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## **General**

### **Product Description**

Chrysalis is available in a standard thickness of 0.20 inches (Nominal 3/16<sup>th</sup> of an inch), appropriate for use in a wide variety of vertical applications including furniture, wall partitions, cabinet doors, retail display fixtures, signage, light diffusion panels, shelving, among many others. Chrysalis also is available in 1/8, 3/8 and 1/2 inch thicknesses when requested. Due to inclusion thickness variability and surface texture the thickness will vary +/- 10% Lead times will vary. The product is offered in a 4 foot by 8 foot panel subject to a +/-1/8" tolerance. Squareness is subject to a =/1/4" tolerance and a 1/4" lay flat tolerance.

Chrysalis blends impact resistance equal to ten times that of many acrylics and forty times more than glass. The flexibility, formability (both cold and hot), and refinishing characteristics of modified polyester sheet (PETG) is coupled with uniquely designed translucency. Chrysalis may be fabricated using conventional woodworking power tools (tungsten-carbide saw blades \*see *cutting*), creating unlimited design opportunities.

### **Safety**

Chrysalis sheet is a hard material which may have sharp edges and corners after fabrication which may cause small cuts to unprotected skin. It is recommended that users wear protective gloves to avoid injury when handling Chrysalis sheet. (Cotton is the most flexible but canvas, or leather may also be used.)

Prolonged exposure of Chrysalis to open flames or excessive heat may cause material to first melt and then ignite. Should Chrysalis ignite, it is easily extinguished with water.

When thermoforming Chrysalis, all ovens should be UL approved and operated within the design parameters and in accordance with the oven manufacturer's specifications and safety precautions.

Vacuum systems or air handling systems are recommended for the safe extraction of Chrysalis dust. Such systems are consistent with woodworking tools and machinery and should be operated within standard parameters comparable to and approved for woodworking applications. Chrysalis dust is no more dangerous than wood sawdust. None of the special precautions necessary for acrylics are needed.

## **Storage & Handling**

### **Inspection**

Please carefully inspect all Chrysalis sheets ***prior to cutting, drilling or fabricating*** and inform Duraglas Customer Service at 1-714-800-1648 immediately of any damage or defects. Failure to do so may jeopardize your rights to warranty replacement and/or reimbursement for shipping damage. Email customer service at [customerservice@chrysalishd.com](mailto:customerservice@chrysalishd.com)

Chrysalis is shipped with a protective masking on both top and bottom surfaces to prevent damage and scratching of material surface during shipping and handling. It is recommended that the polyethylene protective masking remain attached to the Chrysalis sheet during fabrication and thermoforming operations to prevent accidental scratching of the surface. If the protective film is accidentally removed, a suitable adhesive poly-film should be re-applied to protect the material during fabrication.

Chrysalis should be stored where atmospheric conditions are controlled, eliminating extreme temperature, direct sunlight, and exposure to rain and snow. Chrysalis is best stored on edge at a 10° angle from vertical. The suggested storage method for Chrysalis is in a way that provides full surface support to eliminate bow, reducing pressure on the masking (protective film) and minimizing imprinting of foreign particles into the material surface between sheets. Long-term (greater than 120 days) horizontal storage of Chrysalis on stacked pallets is NOT recommended. Single pallet storage is acceptable and a full covering of the slats with a DPL sheet over plywood is recommended to avoid slat imprint through the protective film.

## **Fabrication**

### **General**

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Chrysalis can be fabricated using conventional power and hand tools. The following practices should always be observed when fabricating Chrysalis:

- Keep cutting tools sharp, clean, and free of damage.
- Tungsten carbide tipped tools are the recommended for fabricating Chrysalis, but many carbide tipped woodworking tools may be adequate.
- Chrysalis should be firmly and securely supported and secured to prevent chatter and chipping of material.
- Chrysalis may soften when excessive heat builds in the material while cutting which may manifest in a slight heat signature on the panel corners and edges of the panel. A continuous supply of cool air focused on the product in the cutting area can aid in dissipating excessive heat.
- Special Note for Chrysalis HD. Maximum traverse speed while cutting is 10 fpm.
- Special Note for Chrysalis Studio. Maximum traverse speed while cutting is 15 fpm.
- Keep Chrysalis and the work surface free of dust, chips and dirt such that scratching or particle impact damage of surface during fabrication is avoided.
- Leave the masking on Chrysalis during any fabrication to minimize the risk of scratching. Replace the protective film with a suitable adhesive poly-film if the original film is accidentally removed.

## **Edge Sealing**

If your Chrysalis application will be exposed to long term moist or wet condition, seal the edges after cutting or fabrication to prevent wicking. We recommend sealing as a precaution under any moist or wet conditions and do not warrant against such damage. Do not use alcohol or any solvent to clean the surface or the edges because damage may result. For caulking/sealing/moisture intrusion prevention use Dow 995 adhesive or DAP Dynaflex 230.

## **Cutting**

Traveling table saws are most commonly used for production runs of long straight cuts. Traveling saws are recommended because the material remains stationary during cutting operations reducing the risk of scratching sheet surface. When using portable circular saws: Re-masked Chrysalis with greater than 2 mil adhesive poly-film and use guide strips securely clamped to a fixed supporting work surface for best results. Use of hollow ground circular saw blades to prevent binding, and to minimize frictional heat. Large diameter blades should utilize expansion slots to minimize warping and chipping of the blade. All teeth should be of uniform height with 7° positive rake angle. A tungsten carbide tipped blade with alternate teeth beveled 45°, commonly known as a modified triple chip blade, is suggested for cutting Chrysalis. The recommended rim speed of the circular saw blades is 8,000- 12,000 peripheral surface feet per minute (PSFPM). The following formula should be used in determining the proper rpm per saw diameter, where d= saw blade diameter.  $RPM = 144,000 / 3.14(d)$  Cutting Chrysalis too fast results in heat buildup and a slight heat signature on the corners and edges of the parts. This should be avoided. (This is dependent on the blade diameter: The larger the blade the faster the cut possible. Sharp blades cut with less heat as well.)

When using a table saw, the blade should extend slightly higher than the thickness of material, to reduce chip loading and allow chips to clear saw tooth gullet. Chipping of material may occur if blade extends too far above material thickness. The throat gap should not exceed the width of the cut to reduce vibration and chipping. A separator blade should be installed directly behind the saw blade to prevent the re-welding of material following the heat build-up generated during the cutting operation. A steady even feed speed is recommended for best results. Keep Chrysalis and the work surface free of dust, chips and dirt such that scratching or particle impact damage of surface during fabrication is avoided. Leave the masking on Chrysalis during any fabrication to minimize the risk of scratching. Do not cut Chrysalis without a protective film in place on the surface of the panel and re-masked Chrysalis with greater than 2 mil adhesive poly-film should the protective film be removed.

## **Band Saw Cutting**

When cutting large diameter curves band saw cutting with soft metal-cutting blades is recommended. Cooling with a continuous air blast will dissipate heat buildup during cutting and may prevent material from re-welding behind saw blade. Material accumulation on saw blade should be removed periodically. Do not cut Chrysalis without a protective film in place on the surface of the panel and re-

masked Chrysalis with greater than 2 mil adhesive poly-film should the protective film be accidentally removed.

## **Drilling**

Drill Chrysalis sheet with slow helix angle jobber drill bits, commonly used for brass or hard plastics, to provide the best finish while reducing chipping and shattering of material. Tubular hole saws may be used for drilling large diameter holes. Fly cutters may also be used for large diameter holes. Frequent cleaning of drill bits may be required to prevent chips from thermally fusing to material.

A drill point angle of 130° is recommended when drilling Chrysalis. Make sure that the panel is fully supported. The cutting edge should have zero rake. It is important that drill flights penetrate the top surface of material prior to the drill point exiting bottom side of sheet. A drill point angle of 60° should be used when drilling unsupported Chrysalis sheet. Do not drill Chrysalis without a protective film in place on the surface of the panel and re-masked Chrysalis with greater than 2 mil adhesive poly-film should the protective film be removed.

## **Laser Cutting**

Chrysalis sheet is suitable for laser cutting operations. Laser cutting yields a gloss polished edge quality desired for some applications. Do not cut Chrysalis without a protective film in place on the surface of the panel and re-masked Chrysalis with greater than 2 mil adhesive poly-film should the protective film be accidentally removed. Laser cutting facilities should be equipped with adequate ventilation at the cutting head to exhaust vapors. Laser cutting may produce a stressed heat affected zone up to 1/8" into Chrysalis sheet if the power is set too high. The edges may also re-weld together if the power is set too high.

