or two sides, and is easily identified by the printed paper masking. A polyethylene masking is also available.

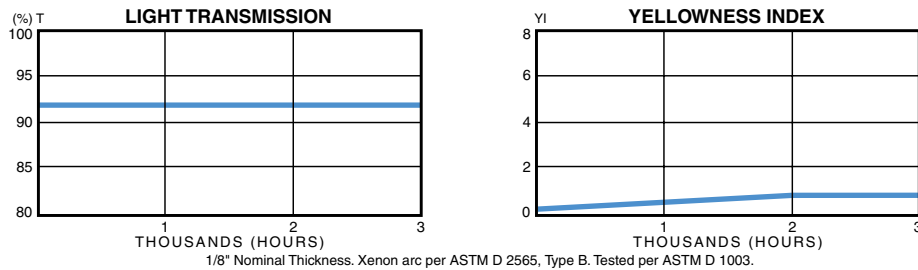
ABRASION RESISTANCE

Assessing how well a product will perform under the conditions of an application must take into account the type of abuse or abrasion the product will encounter. Abrasion can be divided into three types. Scratching is the most common type of abrasion and is often caused by frequent cleaning and handling. Resistance to scratching is evaluated by using a rotary brass wool test in which a coarse brass scouring pad is rubbed on the coated sheet surface by automated test equipment. Resistance to wear is measured by exposing a sample to continuous contact with an abrasive wheel in the Taber abrasion test. Resistance to particle impacts, such as sand, is measured using the falling sand test. This test simulates the type of abrasion typically experienced by a motor vehicle windshield. The following graphs show typical test data demonstrating the outstanding properties that ACRYLITE GAR sheet offers versus conventional uncoated acrylic sheet.



WEATHERING

ACRYLITE GAR sheet maintains its original appearance and color despite heat, cold, sunlight and humidity. It withstands the adverse effects of outdoor weathering and has been found to experience no significant loss of light transmittance or any appreciable increase in yellowing after an accelerated weathering period of 3000 hours, Xenon Arc. This should ensure many years of trouble free performance.



PHYSICAL PROPERTIES

Property	ASTM Method	Typical Substrate Value (3.0mm Thickness)
Mechanical	Tensile Strength	D 638 10,000 psi (69 M Pa)
	Elongation, Rupture	4.2%
	Modulus of Elasticity	400,000 psi (2800 M Pa)
	Flexural Strength	D 790 16,500 psi (144 M Pa)
	Modulus of Elasticity	475,000 psi (3300 M Pa)
Izod Milled Notched	D 256 0.4 ft.lbs/in. (21.6 J/m) of notch	
Optical	Light Transmission, Total	D 1003 92%
Thermal	Deflection Temperature Under Load (264 psi)	D 648 210°F (99°C)
	Vicat Softening Point	D 1525 239°F (115°C)
	Coefficient of Linear Thermal Expansion	D 696 0.000034 in/in.°F (.000061 m/m.°C)
	Coefficient of Thermal Conductivity	C 177 1.3 BTU/hr.ft. ² .°F/in (.19W/m ² .K)
Flammability	Burn Rate	D 635 1.0 in/min (25 mm/min)
	Self-Ignition Temperature	D 1929 910°F (490°C)
	Smoke Density Rating	D 2843 10%
Abrasion Resistance of the Coating		Change in Haze
Rotary Brass Wool (25 cycles)		Proprietary method < 1%
Taber Abrasion (100 cycles)		D 1044 < 2%
Falling Sand (3,000 grams)		DIN 52 348 < 10%

CHEMICAL RESISTANCE

The following table shows the typical test data demonstrating the resistance of ACRYLITE GAR sheet to various chemicals versus uncoated sheet. Note: some chemicals will attack edges and uncoated surfaces of sheet. Contact CYRO's Technical Center regarding the compatibility of any chemical not listed.

Chemical	ACRYLITE GAR sheet	Standard acrylic sheet
Acetone	> 24 hrs	< 15 min
Ethylene Dichloride	> 24 hrs	< 15 min
Gasoline	> 24 hrs	> 24 hrs
Hydrochloric Acid	> 24 hrs	> 24 hrs
Methyl Alcohol	> 24 hrs	> 24 hrs
Methylene Chloride	> 24 hrs	< 15 min
Methyl Ethyl Ketone	> 24 hrs	> 15 min
Nitric Acid	< 24 hrs	< 15 min
Sodium Hydroxide	> 24 hrs	< 24 hrs
Sulfuric Acid	> 24 hrs	< 15 min
Toluene	> 24 hrs	< 15 min
Isopropanol	> 24 hrs	> 24 hrs
Kerosene	> 24 hrs	> 24 hrs

Testing the resistance of these chemicals was conducted per ASTM D 1308. Time intervals for visually inspecting the sheet surface; 15 minutes, 1 hour and 24 hours. The table shows the time it took the chemical to visually attack the surface.

