# **AEROSPACE PRODUCTS**





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For more information on SPARTECH POLYCAST or any other products manufactured by Spartech, contact us by phone, e-mail, or visit our website.



## OUR COMPANY



Cast acrylic sheet is the ideal material for aircraft transparencies. Spartech Polycast is known, the world over, as a leading producer of cast acrylic sheet for cabin windows, fighter canopies, windscreens, wing-tip lenses, outer laminates and instrument panels for general aviation and military aircraft. Polycast is also recognized as the manufacturer most responsive to the specific needs of its customer. Our range of sizes, thicknesses, colors and research facilities are dedicated to meeting the present and future needs of the demanding aerospace industry.

Spartech Poylcast has been manufacturing cast acrylic sheet for over 30 years and is presently the principal supplier of acrylic sheet meeting U.S. Military Material Specifications MIL-P-5425, MIL-P-8184 and MIL-P-25690 to the United States aerospace industry. Spartech Polycast has developed an enhanced crazed-resistant material and MIL-P-8184 has been revised to recognize the improved performance of this material.

### OUR SERVICES

- Here are some of the ways in which Spartech Polycast has made creative, effective and prompt response to the needs of out customers and the aerospace industry in general.
- The development of improved acrylic to meet the fast-changing demands of commercial and military aircraft manufactures for superior material.
- The production of a horizontally shrunk sheet with residual shrinkage of less than .25% (Mil Spec allows up to 1%). This characteristic allows for forming before fabrication. It is ideal for edgelit panel and radar screen applications.
- Polycast standards consistently surpass the quality levels
  required by the Mil Spec. Polycasts sheet cleanliness and optical clarity are superior in the industry.
- The development of a sheet with different thicknesses in the
  center as compared to the edges. This enabled an aircraft manufacturer to design a canopy with strong, frontal impact capabilities yet which is thin enough on top so that a pilot can eject through it.

The formulation of colors which meet specific percentages of light transmission at final, stretched thickness.

The development of a strong technical support which is widely known in the aerospace industry for its commitment to technical customer service, whether rendered by mail, phone or in person.

# **OUR PRODUCTS**

**POLY A (ASTM D-4802)** is our standard unshrunk acrylic manufactured to a visual and optical aircraft specification. It is available in clear as well as transparent colors. common applications are non-critical glazing for commercial helicopters and sport planes.

**POLY FR9** is an interior acrylic material ideal for aircraft applications where low flame spread and low smoke generation are desirable.

**POLY 900** is a semi-cross-linked material formulated to meet British specifications DTD-5592.

**POLY II (MIL-P-5425)** military specification covering heat-resistant, preshrunk, clear, and colored acrylic sheet. Material supplied for conformance for this specification is identified by the name POLY II<sup>®</sup>. Polycast is qualified to furnish sheets in thickness 0.060-1.000 to meet this specification.

**POLY 76 (MIL-P-8184)** is a crosslinked, preshrunk acrylic with excellent resistance to crazing, solvent attacks and thermal dimensional change. As one of few U.S. Military approved materials for stretched panels (MIL-P-25690), sophisticated applications for both military and commercial aircraft are numerous. Availability in transparent colors enhances the versatility of this product. It meets or exceeds all requirements of MIL-P-8184. Type I and II, Class 1 and 2.

**POLY 84 (MIL-P-8184)** is a uniquely formulated, crosslinked preshrunk acrylic specifically designed to provide superior craze and solvent resistance for today's changing environment. Improvements such as lower water absorption and increased resistance to acids expands the number of "as cast" applications. Poly 84 also meets or exceeds MIL-P-8184, Type I and II, Class 1 and 2. Its superior craze resistance makes it ideal for monolithic windscreens, outer laminates and canopies. It is also available in transparent colors. It meets or exceeds all requirements of MIL-P-8184. Type I and II, Class 1 and 2.

**POLY 2000 (MIL-P-25690)** military specification covering stretched acrylic sheet specially designed from Mil-P-8184 base material. It offers enhanced craze properties and increased crack resistance. Material supplied for conformance to this specification is identified as Poly 2000<sup>™</sup>.