Laser Cutting Chart - Spectar Copolyester  
Equipment: 200watt Multi-Cam laser

### Optimum Cutting Parameters:

	SPECTAR		
Gauge (mils)	118	177	236
Power (watts)	150	150	200
Speed (inches/min)	88	60	50
Freq. (Hz)	6000	7000	20000
Cut Height (inches)	-0.01	-0.03	-0.1
Air Pressure (psi)	50	50	50

Optimum cutting parameter was determined by visual inspection of edge cut quality (smooth polished edge) and edge clarity (no yellowness). Approximately two hundred fifty (250) samples were cut for each material at each gauge to verify the settings.

Key Point: PETG sheet uses lower power and slower cutting speeds when laser cutting as compared to Acrylic sheet.

## **Scraping/Filing**

Saw cutting operations may produce uneven edge quality, chips, or chatter marks. Scraping of Chrysalis edge may remove uneven surface material, improving the edge quality. Using tool steel with edge ground to a sharp 90° angle, a scraper drawn towards the operator with firm pressure over a securely fixed Chrysalis edge will remove uneven edge height. Care should be taken to angle the scraper to remove only the high points of the edge surface. Aligning the scraper parallel with saw marks may only recreate the uneven edge quality. Edge filing may also improve edge quality. Files drawn over the Chrysalis edge towards the operator in a smooth steady motion will improve edge quality. Round, half-round, and triangular files may be used to accomplish alternative edge profiles. Files may need to be cleaned periodically with a wire brush to remove the modified polyester cuttings. Do not scrape or file Chrysalis without a protective film in place on the surface of the panel

so that accidental damage will be mitigated. Re-masked Chrysalis with greater than 2 mil adhesive poly-film should the protective film be accidentally removed.

## **Edge & Scratch Flame Polishing**

The edge and surface of Chrysalis sheet may be polished using a flame process. Only Fabricators experienced with torch use should perform flame-polishing operations.

Results from edge flame polishing are based largely on adequate machining and preparation of the surface to be polished.

Ensure that material to be worked is well illuminated, and accessible on all sides to the torch. The flame should be adjusted until blue in color, and large enough to polish material in one pass. Areas requiring multiple passes of the flame must be allowed to cool between passes. The flame should be passed across the material rapidly providing enough heat to accomplish desired polish and gloss level.

**CAUTION:** Chrysalis sheet will ignite if flame is concentrated in one area. Should Chrysalis ignite, it is easily extinguished with water. *Never perform flame-polishing procedures in the presence of flammable materials or vapors.*

## **Cold Forming**

Chrysalis may be mechanically cold formed into simple curves by bending the sheet while being held by physical stops, such as a frame system. A minimum radius of 300 times the sheet thickness is required for cold forming. Attempts to achieve radii below this requirement may damage Chrysalis. (Standard 72 degrees F, Standard pressure)

## **Thermoforming**

Chrysalis is manufactured using thermoplastic resin allowing the possible forming of complex shapes in a heated state. The degrees to which Chrysalis may be formed, and the possible depth of draw, rely heavily on the elasticity of the core material embedded in the resin. It is important to note that Chrysalis sheet should not be wet before use in thermoforming operations. When Chrysalis is at thermoforming temperature, it is important to note that any contact with another surface will cause the area affected to thermoform to the surface of whatever is contacted. Care must be taken to insure there are no extraneous marks or texture differences are imparted accidentally. Also, depending on temperature and the radius of the bend and the skill of the thermoformer, the inclusion could deform inside the panel matrix. This does not affect the product quality nor is it considered a defect in manufacturing.

## **Strip Heating**

It is possible to form Chrysalis in straight line bends by applying localized heat using strip heaters and bending part with hand pressure (always use protective gloves) then mechanically holding part in desired position until it cools. Strip heat bending should be performed at the lowest possible temperature required to achieve desired form to minimize stress built up in the sheet. (We recommend that the operation not exceed 250 degrees F. Chrysalis can be thermoformed at temperatures close to 220 degrees F or even less if the bending takes a few minutes) Chrysalis must be heated uniformly along the bend line and throughout the thickness of the sheet for best results. Caution: If Chrysalis is heated too long or at too high a temperature the protective film may bubble and transfer this texture to sheet surface.

Inconsistent or insufficient heating of the sheet may cause inconsistent bending. The bend should always be made away from the heated side. It may be required to heat both side of material simultaneously using two strip heaters. Once material has been sufficiently heated, formed, and mechanically held in position, it is recommended that air flow (a fan) be allowed to pass over both sides of the heated area to facilitate cooling for a period greater than or equal to the heating cycle time.

## **Oven Heating**

It is recommended that Chrysalis be heated in circulating air ovens providing the greatest temperature control and uniform heating throughout the sheet. (We recommend that the operation not exceed 250 degrees F. Chrysalis can be thermoformed at temperatures close to 220 degrees F

or even less if the bending takes a few minutes) Horizontal oven shelves should be made of a milled or sandblasted aluminum material for best results. Textured or perforated shelves may transfer texture into material surface during the heating operation. Vertical heating is preferred. To avoid stretching the material during vertical heating operations, strict temperature control and adequate clamping is required and test runs are suggested. Material should be clamped on all sides, or along the longest dimension using continuous clamps. Remove the polyethylene masking on the sheet prior to the heating cycle. Parts must be cooled to room temperature before handling. If subsequent fabrication steps are needed, re-apply an adhesive poly-film to protect the panel.

## **Infrared Ovens**

While infrared, or radiant, ovens may heat Chrysalis sheet faster than circulating air ovens, uniform heating is more difficult to achieve. Users and fabricators are encouraged to perform their own tests on individual heating devices to determine adequate heating cycles. Double-sided heating is recommended for best results with Chrysalis. It is important to ensure that material is evenly and adequately heated throughout the entire thickness of the sheet, and that one side does not become overheated.

## **Vacuum Forming**

Chrysalis may be heated and draped over thermoforming molds and subject to a vacuum forming process. The degree to which Chrysalis may be molded, and the depth of the possible draws, is heavily dependent on the elasticity of the core material embedded in the Chrysalis sheet. Fabricators and users should perform their own tests on selected Chrysalis materials to determine each individual product's suitability for the intended purpose. It is recommended that vacuum form molds be made of aluminum with incorporated temperature control capability. The mold temperature range is from 180° - 210° F for the purpose of pre-testing. The final temperature is dependent on the fabricator's equipment. The mold surface should be machined smooth to reduce mold texture from transferring to material surface.

The determination of the correct cooling cycle is dependent on pre-testing with the equipment at hand. Excessive cooling times will cause the part to shrink back on the mold. Insufficient cooling may cause the part to distort beyond the desired part shape. Fabricators should perform testing to determine adequate heating and cooling cycle times based on mold temperature and ambient temperature.

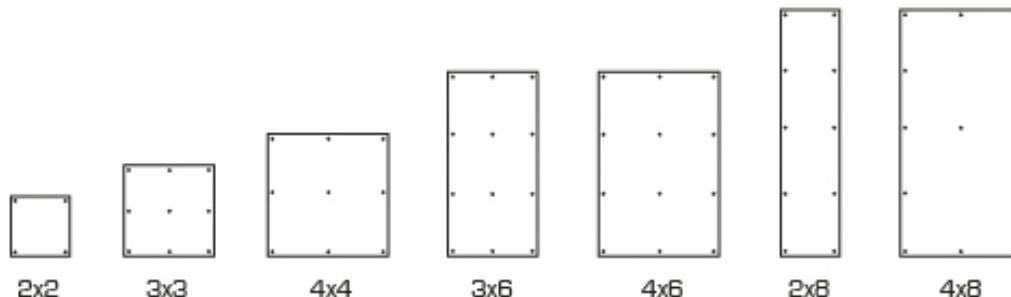
Chrysalis can be easily shaped into simple single curve shapes along a single axis with minimal pressure upon heating the material to temperatures close to 220 degrees F or even less if the bending takes a few minutes. Temperatures in excess of 250 degrees F are not recommended.

## **Fastening**

It is not recommended to use Chrysalis for load-bearing applications. Through bolting methods may be used to fasten Chrysalis sheets. See the instructions for use of fastening systems from the fastening system manufacturers (stand-off hardware, channel systems, cable shelving systems, balustrade clips, partition posts, panel connectors, panel clamps and insert clips from CRL, Haefele, Sugatsune among others ) for detail on use. Insure that the bolt holes are sized to accommodate movement during thermal expansion of the panels. Always use rubber or nylon grommets and washers to insulate material from fastener. Do not over-tighten fasteners because fracturing may occur.

We do not recommend attaching any resin panel to a wall with an adhesive. There are too many variables such as: thermal contraction and expansion which can break the adhesive from the wall. Unsightly visible glue may detract from the transparent panel. There is a possibility of wall damage if the glue releases plus liability if the panel falls on someone.

