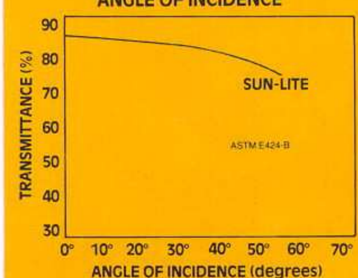
TECHNICAL SUMMARY

Transmission characteristics after aging will vary depending upon actual exposure conditions. In properly designed and maintained solar devices, Sun-Lite® HP is expected to retain in excess of 90% of its original transmission over a 15-20 year lifetime. No other polymer based material can compare to Sun-Lite® HP!

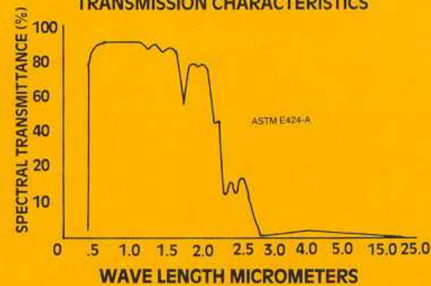
AVERAGE PHYSICAL PROPERTIES	METHOD	UNITS	.040 SUN-LITE H.P.
Solar Energy Transmittance	E424 Method B	%	86%
Heat Transmittance	5-50 Microns	%	less than 5%
Index of Refraction	D542	Ratio	1.55
Tensile Strength	D638	PSI	10,000
Flexural Strength	D790	PSI	17,150
Flexural Modulus	D790	PSI x 10^6	1.0
Shear Strength	D732	PSI	12,800
Izod Impact	D256	Ft. lb./In.	4.89
Water Absorption	D570	% by wt.	0.60
Thermal Expansion	D696	(In./In./°F) x 10^{-5}	1.36
Thermal Conductivity, k	C177	BTU/hr-ft.^{2}-°F/in. thickness	0.713
Specific Heat	C-351	BTU/lb.-°F	0.318
Specific Gravity	D792	Ratio	1.324
Weight	ASTM D3841	Oz./Ft.^{2}	2.8-4.7
Thickness	ASTM D3841	Inches	.025/.040/.060
Burn Rate	D635	In./Min.	<2.5

SOLAR TRANSMITTANCE VS. ANGLE OF INCIDENCE



*Solar Energy Transmission: 86% at 0°, 83% at 30°, 80% at 45°, 75% at 60°

TRANSMISSION CHARACTERISTICS



Transverse Load Deflection: Sun-Lite® HP deflects less than 1.0″ with a 180 P.S.F. load by ASTM D-1502-60. Sun-Lite® HP must be properly installed and fastened – see Installation Suggestions.

Thermal Shock: after repeated cycles of thermal shock (350°F. to 32°F.) no harmful effects were observed.

Impact Resistance: as with many fiberglass reinforced materials, impact strength is not expected to decrease with age. Sun-Lite® HP has an initial impact strength over 28 foot lbs. for a .040″ thickness.

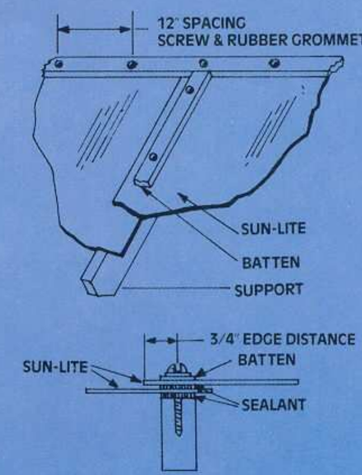
Combustibility Characteristics: ignition temperature above 650°F. and a burn rate well under 2.5″ per minute give this material unique combustibility characteristics among fiberglass reinforced materials as well as being an approved plastic glazing material under Major Model Building Codes (CC-2).