# TOLERANCES

### POLY II<sup>®</sup>

### POLY 76<sup>®</sup> POLY 84<sup>®</sup>

Standard Thickness <sup>1</sup>		Cla	iss A	Cla	iss B	Class C			
Inches	Metric	Inches	Metric	Inches	Metric	Inches	Metric		
0.030 0.060 0.080 0.100 0.125	0.762 1.524 2.032 2.540 3.175	$\pm 0.012$ $\pm 0.012$ $\pm 0.012$ $\pm 0.012$ $\pm 0.012$ $\pm 0.015$	$\pm 0.305$ $\pm 0.305$ $\pm 0.305$ $\pm 0.305$ $\pm 0.381$	$\pm 0.020$ $\pm 0.020$ $\pm 0.020$ $\pm 0.020$	<u>+</u> 0.508 <u>+</u> 0.508 <u>+</u> 0.508 <u>+</u> 0.508	<u>+</u> 0.030	<u>+</u> 0.762		
0.150 0.187 0.220 0.250 0.312	3.810 4.750 5.588 6.350 7.925	$\begin{array}{c} \pm 0.017 \\ \pm 0.020 \\ \pm 0.023 \\ \pm 0.025 \\ \pm 0.030 \end{array}$	$\pm 0.432$ $\pm 0.508$ $\pm 0.584$ $\pm 0.635$ $\pm 0.762$	$\begin{array}{c} \pm 0.020 \\ \pm 0.023 \\ \pm 0.025 \\ \pm 0.030 \\ \pm 0.035 \end{array}$	$\pm 0.508$ $\pm 0.584$ $\pm 0.635$ $\pm 0.762$ $\pm 0.889$	$\begin{array}{c} \pm 0.030 \\ \pm 0.030 \\ \pm 0.030 \\ \pm 0.035 \\ \pm 0.040 \end{array}$	$\begin{array}{r} \pm 0.762 \\ \pm 0.762 \\ \pm 0.762 \\ \pm 0.889 \\ \pm 1.016 \end{array}$		
0.375 0.417 0.500 0.625 0.750	9.525 12.700 15.875 19.050	$\pm 0.035$ $\pm 0.040$ $\pm 0.050$ $\pm 0.050$	<u>+0.889</u> <u>+1.016</u> <u>+1.270</u> <u>+1.270</u>	$\pm 0.040$ $\pm 0.045$ $\pm 0.050$ $\pm 0.050$	±1.016 ±1.143 ±1.270 ±1.270	<u>+0.045</u> <u>+0.050</u> <u>+0.060</u> <u>+0.065</u>	<u>+</u> 1.143 <u>+</u> 1.270 <u>+</u> 1.524 <u>+</u> 1.651		
0.875 1.000 1.250 1.500 1.750	22.225 25.400 31.750 38.100	$\pm 0.050$ $\pm 0.050$ $\pm 0.063$ $\pm 0.075$	±1.270 ±1.270 ±1.600 ±1.905	$\pm 0.050$ $\pm 0.050$ $\pm 0.063$ $\pm 0.075$	±1.270 ±1.270 ±1.600 ±1.905	<u>+0.070</u> <u>+0.075</u> <u>+0.094</u> <u>+0.112</u>	<u>+</u> 1.778 <u>+</u> 1.905 <u>+</u> 2.388 <u>+</u> 2.845		
2.000 2.250 2.500 3.000 3.500 4.000	50.800 57.150 63.500 76.200 88.900	$\pm 0.100$ $\pm 0.113$ $\pm 0.126$ $\pm 0.146$ $\pm 0.159$	$\pm 2.540$ $\pm 2.870$ $\pm 3.200$ $\pm 3.708$ $\pm 4.039$	$\pm 0.100$ $\pm 0.113$ $\pm 0.126$ $\pm 0.146$ $\pm 0.159$	<u>+2.540</u> <u>+2.870</u> <u>+3.200</u> <u>+3.708</u> <u>+4.039</u>	$\pm 0.131$ $\pm 0.168$ $\pm 0.180$ $\pm 0.204$ $\pm 0.219$	$\pm 3.327$ $\pm 4.267$ $\pm 4.572$ $\pm 5.182$ $\pm 5.563$		

#### Overages

All sheet supplied net trim (with no overages).

#### **Untrimmed Sheet**

Untrimmed sheets are available. No guarantee is given as to the additional area obtained by ordering untrimmed sheet.

<sup>1</sup>Intermediate thickness are available.

# SIZE AND THICKNESS

#### POLY II® UVA (MIL-PRF-5425)

#### Clear

Standard Items: Standard items may be ordered D Non-standard Items: Contact Inside Sales for in standard packages (cases and pallets) in quantities listed on inside back cover.