All placements are based on a Chrysalis HD or Chrysalis Studio 3/16" panel



## **Seaming / Gluing / Cement**

Chrysalis sheet may be joined together using a number of commercially available transparent adhesives typically used with modified polyester or solid surface materials. The strength and aesthetic appearance of the seams depends largely on the shape of the seam, the preparation of the edges to be joined, and the skill and care of the fabricator. Prior to joining, properly prepared edge surfaces should be free of detergents, oils, fingerprints, and foreign particles. Best seaming results are achieved when edge surfaces have been planed, joined, routed, or saw cut producing a clean smooth edge quality. Rough cuts should be sanded or machined until a smooth, flat, square edge is achieved. Properly prepared and fabricated seams may approach the strength of the original material. It is important to note that heat generated during machining of the material may induce heat stress affected zones. Never use solvents. (For caulking/moisture intrusion prevention use Dow 995 adhesive or DAP Dynaflex 230. For connecting parts use Weld-On 55 and 58, both are clear, strong adhesives; or for UV cure use Loctite 3103 through 3106 (different viscosities); Weld On 16 or 42 (42 gives higher strength bonds with PETG). Use as instructed by manufacturer.)

## **Glazing**

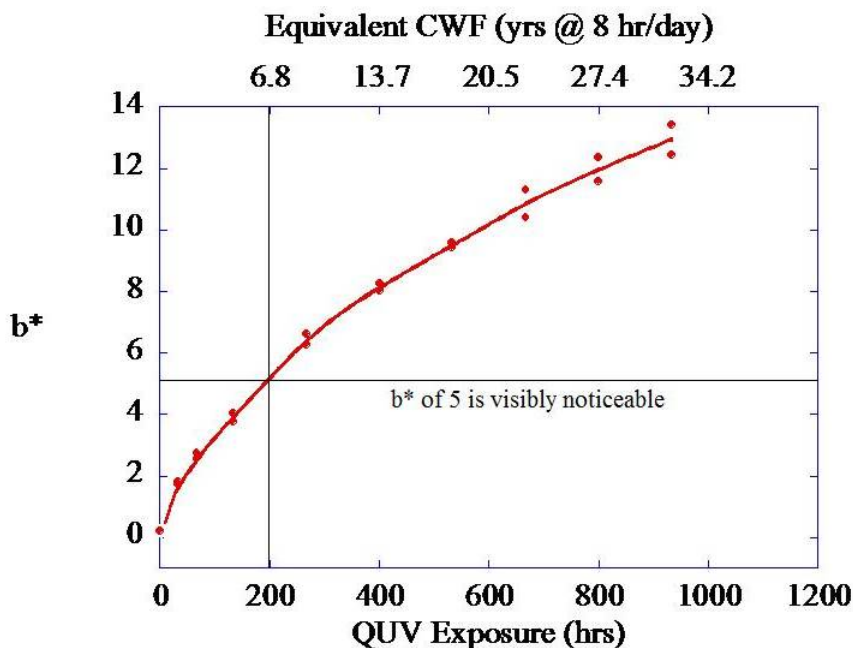
Chrysalis sheet may be used in interior safety glazing applications such as doors, windows, and wall panels. Chrysalis meets the safety requirements of ANSI Z97 and CPSC 16 CFR 1201 for plastic safety glazing materials. Chrysalis reduces sound values over a wide range of frequencies (Over 23%). It is important to note that Chrysalis will expand and contract with temperature and humidity changes at a rate higher than glass. It is strongly recommended to cut Chrysalis panels 1/16" per foot less than the window frame opening to accommodate expansion and contraction during temperature change.

## **Lighting Applications**

The minimum distance needed between a light source and a Chrysalis panel to prevent heat-related distortion is one inch for T-8 or T-12 CWF (cool white fluorescent) bulbs or three inches for a 60 watt incandescent bulb. The decorative light covering must also include an open design which permits warm air to escape without significant heat build-up. (Do not install Chrysalis where there is a possibility of heating above 175 degrees F or 79 degrees C) by International Building Code. The light source must be above the Chrysalis, or vertically adjacent to Chrysalis. Only LED lights are applicable below the Chrysalis installation because they emit little heat.

In addition to heat distortion which may occur above 175 degrees F or 79 degrees C, self ignition is possible above 800 degrees F or 426 degrees C. Some light sources may cause yellowing in Chrysalis panels. As the chart below shows, a T-12 CWF bulb caused an increase in yellowing by 5 b\* units over a 6 year period with an average exposure of 8 hours per day and a constant room temperature of about 72 °F. The actual test conditions were accelerated by using a QUV 340 weatherometer with an approximate correlation to convert the results to real-time. Since Chrysalis panels are manufactured with a green tint, this light-induced yellowing may not be noticeable. This data was also obtained from clear Chrysalis panels without any decorative inclusions. The degrees of yellowing with the different inclusions themselves have not been quantified.

## Chrysalis Panel Yellowing with Exposure to T-12 Cool White Fluorescent Bulbs



### Color Variation

Standard commercial color matching allows for 1 DE in the LAB tri-stimulus value color scale. Inclusions may vary from lot to lot within this tolerance as well. The combined color shift from lot to lot and inclusion to inclusion is complicated by color changes due to lighting and age. If panels are to be installed adjacently it is highly recommended that all panels be manufactured at the same time to insure maximum aesthetics. The thickness also changes the perceived color. All of our inclusions are man-made so there are no color shifts from seasonality or from harvest to harvest.

### Sound Transmission

Building materials, especially interior finishes, through standard testing earn ratings of STC and NRC based on their sound characteristics. NRC generally applies to a single material such as on the surface of a wall which determines the reverb or liveliness of a room. STC (Sound Transmission Class) generally applies to the assembly that composes the wall, including framing, insulation, sheet products (gypsum wallboard for example) and a surface material (such as vinyl wall covering) which limits the amount of sound that travels through the wall assembly into an adjacent space. The value average of sound absorption coefficients at frequencies of 250, 500, 1000 and 2000 Hz indicates a material's ability to absorb sound. These frequencies encompass the fundamental frequencies and first few overtones of typical human speech, and, therefore, the NRC provides a decent and simple quantification of how well the particular surface will absorb the human voice. A more broad frequency range should be considered for applications such as music or controlling mechanical noise. This is measured in dB or Decibels which is a logarithmic unit. As a general result, Chrysalis will absorb more than or equal to twice the sound as glass. (I.E. – 1/8" Chrysalis approximates 1/4" glass, and 3/16" of Chrysalis approximates 3/8" glass.)

### Care and Cleaning

#### General

Chrysalis decorative panels should be treated just like modified polyester sheet. (See Eastman Chemicals website [www.eastman.com](http://www.eastman.com) for more information on Spectar Resin Products.) Care should be used to observe the following guidelines when cleaning Chrysalis.

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Some Chrysalis inclusion layers may possibly wick moisture into the sheet at the edge, discoloring the core. Always ensure that edges of material are sealed to prevent exposure of material edge to moisture.

You may clean Chrysalis with Windex, Simple Green, Mr. Clean All in one, Formula 409, Green Works Glass & Surface Cleaner, Glass Plus, Joy, Ultra Pine Mr. Clean, Pine Sol, and Fantastik or any mild detergent, and a soft scratch free sponge, cloth, or chamois to remove most stains with light gentle pressure so as not to scratch surface.

Do not use Lysol all purpose cleaner, Lysol Citrus Disinfecting Cleaner, Lysol Original Disinfectant, Top Job, Spray Power, Toilet Bowl Cleaner, Comet, AJAX, Bon Ami or any abrasive cleaner, Chlorine Bleach, any Clorox Cleaner, straight ammonia, or any solvent compound because of possible discoloration.

More stubborn stains can be removed using *3 M Finesse-It* compounds according to instructions. Never use solvent containing cleaning liquids or compounds. Also 600 grit wet/dry sandpaper can be used followed by flame healing. (Crème Bruleé torches work well with some practice. Practice on scrap material before trying this technique.) Never use solvent containing cleaning liquids or compounds. After flame healing the panel, polishing it with a polyester cloth will return the surface to a Dry Erase Capability.

Do not use acetone, gasoline, benzene, lacquer thinner, chlorinated solvents, kerosene, hexane, MIBK, MEK or aliphatic naphtha, or gritty abrasive scouring compounds, or alkaline cleaners including modified ammonia or quaternary ammonium compounds to clean Chrysalis sheet as damage to the sheet will occur. Do not use squeegee, scraper, or synthetic rags that may scratch surface. Kitchen paper towels contain calcium carbonate which will scratch the surface. Never scrub Chrysalis sheet surface. Gently pat or wipe surface with a soft scratch free cloth to reduce scratching material surface.

To counteract electrostatic charges that might attract dust and fine particles, an antistatic spray product on a *soft, scratch-free cloth* is recommended.