SUN-LITE® HP INSTALLATION SUGGESTIONS

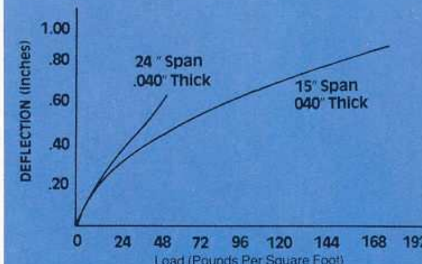
Provision should be made to be sure the Sun-Lite® HP will carry the design load, remain weathertight, accommodate thermal expansion and be aesthetically acceptable. Load capacity is determined by sheet thickness and rafter, purlin, girt or stud support spacing. Suggested spans are shown in Table 1. Suggested minimum roof pitch is 2″: 12″. When overlapping Sun-Lite® HP sheets, a minimum of 1½″ lap on sides and ends is suggested. This overlap will allow fastening two sheets with a single fastener and maintain the proper edge distance to prevent the fastener tear-out.

TABLE 1

Sun-Lite® HP Thickness	Suggested Span
.025	24″
.040	24″
.060	30″



TRANSVERSE LOAD DEFLECTION



Sun-Lite® HP is available in .025″, .040″, and .060″ thicknesses; 24″, 36″, 48″, and 49½″, and 60″ widths; 10′, 25′, 50′ and 1500′ lengths.

NOTE: All data presented is the most recent available at the time of printing, and is subject to change without notice.

The information in this brochure is accurate to the best of our knowledge, but no warranty is expressed or implied. Furthermore, the information is not intended for the use of non-professional designers, applicators, or those who do not purchase or specify these products in the normal course of business.

SOLAR COMPONENTS CORPORATION P.O. Box 237, Manchester, New Hampshire 03105
Phone 603-668-8186

KALWALL® Sun-Lite® HP SOLAR GLAZING MOLECULARLY ENG

KALWALL® Sun-Lite® HP Solar Glazing for low and medium temperature solar heat collectors.

Features:

- Engineered excel under extreme Moisture, Heat, and U.V. exposure conditions;
- High solar transmission, low infrared transmission;
- Shatterproof, high impact resistance;
- Light weight;
- Easily handled, cut with hand tools, nailable;
- Low expansion coefficient;
- Low cost.

Experience has shown that plastics and plastic based resins fabricated into glazing sheets, panels, or films for covers on solar collectors of all types have been quite satisfactory for long-term use in lower temperature solar applications, that is, when the covers are exposed to temperatures regularly approaching 160°F., under relatively low humidity conditions.

However, many materials, including acrylics, polycarbonates, and fiberglass reinforced polyesters, have failed to maintain high solar transmission with the combined effects of higher temperatures, more extreme moisture, and sunlight. Such exposures include solar greenhouses, solar attics and furnaces, Trombe walls, site, or factory-built air heaters and water heaters.

Solar collector covers are exposed to a solar environment which, due to the extreme cycling of heat, moisture, and ultra violet rays, causes deterioration due to molecular change. The result is an unacceptable loss of solar transmission, usually accompanied by visual whitening, and/or yellowing. Due to the development of the Solar Industry since the late '60's and early '70's, many polymer based systems have been improved to provide more satisfactory service under certain specific conditions, i.e. tougher and more ultra violet resisting coatings on thermoplastics and fiberglass materials, added chemicals to provide more moisture resistance. However, none of these attempts has provided a truly new generation of solar collector cover material which is fully satisfactory for the low and medium temperature exposures, up to the range of 212°F., under severe moisture conditions. This would include the covers for hydronic collectors in most of the Continental United States. While the collector absorber plate in a medium temperature hydronic collector may reach temperatures approaching 300°F. in stagnation, the state-of-the-art collector glazing will seldom reach 212°F. in a single glazed unit and 257°F. for the inner glazing in double glazed collectors. (These temperatures have been repeatedly verified based on work done by the National Bureau of Standards.)