BSS BS

availability. Also contact Inside Sales for items which do not appear on chart.

### Color

POLY II is available in most colors, manufactured in accordance with MIL-P-5425 insofar as the specification Sales for further informantion.

	SIZES	Tolerance Cle	Thicknesse	.030	.060	.080	.100	.125	.150	.187	.220	.250	.312	.375	.500	.625	.750	.875	1.000	*Available as o
_	36 x 48 36 x 60 36 x 72 40 x 50 48 x 48	A * A *																		from larger size of larger size <b>POLY II</b> ® U
	48 x 60 48 x 72 48 x 96 60 x 72 60 x 96	* C B C																		(MIL-PRF-54 Standard in and .250 onl sizes & thick on a min-ma
-	72 x 72 72 x 96	C C																		

s cutdowns izes. Tolerance e prevails.

#### UVT

5425) – n 48 x 96 .125 nly. All other cknesses are ax basis.

### POLY 76<sup>®</sup> (MIL-PRF-8184, Type I and II, Class I)

#### Clear

- **Standard Items:** Standard items may be ordered in standard packages (cases and pallets) listed on inside back cover.
- POLY 84<sup>®</sup> (MIL-PRF-8184, Type I and II, Class 2)
- Non-standard Items: Contact Inside Sales for availability and for items which do not appear on chart.

### Color

Available in most colors, manufactured in accordance with MIL-PRF-8184 insofar as the specification is applicable. Please contact Inside Sales for further information.

															-
SIZES	Tolerance Class	Thicknesses <sup>1</sup>	.060	.080	.100	.125	.150	.187	.220	.250	.312	.375	.500	.625 & above	/
36 x 48 36 x 60 36 x 72 40 x 50 48 x 48	A * A *														
48 x 60 48 x 72 48 x 96 60 x 72 60 x 96	* BCBC														
72 x 72 72 x 96	C C														

<sup>1</sup>Intermediate thicknesses are available with special ordering requirements.

\*Available as cutdowns from larger sizes. Tolerance of larger size prevails.

# **APPROVALS AND SPECIFICATIONS**

	U.S	GREAT BRITAIN	GERMANY
POLY A	AMTM D-4802 AMS-L-P391		
POLY II®	MIL-PRF-5425		Exceeds WL5.1412
POLY 76 <sup>®</sup> Type I or II, Class 1	MIL-PRF-8184	Exceeds DTD 5592	Exceeds W25.1415
POLY 84 <sup>®</sup> Type I or II, Class 2	MIL-PRF-8184	Exceeds DTD 5592	Exceeds WL5.1415
POLY 900 <sup>®</sup>		Exceeds DTD 5592	