## **Dry Erase Capability**

Chrysalis HD and Chrysalis Studio Translucent Architectural Panels with our glass gloss finish can be used as Dry Erase surfaces. (Use of dry erase markers on Matte or textured surfaces are not recommended.) The naturally inert surface is not only biostatic, but resists many common stains. Testing has demonstrated resistance to ghosting without resorting to the use of wet cleaners or mild detergents. Approved "**Dry Erase**" products are: Sanford **Expo Low Odor**, Bic **Valleda Low Odor**, and **Staples Low Odor**. These products **exclusively** have been tested and approved for use on Chrysalis HD and Chrysalis Studio and will not void the warranty. **Do Not Use** any "**Bold**" dry erase markers, as they contain VOC's (organic solvents) which can pose a problem for sensitive individuals and may also stain the product.

Accidental use of **permanent markers** can also be removed with >75% Isopropyl (de-natured) alcohol provided it is done in a timely manner. Successful removal has been accomplished within 15 days of accidental use of the *Sharpie Black* or *Sharpie Blue* permanent marker.

## **Graffiti Removal – Krylon Paint**

Krylon Black '*Short Cuts*' Hobby/Craft Paint in a spray can has been successfully removed after 15 days of drying with 99% isopropyl alcohol applied to a soft cotton rag which was then rubbed on the stain. **\*\*Caution**, do not let alcohol remain on the panel for more than 24 hours. Do not soak Chrysalis in alcohol.

## **Refinishing**

For refinishing, please see REFINISHING instructions using 3M Trizact system. 3M™ Modified polyester Solid Surface Finishing with 3M™ Trizact™ Film Abrasives Finishing modified polyester based solid surfaces with 3M™ Trizact™ Hookit™ II film abrasives is quick and easy. Just follow the simple instructions. Also 600 grit wet/dry sandpaper can be used followed by flame healing. (Crème Bruleé torches work well with some practice. Practice on scrap material before trying this technique.)

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For cleaning and polishing light scratches, the following products may be used: Novus Plastic Polish Systems [www.novuspolish.com](http://www.novuspolish.com), Janvil Plastic Restore and Polish [www.scratchpolish.com](http://www.scratchpolish.com), 3M Finesse-It.

## Technical Specifications

### PETG Chemical Resistance

Users of Spectar Copolyester should make and be guided by their own tests under conditions equivalent to or representative of those to which the resin will be subjected in service.

<b>Chemical Resistance Database</b>							
A 2" diameter circular disc was immersed in the following chemicals.							
<b>Product</b>	<b>Chemical</b>	<b>Method</b>	<b>Time (hrs)</b>	<b>Temperature (deg C)</b>	<b>Appearance</b>	<b>Weight Change (%)</b>	<b>Dimension Change (% radial)</b>
Spectar	2-ETHYLHEXYL SEBACATE	Immersion	2000	23	No effect	0.02	0.16
Spectar	2-ETHYLHEXYL SEBACATE	Immersion	200	23	No effect	-0.03	-0.11
Spectar	2-ETHYLHEXYL SEBACATE	Immersion	20	23	No effect	0	-0.03
Spectar	ACETIC ACID - 5% VOL/VOL.	Immersion	2000	23	No effect	0.6	0.17
Spectar	ACETIC ACID - 5% VOL/VOL.	Immersion	200	23	No effect	0.3	0.14
Spectar	ACETIC ACID - 5% VOL/VOL.	Immersion	20	23	No effect	0.12	-0.03
Spectar	ACETIC ACID (S.P. GR. 1.05)	Immersion	2000	23	Haze	16.66	16.07
Spectar	ACETIC ACID (S.P. GR. 1.05)	Immersion	200	23	Haze	7.93	7.51
Spectar	ACETIC ACID (S.P. GR. 1.05)	Immersion	20	23	No effect	0.1	0
Spectar	ACETONE	Immersion	2000	23	Haze	14.28	19.97
Spectar	ACETONE	Immersion	200	23	Haze	15.85	20.87
Spectar	ACETONE	Immersion	20	23	Haze	8.84	10.47
Spectar	AMMONIUM HYDROXIDE (SP. GR. 0.90)	Immersion	2000	23	Deformation	3.82	6.14
Spectar	AMMONIUM HYDROXIDE (SP. GR. 0.90)	Immersion	200	23	No effect	0.35	0.22
Spectar	AMMONIUM HYDROXIDE (SP. GR. 0.90)	Immersion	20	23	No effect	3.98	3.74
Spectar	AMMONIUM HYDROXIDE(10%)	Immersion	2000	23	Discoloration	0.81	0.33
Spectar	AMMONIUM HYDROXIDE(10%)	Immersion	200	23	No effect	0.29	0.72
Spectar	AMMONIUM HYDROXIDE(10%)	Immersion	20	23	No effect	0.12	0
Spectar	ANILINE	Immersion	2000	23	Dissolving	-100	-100
Spectar	ANILINE	Immersion	200	23	Dissolving	-100	-100
Spectar	ANILINE	Immersion	20	23	Dissolving	-100	-100
Spectar	ANTIFREEZE/COOLANT	Immersion	2000	23	No effect	-0.08	0.11
Spectar	ANTIFREEZE/COOLANT	Immersion	200	23	No effect	-1.77	0.05
Spectar	ANTIFREEZE/COOLANT	Immersion	20	23	No effect	0.03	-0.08
Spectar	BRAKE FLUID	Immersion	2000	23	No effect	1.43	1.57
Spectar	BRAKE FLUID	Immersion	200	23	Haze	0.77	0.81
Spectar	BRAKE FLUID	Immersion	20	23	No effect	0.24	0.21
Spectar	CITRIC ACID - 1%	Immersion	2000	23	No effect	0.59	0.27
Spectar	CITRIC ACID - 1%	Immersion	200	23	No effect	-1.47	0.08
Spectar	CITRIC ACID - 1%	Immersion	20	23	No effect	0.11	-0.05
Spectar	COTTONSEED OIL	Immersion	2000	23	No effect	0.06	-0.02
Spectar	COTTONSEED OIL	Immersion	200	23	No effect	-0.01	0.17
Spectar	COTTONSEED OIL	Immersion	20	23	No effect	0.01	0.05
Spectar	DETERGT. SOL. (0.025%)	Immersion	2000	23	No effect	0.6	0.26
Spectar	DETERGT. SOL. (0.025%)	Immersion	200	23	No effect	0.28	0.06
Spectar	DETERGT. SOL. (0.025%)	Immersion	20	23	No effect	0.11	-0.1
Spectar	DI(2-ETHYLHEXYL) PHTHALATE	Immersion	2000	23	No effect	0.08	0
Spectar	DI(2-ETHYLHEXYL) PHTHALATE	Immersion	200	23	No effect	0.04	0.06
Spectar	DI(2-ETHYLHEXYL) PHTHALATE	Immersion	20	23	No effect	0.01	0.02
Spectar	DIESEL FUEL	Immersion	2000	23	No effect	0.07	0.14
Spectar	DIESEL FUEL	Immersion	200	23	No effect	0.03	0.08
Spectar	DIESEL FUEL	Immersion	20	23	No effect	0.02	-0.03
Spectar	DIETHYL ETHER	Immersion	2000	23	Haze	4.67	6.18
Spectar	DIETHYL ETHER	Immersion	200	23	Haze	2.56	3.33
Spectar	DIETHYL ETHER	Immersion	20	23	No effect	1.08	1.46
Spectar	DIMETHYL FORMAMIDE (DMF)	Immersion	2000	23	Discoloration	32.58	39.83
Spectar	DIMETHYL FORMAMIDE (DMF)	Immersion	200	23	Haze	37.53	40.33
Spectar	DIMETHYL FORMAMIDE (DMF)	Immersion	20	23	Haze	25.52	28.94