Kalwall Corporation, has been, and continues to be, a pioneer in the development of high performance, lightweight glazings for the Solar Industry. It recognized that the need for a non-glass alternative providing lightweight, shatter resistance, and ease of handling was very large indeed! Fabricators, architects, and to some extent consumers, have become disenchanted with non-glass alternatives due to apparent degradation of virtually all of the existing plastic based materials under many solar exposures. Kalwall, based upon its long years of experience and successful development of Sun-Lite Premium and Premium II, has now finished development on an entirely new solar glazing material *molecularly engineered* to perform in this highly demanding glazing exposure. This new system is called Sun-Lite® HP, and is engineered to resist the terrific accelerated aging processes applied to solar glazing materials. An absolutely fresh approach to molecular structuring was required in the development of Kalwall's new Sun-Lite® HP.

The comparisons between the new Sun-Lite® HP and existing solar glazing alternatives is dramatic.

MILLIONS OF SQUARE FEET of previous Sun-Lite grades have been installed over the past twelve years throughout the world. Because Solar Components is a *solar* company, rather than a *plastics* company, we have maintained surveillance on hundreds of applications, under varying conditions.

MOIST HEAT RESISTANCE

Loss of transmission due to moisture permeation is fatal to most polymer materials unless molecularly structured to resist moisture. Tests of materials under full soak as well as soak/dry cycling @140°F., 160°F., and 212°F. show few materials survive the elevated temperatures and 100% relative humidity conditions common to flat plate collector condensation cycling, even in solar greenhouses!

THERMAL STABILITY

Unless engineered for heat exposure, polymers break down over time. Combinations of internal microcracking, delamination of reinforcing fibers from the resin, and surface chipping will occur. 3,000 hours will roughly equate to 3-10 years exposure depending upon collector design and climate. Tests prove the molecular integrity built into the Sun-Lite® HP system.

ULTRA VIOLET RESISTANCE

U.V. stabilizer technology is well known, but the best additives are expensive and often degrade other properties. Sun-Lite® HP's chemistry provides the best of both worlds, even without a weatherable surface laminate others rely upon exclusively. Exposure of samples under artificial and natural conditions all show Sun-Lite® HP's unusual stability.

Other polymer based materials rely on surface films or coatings for U.V. protection. Sun-Lite® HP's surface and internal resin matrix have been completely U.V. stabilized for maximum service life.

INEERED TO PERFORM UNDER SEVERE EXPOSURE.

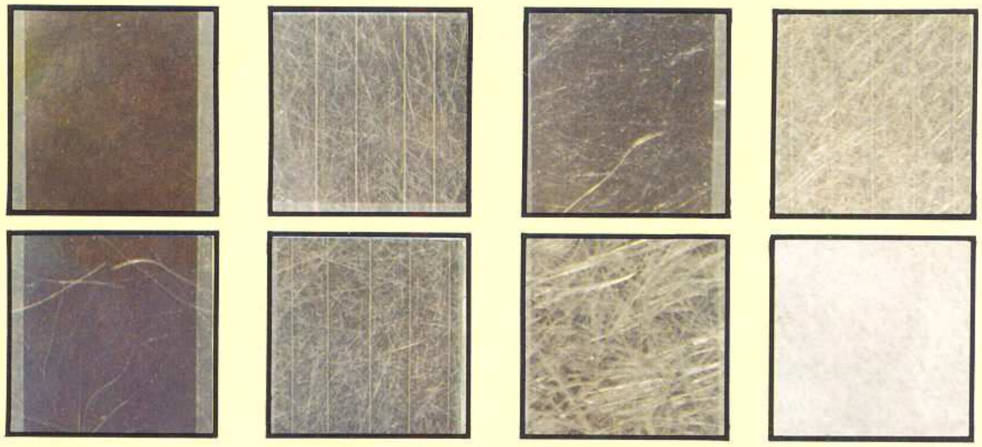
HANDS ON REAL WORLD EXPERIENCE shows ASHRAE 93-77, ASTM, and NBS mini-collector tests to be too short to predict long-term glazing performance under these drastically varying conditions. Therefore, we have created an appropriately severe testing series to separate the best from the rest. Sun-Lite® HP is the highest performing polymer based glazing for low and medium exposure we know of in this world!