# PROPERTIES

Typical Properties (.250" unless noted)			Polycast	Poly FR9 (.060")	Poly 900 (DTD-5592- UK)	Poly II (Mil-P-5425)	Poly 84 (Mil-P-8184)	Poly 76 (Mil-P-8184)	Poly 2000 (Mil-P-25690; Class I)	Poly 2000 (Mil-P-25690 Class 2)
Mechanical Properties	Test Method	Units			ony				0.000 .)	01000 2)
Specific Crowity			1 10	1 10	1.10	1.10	1 10	1 10	1.19	1 10
Specific Gravity Tensile Strength	ASTM-D-792 ASTM-D-638		1.19	1.19	1.19	1.19	1.19	1.19	1.19	1.19
Yield	A3110-030	psi	11,250	>10,500	11,250	11,250	11,250	11,250	12,100	12,100
Elongation, Rupture		%	6.4	4.5	6.2	6.4	4.0	4.0	,	,
Modulus of Elasticity		psi	450,000	450,000	-			-		
Flexural Strength	ASTM-D-790									
(Rupture)		psi	15,250		15,250	15,250	15,250	15,250		
Modulus of Elasticity		psi	475,000		475,000	475,000	475,000	475,000		
Compressive Strength	ASTM-D-695		40.000		40.000	40.000	10.000	40.000		
(Yield) Madulus of Electicity		psi	18,000		18,000	18,000	18,000	18,000		
Modulus of Elasticity Compressive Deformation (Under Load)		psi	440,000		440,000	440,000	440,000	440,000		
4000 PSI 122F, 24hr	ASTM-D-621	%	0.75		0.75	0.75	0.75	0.75		
Sheer Strength	ASTM-D-732	psi	9,000		9,000	9,000	9,000	9,000	3,700	3,700
Impact Strength	ACTIVED 152	poi	0,000		0,000	5,000	0,000	0,000	0,700	0,100
Izod Milled Notch	ASTM-D-256	ft. lbs/in. of notch	0.375*							
Falling Steel Ball, 0.5lb. (Breakage drop height (ft.)	200		18							
Rockwell Hardness	ASTM-D-785		M98*	M96*	M98*	M98*	M98*	M98*		
Barcol Hardness	ASTM-D-2583		50*		50*	50*	50*	50*		
Residual Shrinkage (Internal Strain)	ASTM-D-4802									
Polycast		%	2.2		0.0					
Polycast Mil Spec		%		<1	2.2	<1	<1	<1		
Optical Properties										
Refractive Index	ASTM-D-542		1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49
Luminous Transmittance (As Cast)	ASTM-D-1003									
Total		%	92	92	92	92	92	92		
Haze			<0.5	<0.5	<0.5	<0.5	<0.75	<0.75	91	91
Yellowness Index	ASTM-D-1925		0.5						<1.5	<1.5
After 1000 hrs. Accelerated Weathering	ASTM-D-1449	0/								
Total		%	92		92	92	91	91	90	90
Haze Effect Of Accelerated Weathering-On Appearance			<0.5		<0.5	<0.5	<0.75	<0.75	<3.0	<3.0
Crazing / Discoloration / Warping	ASTM-D-1449		none		none	none	none	none		
Ultraviolet Transmission @ 320nm		%	0	0	0	0	TIONE	TIONE		
Craze Resistance	Mil-P-8184	psi	0	0	0	0	0	0		
DRY IPA		P. 41	2,000		2,100	2,100	3,225	3,100	3,700	4,300
Lacquer Thinner			1,000		1,350	1,100	3,030	3,150	3,300	3,600
Sulfuric Acid			0		NA	0	1,550	1,285		,
WET IPA			500		1,460	1,000	2,775	2,440	2,750	3,600
Lacquer Thinner			0		1,200	0	2,700	2,450	2,650	3,000
Sulfuric Acid			0		NA	0	1,020	500		
Thermal Properties										
Hot Forming Temperature			320 **		320 **	320 **	320 **	320 **	218**	218**
Deflection Temperature under load									-	
(Heat Distortion Temp.)	ASTM-D-648									
66 psi		deg. Fahrenheit								
264 psi			203*		230*	216*	221*	234*		
Maximum Recommended Continuous Service Temp.			180		180	180	180	180		
Minimum Recommended Continuous Service Temp.		deg. Fahrenheit								
[lowest temp. tested for bullet-resistance] Coefficient of Linear Thermal Expansion		deg. Fahrenheit			0.000040	0.0000.40	0.000040	0.000040	0.000042	0.000040
		deg. Fahrenheit			0.000042	0.000042	0.000042	0.000042		0.000042
Coefficient of Thermal Conductivity Thermal Relaxation	ASTM-D-696 Cento-Fitch <sup>4</sup>		1.3		1.3	1.3	1.3	1.3	1.3	1.3
@ 230 deg. F	Cento-Filtri	in./in./deg. F							3.3	3.3
@ 293 deg. F	Mil-P-25690	BTU/(Hr.)(Sq.Ft.)							45	3.3 45
Water Absorption	Mil-P-25690	(deg. F/in.)	0.65		0.65	0.65	1.6	2.6	2.6	1.6
	26 day immersion	,	0.2		0.2	0.2	0.2	0.2	0.2	0.2
Flammability (Burning Rate) UL94HB	24 hour immersion	%	1.2*		1.2*	1.2*	0.8*	0.8*		
Self-ignition Temperature	ASTM-D-635	%	830*	0.65		830*				
Specific Heat @ 77°F	ASTM-D-1929	%	0.35	0.2	0.35	0.35	0.35	0.35	0.35	0.35
	DuPont 900	%	27**	<0.3		27**				
Smoke Density	(Therm. An. Cal.) <sup>₄</sup>	in./min.							2,900	2,900
Crack Propagation (Received at STD Conditions)	ASTM-D-2843	deg. Fahrenheit		0.35						
	Mil-P-25690	BTU/(Lb.)(deg. F)		Max:13%;						
		% lha/in 2/2		Rating 23.2%						
		lbs/in 3/2								