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Spectar	DISTILLED WATER	Immersion	2000	23	No effect	0.6	0.25
Spectar	DISTILLED WATER	Immersion	200	23	No effect	0.29	0.16
Spectar	DISTILLED WATER	Immersion	20	23	No effect	0.13	-0.08
Spectar	ETHYL ACETATE	Immersion	2000	23	Haze	18.48	22.88
Spectar	ETHYL ACETATE	Immersion	200	23	Haze	20.34	23.92
Spectar	ETHYL ACETATE	Immersion	20	23	Haze	10.42	11.74
Spectar	ETHYL ALCOHOL - 50%	Immersion	2000	23	No effect	0.6	0.24
Spectar	ETHYL ALCOHOL - 50%	Immersion	200	23	No effect	0.3	0.06
Spectar	ETHYL ALCOHOL - 50%	Immersion	20	23	No effect	0.1	-0.08
Spectar	ETHYL ALCOHOL 95%	Immersion	2000	23	No effect	0.13	0.24
Spectar	ETHYL ALCOHOL 95%	Immersion	200	23	No effect	0.04	0.06
Spectar	ETHYL ALCOHOL 95%	Immersion	20	23	No effect	0.03	0.17
Spectar	ETHYLENE DICHLORIDE	Immersion	2000	23	Dissolving	-100	-100
Spectar	ETHYLENE DICHLORIDE	Immersion	200	23	Dissolving	-100	-100
Spectar	ETHYLENE DICHLORIDE	Immersion	20	23	Dissolving	-100	-100
Spectar	GASOLINE	Immersion	2000	23	Discoloration	0.49	0.46
Spectar	GASOLINE	Immersion	200	23	Discoloration	0.18	0.21
Spectar	GASOLINE	Immersion	20	23	No effect	0.09	0
Spectar	HEPTANE	Immersion	2000	23	No effect	0.13	0.1
Spectar	HEPTANE	Immersion	200	23	No effect	0.05	0.03
Spectar	HEPTANE	Immersion	20	23	No effect	0.01	-0.03
Spectar	HYDROCHLORIC ACID (SP. GR. 1.19)	Immersion	2000	23	Dissolving	-100	-100
Spectar	HYDROCHLORIC ACID (SP. GR. 1.19)	Immersion	200	23	Dissolving	-100	-100
Spectar	HYDROCHLORIC ACID (SP. GR. 1.19)	Immersion	20	23	Haze	-100	-100
Spectar	HYDROGEN PEROXIDE - 28%	Immersion	2000	23	Discoloration	2.41	0.16
Spectar	HYDROGEN PEROXIDE - 28%	Immersion	200	23	No effect	0.41	0.22
Spectar	HYDROGEN PEROXIDE - 28%	Immersion	20	23	No effect	0.15	-0.02
Spectar	HYDROGEN PEROXIDE - 3%	Immersion	2000	23	No effect	0.6	0.05
Spectar	HYDROGEN PEROXIDE - 3%	Immersion	200	23	No effect	0.29	0.11
Spectar	HYDROGEN PEROXIDE - 3%	Immersion	20	23	No effect	0.013	-0.06
Spectar	ISOOCTANE	Immersion	2000	23	No effect	0.12	0.05
Spectar	ISOOCTANE	Immersion	200	23	No effect	0.05	0.03
Spectar	ISOOCTANE	Immersion	20	23	No effect	0.03	0
Spectar	ISOPROPYL ALCOHOL	Immersion	2000	23	No effect	-0.04	0.1
Spectar	ISOPROPYL ALCOHOL	Immersion	200	23	No effect	-0.02	0.03
Spectar	ISOPROPYL ALCOHOL	Immersion	20	23	No effect	0.01	0.02
Spectar	KEROSENE	Immersion	2000	23	No effect	0.07	0.06
Spectar	KEROSENE	Immersion	200	23	No effect	0.02	0.08
Spectar	KEROSENE	Immersion	20	23	No effect	0.01	-0.06
Spectar	LIPID SOLN - 2%	Immersion	2000	23	No effect	0.6	0.29
Spectar	LIPID SOLN - 2%	Immersion	200	23	No effect	0.29	0.11
Spectar	LIPID SOLN - 2%	Immersion	20	23	No effect	0.12	-0.02
Spectar	METHANOL	Immersion	2000	23	No effect	1.07	1.05
Spectar	METHANOL	Immersion	200	23	No effect	0.35	0.33
Spectar	METHANOL	Immersion	20	23	No effect	0.13	0.06
Spectar	MINERAL OIL	Immersion	2000	23	No effect	0.06	0.03
Spectar	MINERAL OIL	Immersion	200	23	No effect	0.03	0.02
Spectar	MINERAL OIL	Immersion	20	23	No effect	0.03	0.06
Spectar	MOTOR OIL	Immersion	2000	23	No effect	0.04	0.05
Spectar	MOTOR OIL	Immersion	200	23	No effect	0.04	0.08
Spectar	MOTOR OIL	Immersion	20	23	No effect	0.06	-0.03
Spectar	NITRIC ACID - 10%	Immersion	2000	23	No effect	0.55	0.19
Spectar	NITRIC ACID - 10%	Immersion	200	23	No effect	0.25	0.27
Spectar	NITRIC ACID - 10%	Immersion	20	23	No effect	0.1	0.11
Spectar	NITRIC ACID - 40%	Immersion	2000	23	No effect	0.53	0.17
Spectar	NITRIC ACID - 40%	Immersion	200	23	No effect	0.23	0.17
Spectar	NITRIC ACID - 40%	Immersion	20	23	No effect	0.1	0.1
Spectar	NITRIC ACID (SP. GR. 1.42)	Immersion	2000	23	Dissolving	-100	-100
Spectar	NITRIC ACID (SP. GR. 1.42)	Immersion	200	23	Dissolving	-100	-100
Spectar	NITRIC ACID (SP. GR. 1.42)	Immersion	20	23	Deformation	-100	-100
Spectar	OLEIC ACID	Immersion	2000	23	No effect	0.05	0.02
Spectar	OLEIC ACID	Immersion	200	23	No effect	-0.02	-0.02
Spectar	OLEIC ACID	Immersion	20	23	No effect	0.01	-0.06
Spectar	OLIVE OIL	Immersion	2000	23	No effect	0.07	0.05
Spectar	OLIVE OIL	Immersion	200	23	No effect	0.02	-0.02
Spectar	OLIVE OIL	Immersion	20	23	No effect	0.02	0
Spectar	PHENOL SOLN - 5%	Immersion	2000	23	Deformation	20.58	23.08
Spectar	PHENOL SOLN - 5%	Immersion	200	23	Deformation	0.72	13.1

Spectar	PHENOL SOLN - 5%	Immersion	20	23	Deformation	6.65	6.09
Spectar	SOAP SOLN - 1%	Immersion	2000	23	No effect	0.61	0.14
Spectar	SOAP SOLN - 1%	Immersion	200	23	No effect	0.28	0.13
Spectar	SOAP SOLN - 1%	Immersion	20	23	No effect	0.11	0.16
Spectar	SODIUM CARBONATE SOLN - 2%	Immersion	2000	23	No effect	0.57	0.14
Spectar	SODIUM CARBONATE SOLN - 2%	Immersion	200	23	No effect	0.28	0.1
Spectar	SODIUM CARBONATE SOLN - 2%	Immersion	20	23	No effect	-1.11	-1.4
Spectar	SODIUM CARBONATE SOLN - 20%	Immersion	2000	23	No effect	0.53	0.11
Spectar	SODIUM CARBONATE SOLN - 20%	Immersion	200	23	No effect	0.26	0.06
Spectar	SODIUM CARBONATE SOLN - 20%	Immersion	20	23	No effect	0.11	0.14
Spectar	SODIUM CHLORIDE SOLN - 10%	Immersion	2000	23	No effect	0.53	0.25
Spectar	SODIUM CHLORIDE SOLN - 10%	Immersion	200	23	No effect	0.25	0.16
Spectar	SODIUM CHLORIDE SOLN - 10%	Immersion	20	23	No effect	0.1	0.05
Spectar	SODIUM HYDROXIDE - 10%W/V IN WATER	Immersion	2000	23	Haze	-0.98	-1.05
Spectar	SODIUM HYDROXIDE - 10%W/V IN WATER	Immersion	200	23	No effect	-0.5	0.03
Spectar	SODIUM HYDROXIDE - 10%W/V IN WATER	Immersion	20	23	No effect	-0.46	0.18
Spectar	SODIUM HYDROXIDE - 60%	Immersion	2000	23	Dissolving	-100	-100
Spectar	SODIUM HYDROXIDE - 60%	Immersion	200	23	Dissolving	-100	-100
Spectar	SODIUM HYDROXIDE - 60%	Immersion	20	23	No effect	1.23	1.61
Spectar	SODIUM HYDROXIDE 1%	Immersion	2000	23	Haze	0.46	0.11
Spectar	SODIUM HYDROXIDE 1%	Immersion	200	23	No effect	0.26	0.18
Spectar	SODIUM HYDROXIDE 1%	Immersion	20	23	No effect	0.1	0.13
Spectar	SODIUM HYPOCHLORITE SOLUTION	Immersion	2000	23	Haze	0.36	0.02
Spectar	SODIUM HYPOCHLORITE SOLUTION	Immersion	200	23	No effect	0.22	0.18
Spectar	SODIUM HYPOCHLORITE SOLUTION	Immersion	20	23	No effect	0.1	-4.3
Spectar	SULFURIC ACID - 30%	Immersion	2000	23	No effect	0.43	0.08
Spectar	SULFURIC ACID - 30%	Immersion	200	23	No effect	0.28	0.1
Spectar	SULFURIC ACID - 30%	Immersion	20	23	No effect	0.1	0.03
Spectar	SULFURIC ACID (SP. GR. 1.84)	Immersion	2000	23	Dissolving	-100	-100
Spectar	SULFURIC ACID (SP. GR. 1.84)	Immersion	200	23	Dissolving	-2.7	-3.44
Spectar	SULFURIC ACID (SP. GR. 1.84)	Immersion	20	23	Dissolving	-100	-100
Spectar	SULFURIC ACID 3%	Immersion	2000	23	No effect	0.6	0.23
Spectar	SULFURIC ACID 3%	Immersion	200	23	No effect	0.25	0.21
Spectar	SULFURIC ACID 3%	Immersion	20	23	No effect	0.11	0.14
Spectar	TOLUENE	Immersion	2000	23	Haze	25.15	0.95
Spectar	TOLUENE	Immersion	200	23	Haze	26.84	33.16
Spectar	TOLUENE	Immersion	20	23	Haze	14.75	18.12
Spectar	TRANSFORMER OIL	Immersion	2000	23	No effect	0.09	0.02
Spectar	TRANSFORMER OIL	Immersion	200	23	No effect	0.03	-0.1
Spectar	TRANSFORMER OIL	Immersion	20	23	No effect	0.02	-0.06
Spectar	TRANSMISSION FLUID	Immersion	2000	23	No effect	0.03	-0.02
Spectar	TRANSMISSION FLUID	Immersion	200	23	No effect	0.03	0.05
Spectar	TRANSMISSION FLUID	Immersion	20	23	No effect	0.04	0.03
Spectar	TURPENTINE	Immersion	2000	23	No effect	0.12	0.08
Spectar	TURPENTINE	Immersion	200	23	No effect	0.08	-0.03
Spectar	TURPENTINE	Immersion	20	23	No effect	0.06	-0.02