FABRICATION

ACRYLITE GAR sheet can be stored, saw cut, drilled, routed, milled and laser cut using the same tooling and techniques that are used when machining ACRYLITE® GP acrylic sheet. Please refer to ACRYLITE sheet Technical Brief #'s 1-12 for details on how to perform certain machining steps or to find manufacturers of equipment and tooling. When performing any type of machining operation on ACRYLITE GAR sheet, it is recommended to leave the protective masking on the sheet.

There are certain operations that are not recommended for ACRYLITE GAR sheet. They may damage, or in some manner, adversely affect the performance of the abrasion resistant coating. The following operations have fabrication restrictions:

Edge Preparation: Scraping, wet sanding, and buffing are acceptable methods of preparing a finished edge. **Flame polishing is not recommended.** Overspray from the flame will cause the surface coating to crack or craze. This may lead to delamination of the coating and a loss of abrasion resistance in the affected area.

Cementing: ACRYLITE GAR sheet is available with the abrasion resistant coating on one or two sides. When cementing to a non-coated surface, use the same solvent or polymerizable cements commonly used on ACRYLITE sheet. Solvent cementing to an abrasion resistant coated side requires surface preparation. To solvent cement to the coated side, the coating must first be removed by wet sanding or routing. When removing the coating, ensure that the bonding surface is flat, clean and free of stress. Annealing the piece will ensure a stress free surface. Refer to CYRO's Technical Brief # 8 "Cementing" for details, procedures and a list of acceptable cements.

Thermoforming: Line bending or thermoforming ACRYLITE GAR sheet is not recommended. Due to differences in the thermal properties of the coating and substrate, these heating processes can lead to delamination of the coating.

Painting, Silkscreening: Neither is recommended because the abrasion resistant coating provides chemical resistance which will prevent ink or paint from adhering properly.

NOTE: the uncoated side of the one-side coated product is ideal for these applications.

CLEANING

A liquid detergent and water solution is the recommended cleaner for ACRYLITE GAR sheet. While the use of abrasive cleaners is not recommended, the following brand name cleaners have been tested and found to work well on coated surfaces.

CAUTION: Some of these cleaners may attack the uncoated side or edges of the sheet.

Fantastik® household cleaner	Mr. Clean® household cleaner
Formula 409® household cleaner	Top Job® household cleaner
Glass Plus® cleaner	Windex® window cleaner

Never use mechanical methods, such as razor blades, putty knives or scrapers on the surface of the sheets. This may lead to gouging and removal of the abrasion resistant coating.

Graffiti Removal: Several solvents and cleaning agents are effective in graffiti removal. Although ACRYLITE GAR abrasion resistant sheet has excellent chemical resistance, cleaners and solvents should be tested before using to ensure that they do not harm the coating. Avoid exposure of edges and uncoated sheet surface to cleaning agents. For additional information, contact CYRO's Technical Center.

Recommended Cleaners: Due to the varying nature of graffiti, some cleaning agents will be more effective at removal than others. Two cleaning agents that have been found to work well on a variety of graffiti are:

Commercial Remover:
GRAFFITI TERMINATOR REMOVER
Genesis Coatings, Inc.
San Diego, CA
1 (800) 533-4273

Solvent:
TOLUENE
J.T. Baker
Phillipsburg, NJ
1 (908) 859-2151

Be sure to read the supplier's MSDS and follow their directions carefully for handling, use and disposal of the cleaner.

Procedure: Apply the cleaner generously, avoiding contact with uncoated surfaces. Allow the cleaner to penetrate the graffiti for 2 – 5 minutes. Remove the graffiti by rubbing with a soft cloth. Repeat these steps as needed to remove the graffiti. A plastic putty knife or smoother blade (found in the wallpaper section of a department store) may be used to scrape at stubborn or hardened paints, but care must be taken not to gouge the coating. **Never use a razor blade, metal knife or scraper.** Wash the area with mild soap and water to remove residue.

CODE APPROVAL

ACRYLITE GAR sheet meets the requirements of the following codes and regulations:

- ANSI Z 97.1 for Safety Glazing Materials Used in Buildings
- ANSI Z26.1, AS-4, 5, 6 & 7 for Safety Glazing Materials for Glazing Motor Vehicles
- Uniform Building Codes for use as a Light Transmitting Plastic:
 - See BOCA Evaluation Services, Inc., Research Report # 94-30
 - ICBO Evaluation Service, Inc. Evaluation Report # 3715-CC2 Classification
 - SBCCI PST & ESI Evaluation Report # 95112A
 - City of Los Angeles, Research Report RR 24392
 - Wisconsin Material Approval, Approval # 950043-L
- Consumer Products Safety Commission, Safety Standard for Architectural Glazing Materials, 16CFR 1201, Categories I & II
- UL Recognized Component, File # E54671:
 - UL Flammability Ratings: HB in all thicknesses

Flammability: ACRYLITE GAR sheet is a combustible thermoplastic. Precautions should be taken to protect this material from flames and high heat sources. ACRYLITE GAR sheet usually burns to completion if not extinguished. The products of combustion, if sufficient air is present, are carbon dioxide and water. However, in many fires sufficient air will not be available and toxic carbon monoxide will be formed, as it will when other common combustible materials are burned. We urge good judgment in the use of this versatile material and recommend that building codes be followed carefully to assure it is used properly.

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

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