

Aviation

ACRYLITE® Acrylic Sheet Products for
Aircraft Transparencies



Evonik CYRO LLC, an Evonik Degussa Corporation group company, is a leading manufacturer of acrylic sheet & molding compounds, and bulk and performance monomers. Having spearheaded the development and expansion of continuously manufactured and specialty cell cast sheet products, we have earned a reputation as a leader in innovative new technology in the plastics industry. Evonik CYRO is part of the North American Performance Polymers business unit within the Chemicals Business Area of Evonik Industries.

Evonik's Performance Polymers business occupies a leading global position in the international methacrylates chemistry market. Our strengths are creativity, specialization, continuous self-renewal, and reliability.

Aircraft glazing was one of the first applications for cast acrylic sheet. Acrylic is lightweight, resistant to thermal shock and has excellent optical clarity and mechanical properties. Evonik CYRO has successfully marketed these products for both military and commercial aircraft applications for many years.

The aviation acrylic sheet products include:

ACRYLITE® 249 aviation-grade, crosslinked acrylic sheet is certified to meet Military Specification MIL-P-8184 as a Type II, Class 2 material.

ACRYLITE® GMS aviation acrylic sheet is manufactured to meet the requirements of Military Specification MIL-P-5425.

ACRYLITE® GMU cell cast acrylic sheet is designed for general aviation applications and is superior to standard cell cast acrylics in both optical quality and thickness tolerance.

Typical Applications of Our Products

ACRYLITE® 249 sheet is used in a wide variety of commercial aircraft, military jets and helicopter transparencies.



F/A-18, windshield and canopy made from ACRYLITE® 249 sheet

ACRYLITE® GMS sheet applications include instrument panels, wingtip lenses, dust covers, helicopter bubbles and aircraft canopies.



View through a Boeing B 747, window with dust covers made from ACRYLITE® GMS

ACRYLITE® GMU sheet for aviation applications where military specifications are not required, such as general aviation windshields.



Bell helicopter glazing made from ACRYLITE® GMU sheet

The Products

ACRYLITE® 249 acrylic sheet meets and is certified to MIL-P-8184F (Type II, Class 2). ACRYLITE® 249 is a cross-linked cast acrylic sheet with increased resistance to crazing and solvent attack, as well as improved dimensional stability after heating. This specification requires optical quality cast acrylic sheet that is superior to conventional acrylic sheet. ACRYLITE® 249 sheet is used in a wide variety of aviation and ground vehicle transparencies in monolithic or laminated form.

ACRYLITE® GMS acrylic sheet meets and is certified to MIL-P-5425E for use in the aviation industry as a laminate part or as a stand alone sheet. It has the optical quality, hardness and sheet tolerance required by the industry. It is manufactured using equipment that is reserved for aviation acrylic products and is subjected to a rigorous optical inspection, the most critical in the industry. Current applications include instrument panels, wingtip lenses, dust covers, helicopter bubbles and aircraft canopies.

ACRYLITE® GMU sheet is a cell cast acrylic sheet designed for general aviation and helicopter window applications and is superior to standard cell cast acrylics in both optical quality and thickness tolerance. It is manufactured using the same process and the exacting optical requirements as product manufactured to meet MIL P-8184F and MIL P-5425E. ACRYLITE® GMU sheet is a good choice for meeting the difficult optical requirements of MIL P-8184F and P-5425E, but is more economical and ideal for many non-military aircraft applications.

JAS 39 Gripen, windshield made from European GS 249 stretched



Sales Range

	Thickness (inches)										
ACRYLITE® GMU, ACRYLITE® GMS, ACRYLITE® 249	.060"	.080"	.100"	.125"	.150"	.187"	.220"	.250"	.312"	.375"	.500"

	Thickness (inches)	Standard sizes (inches)							
ACRYLITE® GMU	.060":			48" x 72"	48" x 96"			60" x 96"	72" x 96"
	.080" and thicker:			48" x 72"	48" x 96"			60" x 96"	72" x 96"
ACRYLITE® GMS	.060":	36" x 48"							
	.080" & .100":	36" x 48"		48" x 72"			60" x 72"		
	.125" and thicker:	36" x 48"	48" x 60"	48" x 72"	48" x 96"	53" x 80"	60" x 72"	60" x 96"	72" x 96"
ACRYLITE® 249	.060":	36" x 48"							
	.080" & .100":	36" x 48"		48" x 72"			60" x 72"		
	.125" and thicker:	36" x 48"	48" x 60"	48" x 72"	48" x 96"		60" x 72"	60" x 96"	72" x 96"

**All product types offer additional sheet size 77" x 110" for thickness .080" and above"

Overages

All sheets are supplied net trim (no overage). Untrimmed sheets are available. No guarantee is given as to the additional area obtained by ordering untrimmed sheet. For information on custom thicknesses and sizes please contact our sales department.