Note: the comments were not brought over from the database into this file, but in general, the phrase "see comments" is not useable.

### Properties of Spectar Copolyester

- Sparkling Clarity.
- Spectar is environmentally safe because it is completely combustible with no dioxins given off into the atmosphere and no toxic\* substances. (\*Thermal decomposition or combustion of acrylics may emit methyl methacrylate (MMA) vapors.)
- Chrysalis is recyclable; the encapsulating material is made from either virgin or recycled PETG Spectar Copolyester and contains no acrylics.
- Toughness - Chrysalis is much stronger than many other competing materials such as acrylic, even at -40° F.
- Bendable - Spectar can be cold formed (72 degrees F; Standard Room Temperature) or heat bent. Chrysalis will bend in half the time of acrylic and will form to any angle on a sheet metal brake - press with the addition of heat.
- Machinable - Can be drilled, routed or sawed easy as or easier than other plastics.

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- FDA & USDA approved: Complies with the compositional requirements for food contact as a bacteriostatic surface (does not promote the growth of bacteria)- FDA regulation 21 CFR 177.1315(b)(1) and FDA Food Contact Notification 179 (FCN 179), and EU Directive 2002/72/EC
- Meets Greenguard certification requirements with no VOC issues within interior spaces. (See Eastman press release)
- Spectar Copolyester meets the requirements of a light transmitting plastic according to the 2003 version of the ICC Building Code, Chapter 26.  
<http://www.eastman.com/NR/exeres/146A9CCC-DA61-4100-8429-B4AE9858BCD2.htm>
- Security -Correctional Facility forced Entry- (ASTM F1915)--Pass
- Burglary Resistance -- UL972 Pass
- Ballistics - UL 752 (Levels 1-8)--Pass
- Hurricane Glazing Florida Building Code - Missile impact and cycling--Pass
- Transportation - ANSI Z.97—Pass
- Printable - Silk-screens easily using recommended Copolyester inks available from most ink manufacturers.
- Spectar has lower energy costs than any other clear plastic which also translates to reduced cycle times.
- Self-Healing surface when a heat gun or flame polishing is employed.

## **Deflection**

4'x8'x0.2" Spectar sheet.

Neglects effects of the inclusion.

Room temperature (23 deg C), not backlit.

Simply supported (not clamped, resting under its own weight, on all four edges, horizontally, with no external forces other than gravity) this leads to an instantaneous deflection of 0.4" from Roark's formulae. Note that polymer creep over time can affect this value.

## **Bend Radius**

The bend radius for standard Chrysalis is 19.6 inches under standard conditions of heat and pressure. (Standard Conditions: One atmosphere and 72 degrees F.)

## **Impact Resistance**

The impact resistance of PETG is approximately 40 times that of float glass, and 10 times that of tempered glass.

Spectar passes UL974 (Burglary Resistance Testing, Report # CVYU.BP9382). A 5 lb steel ball is dropped from a height of 40 feet onto Spectar sheet fixed in a 2'x2' clamped frame.

Impact resistance testing results have demonstrated that Chrysalis can be up to 30 times more impact resistant than unmodified acrylic, especially under cold flexing . Acrylic which is heavily modified with impact modifiers can be purchased but is more expensive and Chrysalis is still 4 times more impact resistant.

Puncture resistance at maximum load is 18 times greater than general purpose acrylic, and 2 times that of modified acrylic according to ASTM D3763. This translates to tougher and longer lasting applications due to greater to resistance to fracture around mounting points.

The ANSI details for glazing: ANSI 97.1, 5.1 Safety Glazing Performance Standard-PASS Report #'s 136057-001-1 & 136059R

<http://www.eastman.com/products/producthome.asp?product=71002011&SelectorUrl=%2fProducts%2fproductSelector.htm&ListPath=%2fProducts%2fProductList.htm&sSelectorType=Generic&sCategoryName=&sKeyword=spectar>

## **Flammability\***

Chrysalis is made of Spectar Copolyester (PETG), a resin produced by Eastman Chemical Company Extruded Spectar Copolyester sheet is classified as a "Class A" material since it passed NFPA 286 as an interior finish in the states that have adopted the 2003 version of the ICC Building Code, Chapter 8.

This means that Spectar Copolyester

- is rated as CC1 according to ASTM D635 (Rate of Burn Test)
- has a self ignition temperature greater than 800 degrees F according to ASTM D1929
- has less than 75% smoke development per ASTM D2843 (Refer to ICC-ES report ESR1407 [http://www.icc-es.org/reports/pdf\\_files/ICC-ES/ESR-1407.pdf](http://www.icc-es.org/reports/pdf_files/ICC-ES/ESR-1407.pdf))
- is approved for use as an interior finish in Los Angeles, CA, based on LARR # 25650 (Los Angeles Research Report <http://netinfo.ladbs.org/rreports.nsf/41eed0dac71af7748825692d004f0e38/6>).

Special note: The Steiner Tunnel because of its limitations has been retired and superseded by the other two tests for flame spread and smoke generation in most fire codes and is perfectly acceptable in most situations. E-84 was developed in 1944 by Al Steiner, and was replaced in the year 2000 because it is not a good test for plastics. There are exceptions since there are 50 state codes and then some local codes on the books which at this writing may not have been updated.

Further Reading:

Research Article, *Flammability testing state-of-the-art*

E-84 is not the appropriate test for many products.

John de Ris

Factory Mutual Research Corporation Norwood, Massachusetts 02062, USA

More: The Uniform Building Code (UBC) defines light-transmitting plastics and the flammability requirement referencing ASTM-D 635 and ASTM-D 2843 as the appropriate tests. The BOCA National Building Code defines ASTM 635 and ASTM D 2843 as the appropriate test for light-transmitting plastic.

Flammability Handbook for Plastics, 5th Edition, by Carlos Hidalgo, page 235

"For many years, this mini-encyclopedia of information on the fire properties of plastics has been widely used and recognized as a basic guide and reference to the fire behavior and fire retardance of plastics. This fifth edition of the Flammability Handbook for Plastics provides new sections on thermoplastic elastomers, conductive polymers, multicapability test methods, chlorofluorocarbons and flammability, recycling, and depolymerization. Also new to this edition are alphabetical listings of plastics- and product safety-related organizations and terms." -Publisher, "Technomic"

The E-84 does not specify a Pass/Fail result- only a number. The local and state codes accept different numbers as Class "A". Many states and local fire districts would consider the results of PETG in the Steiner Tunnel a "Pass".