Sun-Lite® HP is not suitable for all designs, however, i.e. high temperature hydronic collectors or collectors designed for lengthy stagnation in hot climates. For these special designs, we encourage your thorough testing. *(For all passive applications, and state-of-the-art flat plate designs with controlled stagnation and low to medium operation conditions, Sun-Lite® HP will outperform all other polymer glazings!)*

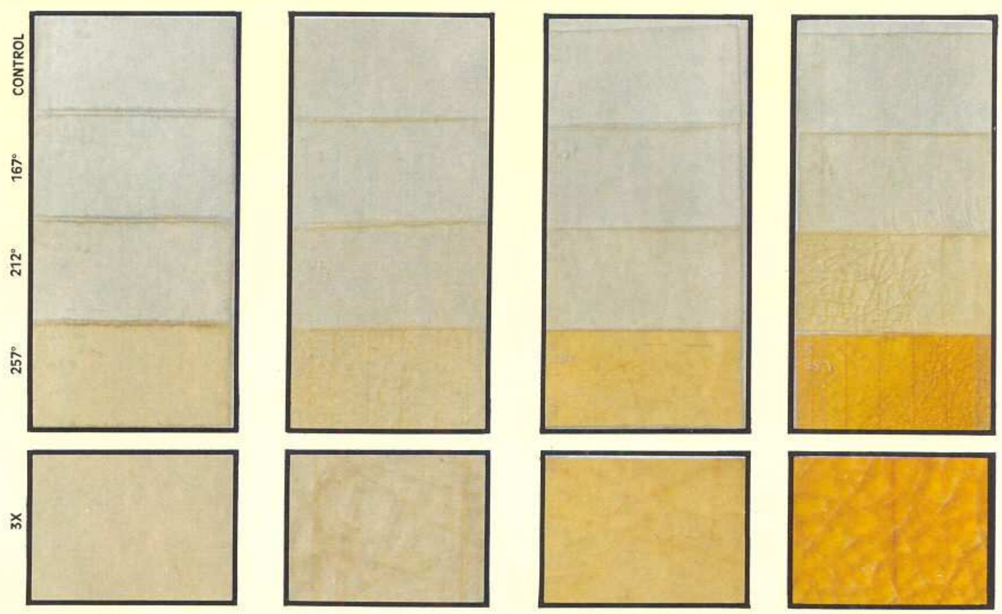
Sun-Lite® HP | **Filon Solar E®** | **Lasco Crystalite®** | **Filon 556**

Water soak @ 160°F. for 24 hours: no change in Sun-Lite® HP, while others begin degradation and transmission loss due to fiber whitening.

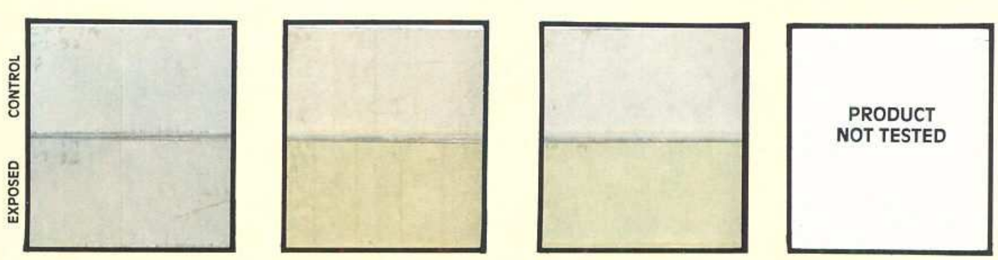
Water soak @ 212°F. for 24 hours: superior molecular linkage in Sun-Lite® HP resists absorption; others fail. Test coupons mounted on black background.



3,000 hours exposure to dry heat @ 167°F., 212°F., and 257°F. Lower photo is 3 x close-up of 257°F. exposure clearly demonstrating Sun-Lite® HP molecular superiority. Test coupons mounted on white background.



Specimens exposed via EMMAQUA®, QUV Weatherometer, Fadometer, as well as natural weathering, all show Sun-Lite® HP's superiority.



NOTE: All tests conducted on production material. Competitive materials purchased in the open market. Test coupons available for inspection at the laboratory upon written request.