Color

ACRYLITE® aircraft-grade sheets are available in a variety of transparent colors. Please contact our sales department for further information.

Tolerances

ACRYLITE® aircraft-grade sheets are supplied within the tolerance limits of the applicable specification.

Fabrication

ACRYLITE® aviation grade sheet offers excellent optical characteristics, thickness tolerances, light stability, and low internal stress levels for consistent performance. ACRYLITE® acrylic sheet can be easily cut, sawed, machined, thermoformed and cemented.

Fabrication techniques used on standard cell cast acrylic sheet are appropriate for ACRYLITE® GMS and ACRYLITE® GMU sheet. When drape forming, excellent results can be achieved if the sheet is heated evenly between 300°F. For pressure forming or vacuum forming operation, temperatures of 340°F to 380°F are recommended.

Most fabrication techniques used with conventional acrylic sheet can also be followed when fabricating ACRYLITE® 249 sheet. Slight technique modification is required.

Techknowlogy Center

We have a trained staff of technical engineers who can provide product knowledge and technical support on request.

Simply log on to our interactive website on www.cyro.com and access the industry leading database of FAQs or email our engineers your questions.

You can also contact one of our experienced engineers by calling 207 490-4230.

We will be happy to help.

Product Properties of Cast ACRYLITE® Sheet

Property	Test Method	Unit	Typical Value		
			ACRYLITE® GMU	ACRYLITE® GMS	ACRYLITE® 249
Specific Gravity	ASTM D-792	g/cm ³	1.19	1.19	1.19
Tensile strength	ASTM D-638	psi	10,000	11,000	11,650
Elongation	ASTM D-638	%	4.2	5.7	4.4
Internal Strain	MIL-P-8184F	%		< 1	0.3
Light transmittance -initial -after accelerated weathering	MIL-P-8184 F ASTM D-1003	% %	92	92.6 92.3	92.6 92.5
Haze -initial -after accelerated weathering	MIL-P-8184 F ASTM D-1003	% %		0.4 0.4	0.3 0.7
Angular Deviation	ASTM D-637	minutes		< 3	3
Thermal Expansion	ASTM D-696	in/in °C	0.000061	0.000061	0.000056
Deflection Temperature (264 psi)	ASTM D-648	°C °F	115 239	115 239	112 234
Flammability	ASTM D-635	inch/min	1.80*	1.25**	0.83***
Water Absorption (24h)	ASTM D-570	%	0.80	0.33	0.13
Craze Resistance - dry: Isopropanol Toluene/Isobutyl Acetate - wet: Isopropanol Toluene/Isobutyl Acetate	MIL-P-8184F MIL-P-8184F MIL-P-8184F MIL-P-8184F	psi psi psi psi			3150 2100 2300 1610

*thickness .118"

**thickness .250"

***thickness of .500"

Approvals and Specifications

	U.S.	Germany	France	Great Britain	AECMA	Russia
ACRYLITE® GMU	Meets AMS-LP-391 ASTM-D-4802	Aviation Grade Material according to European specification can be provided by Evonik Röhm GmbH. Our sales department can give further details.				
ACRYLITE® GMS	Qualified to MIL-P-5425					
ACRYLITE® 249	Qualified to MIL-P-8184 Type II, Class 2					

Evonik CYRO LLC is the North American Performance Polymers business unit within the Chemicals Business Area of Evonik Industries.

Evonik's Performance Polymers business unit occupies a leading global position in the international methacrylate chemistry markets with specialty and standard products from four business lines – Molding Compounds, Acrylic Sheet and Bulk and Performance Monomers.

PMMA Acrylic sheet products are sold in the Americas under the ACRYLITE® and ACRYLITE PLUS® trademarks. They are sold under the PLEXIGLAS® trademark everywhere outside of the Americas.

ACRYLITE® acrylic sheet is a registered trademark of Evonik CYRO LLC, an Evonik Degussa Corporation group company.

Important Notice:

The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE. Nothing herein is to be taken as permission, inducement or recommendation to practice any patented invention without a license.

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