\* *European Flammability ratings also available.*

## **Weight Calculation**

For 3/16", or 0.196" or 5 mm: 4' X 8' sheets – lbs/sq ft = 1.3 & lbs/sheet = 42

- *Note: these are estimated weights and thicknesses. The actual weights and thicknesses will vary depending on internal encapsulated décor.*

## **LEED Credits**

### **Construction Materials Waste Management (MR 2.1 & MR 2.2 - up to 2 points)**

#### **Credit Requirement**

- Develop and implement a construction waste management plan.
- Recycle or salvage at least 50% (1 point) or 75% (2 points)

#### **Chrysalis**

- Chrysalis packaging is designed to be almost entirely recyclable, making it easy to divert construction waste from landfills
- Chrysalis fabrication capabilities create turn-key installations to reduce the amount of materials needed on site

### **Recycled Content (MR 4.1 & MR 4.2 - up to 2 points)**

#### **Credit Requirement**

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- The sum of post-consumer recycled content plus one half of pre-consumer (post-industrial) recycled content must equal at least 10% (1 point) or 20% (2 points) of the total value of project materials.

## Chrysalis

- Chrysalis optional recycled content can be specified at 44% or 98% (non-stock, extended lead time, and up-charge fees required). COA (Certificate of Analysis) is available for certification of product content.

## **Low-Emitting Materials/ IAQ Compliant Products (EQ 4.1 - 1 point)**

### Credit Requirement

- Products used INSIDE the building seeking certification must not exceed LEED limits from Volatile Organic Compounds (VOC) content.

Chrysalis: Meets Greenguard Certification requirements.

The adhesives recommended by Chrysalis meet LEED standards according to their own manufacturer's testing. Chrysalis provides this information as a courtesy. No warranty is expressed or implied for fitness of use or testing result from use of adhesives..

## **Regional materials (MR 5.1 - up to 2 points)**

### Credit Requirements

- A minimum of 10% of construction material costs must be extracted or harvested and/or manufactured within 500 miles of the project site.
- "Manufactured" is defined as the final assembly of components into the product that is furnished and installed. This does not include on-site assembly, erection, or installation of finished components.

## Chrysalis

- All Chrysalis panels are manufactured in Southern California.
- Any Chrysalis product fabricated by a Chrysalis partner or distributor will be considered to be manufactured at the site of the third party. Chrysalis material costs can help projects within 500 miles earn this regional material credit provided they are fabricated within this 500 mile radius.

## **Daylight and Views (EQ 8.1, EQ 8.2, EQ 8.3 - up to 3 points)**

### Credit Requirements

- Achieve a minimum Daylight Factor of 2% for at least 75% (1 point) or 90% (2 points) of all regularly occupied areas.
- Provide daylight redirection and/or glare reduction devices-(prerequisite)
- Views for 90% Seated spaces (1 point)
- Line of site may be drawn through interior glazing

## Chrysalis

- Chrysalis translucent resins can be used in place of opaque materials to maximize the infusion of daylight throughout entire interiors. Metals are approximately 35% translucent and also reflect light back into usable spaces. Many products top 95% translucency. Customer Service can supply information by SKU.
- Chrysalis translucent resins may help diffuse daylight to achieve glare reduction prerequisite.

## **Special Notes:**

- LEED does not certify products, but the information above can assist in earning LEED points for projects.
- LEED approves the final site of assembly as the manufacturing site. Assembly of Chrysalis into the final product on site therefore is considered within 500 miles.
- LEED does not consider drilling holes or installing hardware as falling under the definition of manufacturing.

## **Disclaimer**

We believe this information to be reliable and offer the information in good faith without guarantee, as conditions and methods of use are beyond our control. We recommend prospective buyers perform their own testing to determine product suitability for all purposes before adopting Chrysalis on a commercial scale. In no case is Duraglas liable for direct, consequential, economic, or other damages. Duraglas disclaims all other warranties, expressed or implied, including the warranty of merchantability and fitness for a particular purpose. Special Note: The inclusions used in all of the Chrysalis designs are suspended in the polymer matrix and therefore free to move during manufacture. Strict pattern repeats and alignment are therefore not assured and deviations can occur. This is normal for the EILT process and is not considered a defect.

## **Warranty**

Duraglas, Inc. warrants for a period of up to one year from the date of shipment that its products will conform to the product specifications supplied by Duraglas are free from defects in materials and workmanship. The buyer's sole remedy, at Duraglas' option, shall be to refund the purchase price or to repair or replace the defective product. If Duraglas requests the material to be returned it must be returned before any claim is accepted; Duraglas will issue a Return Authorization Number (RAN) and advise shipping instructions. Any material returned without a Return Authorization Number will be refused and returned to the shipper at shipper's expense. Claims under this limited warranty must be submitted in writing to: Duraglas Corporation, 2915 Red Hill Avenue, Suite 105, Costa Mesa, California, 92626. This limited warranty shall apply to all valid claims for defective product received in writing by Duraglas within one year following shipment of the product. In no case is Duraglas liable for direct, consequential, economic, or other damages. Duraglas disclaims all other warranties, expressed or implied, including the warranty of merchantability and fitness for a particular purpose. Duraglas Inc. does not authorize any representative to make any claims other than those listed and in no event will assume any liability or obligation other than those expressly set forth herein.

This limited warranty does not cover:

1. Damage resulting from accident or abuse;
2. Damage resulting from the failure of a third-party's product;
3. Damage resulting from failure to maintain according to Chrysalis product usage guidelines; or Care and Usage instructions.
4. Damage to custom products designed and manufactured with custom inserts or based on custom specifications supplied by a customer or its agents.
5. Variations in dye lots, gauges, textures, and finishes, that may vary between the samples provided to customers and the product actually delivered.
6. Damage resulting from unusual wear and tear on the product;
7. Damage resulting from improper specification, fabrication or installation.

## **MSDS**

### **1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION**

**Product Name:** Chrysalis HD™ translucent panels

**Product Identification:** Chrysalis PETG

**Manufacturer/Supplier:** Duraglas®, Inc.

**MSDS Prepared by:** Duraglas® Engineering

**Chemical Name:** PETG Sheet

**Synonym(s):** not applicable

**Molecular Formula:** (polyesterphthalate para-dihydroxycyclohexane<sub>x</sub>)

**Molecular Weight:** not applicable

**Product Use:** Translucent Architectural Panels

**OSHA Status:** non-hazardous

*For emergency health, safety & environmental information, call 714-800-1648.*

*For emergency transportation information, call 714-800-1648.*

### **2. COMPOSITION INFORMATION ON INGREDIENTS**

*Typical composition is given, and may vary. A certificate of analysis can be provided.*

**Weight % Component . >99% Plastic <1% colorants**

*One or more of the following co-components may be present in trace amounts: Polyester, Rayon, Aluminum, Cotton, Linen, printing inks or, Paper.*

### **3. HAZARDS IDENTIFICATION**

**Skin Contact:** NO hazard at STP (standard temperature and pressure). The saw dust may be an irritant to sensitive persons.

**Eye Contact:** No hazard at STP (standard temperature and pressure) The saw dust may irritate the eyes through mechanical action. Wear protective eyewear when fabricating.

**Inhalation:** No hazard at STP (standard temperature and pressure) The saw dust may irritate the lungs through mechanical action. Wear protective particulate mask when fabricating.

**Chronic (Cancer):** No evidence of adverse effects.

**Teratology (Birth Defects):** No evidence of adverse effects.

**Reproductive Information:** No evidence of adverse effects.

**HMIS® Hazard Ratings:** Health - 0, Flammability -0, Chemical Reactivity – 0

*In the United States of America, refer to NFPA® Pamphlet No. 654, "Prevention of Fire and Dust Explosions in the Chemical, Dye, Pharmaceutical, and Plastics Industries." HMIS® rating involves data interpretations that may vary from company to company. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.*

## 4. FIRST-AID MEASURES

**Inhalation:** Saw dust inhalation may cause coughing. See a physician if symptoms persist.

**Eyes:** Flush with water if saw dust enters the eye. See a physician if symptoms persist.

**Skin:** Saw dust may irritate skin through mechanical insult. Wash away the dust. Apply an antiseptic if the skin is compromised. See a physician if symptoms persist.

**Ingestion:** Product cannot be chewed, and saw dust is not expected to be absorbed from the gastrointestinal tract so that induction of vomiting should not be necessary.

**Note to Physicians:** In the remote case of burning or molten material contact with the skin, burns should be treated as thermal burns. The material will come off as healing occurs; therefore, immediate removal from the skin is not necessary.

## 5. PHYSICAL AND CHEMICAL PROPERTIES

**Physical Form:** Solid (translucent architectural panel)

**Appearance:** Clear to opaque

**Odor:** imperceptible

**Softening Point:** >210 F

**Solubility in Water:** Insoluble

**Flash Point:** Not applicable, combustible solid

**Auto-ignition Temperature:** Self ignition temperature greater than 800 degrees F.

## 6. STABILITY AND REACTIVITY

**Stability:** Stable under (STP) normal and anticipated storage and handling conditions

**Incompatibility:** Acids, alkalis, strong oxidizing agents and solvents.

**Hazardous Polymerization:** Will not occur.

**Thermal Decomposition:** Thermal decomposition or combustion may emit vapors, smoke, carbon monoxide or carbon dioxide depending on the available oxygen..

## 7. FIRE FIGHTING MEASURES

**Extinguishing Media:** Water spray dry chemical foam or carbon dioxide

**Fire-Fighting Procedures:** Wear self-contained air purifying respirator (pressure-demand, MSHA/NIOSH approved or equivalent) and full protective gear

**Hazardous Combustion Products:** Carbon dioxide, carbon monoxide

**Unusual Fire and Explosion Hazards:** **Safe dust removal equipment should be used.**

## 8. WASTE DISPOSAL/ACCIDENTAL RELEASE MEASURES

**Disposal:** Product can be disposed by incineration or landfill at a facility that complies with local, state and federal regulations. Product should be recycled.

**Accidental Release:** In case of saw dust spill, sweep, and scoop or pick up and remove to a suitable container. No materials should be released near a storm drain.

## 9. HANDLING AND STORAGE

**Maximum Storage Temperature:** 179 F (Long exposure to this high temperature will warp the product.)

**Storage Measures:** Store at STP(standard temperature and pressure) when possible. Keep from contact with oxidizing materials. Minimize dust generation and accumulation.

**Handling Measures: Cutting** Chrysalis™ generates “inert” or “nuisance” dust. Blower collection systems or exhaust ventilation systems should be installed to prevent airborne contaminant dispersion due to cutting, sawing or thermal forming operations.

## 10. EXPOSURE CONTROLS/PERSONAL PROTECTION

*Country specific exposure limits have not been established or are not applicable unless listed below.*

**Ventilation:** Good general ventilation (ASHRAE standards) should be used. Systems common to woodworking and fabricating are sufficient.

**Respiratory Protection:** None required under normal circumstances. However, if engineering controls do not maintain airborne concentrations to an acceptable level, a dust mask should be worn.

**Eye Protection:** Wear safety glasses with side shields when sawing, cutting or routing the material.

**Skin Protection:** Wear cotton or canvas gloves to protect against thermal burns, cuts and abrasions to hands.

**Recommended Decontamination Facilities:** An eye bath and hand washing stations should be available.

## 11. TOXICOLOGICAL INFORMATION

*The product is not toxic.*

**Ingestion:** This material is classified as practically non-toxic by ingestion.

**Eye Contact:** Other than mechanical abrasion, no irritation is likely to develop following contact with the human eye.

**Skin Contact:** No irritation is likely to develop following contact with the skin unless rubbing occurs and abrasion results..

**Skin Absorption:** This product will not be absorbed through the skin.

**Inhalation:** No toxic effects are known to be associated with inhalation of dust from this material

**Other Overexposure Effects:** No other adverse clinical effects have been associated with exposures to this material.

## 12. REGULATORY INFORMATION

**Comprehensive Environmental Response, Compensation, and Liability Act:** Under section of 102 (a) of the act, this product is NOT designated as hazardous. No reportable quantities and no notification requirements to the National Response Center in Washington DC are set forth for its release from a vessel, an offshore or onshore facility (40 CFR Part 302)

**Research Conservation and Recovery Act (RCRA):** This material is identified as solid but NOT hazardous waste by RCRA legislation (40 CFR Part 261) The product should and can be recycled.

**Toxic Substances Control Act (TSCA):** Manufactures, importers, and processors of this product are not subject to reporting health and safety studies under the act (40 CFR Part 716)

**Superfund Amendment and Reauthorization Act of 1986 (SARA):** This product has no requirements under SARA.

## 13. TRANSPORT INFORMATION

**Marine Pollutant Components:** None unless listed below

**DOT (USA):** C lass not regulated

**ICAO Status:** C lass not regulated

**IMDG Status:** C lass not regulated

## 14. OTHER INFORMATION

*Duraglas®, Inc. believes that the information and recommendations contained herein (including data and statements) are accurate as of the date hereof. Users should perform their own tests to determine the suitability of these products for their own particular purposes. NO WARRANTY OF FITNESS FOR ANY PARTICULAR PURPOSE, WARRANTY OF MERCHANTABILITY, EXPRESSED OR IMPLIED, IS MADE CONCERNING THE INFORMATION CONTAINED HEREIN. The information provided herein relates only to the specific product designated and may not be valid where such product is used in combination with any other materials or in any*

*other process. Further, the conditions and methods of use are beyond the control of Duraglas®, Inc. expressly disclaims any and all liability as to any results obtained or arising from any use of the product or reliance on such information.*

## **CSI SPECIFICATION DOCUMENT**

### CHRYSALIS HD ARCHITECTURAL RESIN PANELS

#### **PART 1. GENERAL**

##### SOLID POLYMER PANELS AND/OR FABRICATIONS

##### SECTION 06650

#### 1.01 RELATED DOCUMENTS

Drawings and general provisions of the contract, including general and supplementary conditions and other division 1 specification sections, apply to this section.

#### 1.02 SUMMARY

This Section includes the following:

Solid Polymer Panels and/or Fabrications - Vertical Applications

- Backsplashes
- Back-Lit Panels
- Balustrade Panels
- Bar Fronts
- Cabinet Doors
- Ceiling Panels
- Closet Doors
- Doors
- Elevator Cabs
- Feature Wall
- Furniture
- Lighting
- Marker Boards
- Partitions
- Retail Shelving
- Signage
- Wall Cladding
- Wall Panel (Backlit)

The extent of Solid Polymer Panels and/or Fabrications to be shown on Technical Drawings

Related Sections include the following:

Division 5— Ornamental Railings

Division 6—Finish Carpentry and Interior Architectural Woodwork

Division 8—Standard Steel Doors and Frames, Custom Steel Doors and Flush Wood Doors

Division 9—Ceramic Tile Wall Coverings

Division 10— Visual Display Surfaces and Signs

Division 14— Elevators

Division 15—Plumbing Fixtures

Division 16— Interior/Exterior Lighting

#### 1.03 SUBMITTALS

Product Data:

Product Description

Gauge

Dimensions

Part Sizes

Fabrication Description

Mounting Methods

## Technical Drawings:

1. Plans
2. Elevations
3. Section Views

## Samples for Initial Selection:

Submit minimum 2"x2" Chrysalis samples. Indicate full color and pattern variation.

## Samples for Verification:

Submit minimum 4"x4" Chrysalis sample for each type, texture, pattern and color.

## Maintenance Data:

Submit manufacturer's product care, maintenance data and cleaning instructions. Include in project closeout documents.

## 1.04 QUALITY ASSURANCE

Fire-Test Response Characteristics - Provide original fire test reports to ensure compliance with the following requirements:

### Rate of Burning:

ASTM D635 Class: CC1 for a nominal thickness of 0.25" (1.5mm)

### Self-Ignition Temperature:

ASTM D1929: Greater than 650°F

### Density of Smoke:

ASTM D2843: Less than 75%

### Flammability Classification:

ASTM E-84: Smoke less than 450; Flame spread less than 75.

Impact Resistance: Provide Solid Polymer Panels that comply with the following requirements:

Impact Strength, Un-notched (23°), ASTM D4812: No breakage

Impact Strength, Notched (23°), ASTM D526: 88J/m (1/16")

### Allowable Tolerances:

Maximum Deflection: 1/16" over 12"

Sheet Dimensions: +/- 1/8"

Mockups: Build mock-ups to verify Chrysalis selections made under sample submittals and to demonstrate aesthetic effects.

Build mock-up of each type of Chrysalis Panel and/or Fabrication.

Approved mock-ups maybe come part of the completed work if undisturbed at time of substantial completion.

Related Sections include the following:

Division 5— Ornamental Railings

Division 6—Finish Carpentry and Interior Architectural Woodwork

Division 8—Standard Steel Doors and Frames, Custom Steel Doors and Flush Wood Doors

Division 9—Ceramic Tile Wall Coverings

Division 10— Visual Display Surfaces and Signs

Division 14— Elevators

Division 15—Plumbing Fixtures

Division 16— Interior/Exterior Lighting

## 1.05 DELIVERY, STORAGE AND HANDLING

Do not deliver Solid Polymer Panels and/or Fabrications, system components or accessories to install site until areas are ready for installation.

Handle materials in a manner to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.

Leave protective masking in place during fabrication.

Allow Solid Polymer Panels and/or Fabrications to reach room temperature prior to installation.

## 1.06 PROJECT CONDITIONS

Environmental Limitations: Do not install Solid Polymer Panels and/or Fabrications until all spaces are weather-proofed, and ambient temperatures and humidity conditions are maintained at the levels indicated for occupancy.

## 1.07 WARRANTY

Manufacturer's Warranty on Chrysalis Solid Polymer PETG Panels: Manufacturer's standard warranty agreeing to repair or replace material that fails within the specified warranty period. This does not include failure due to improper fabrication or fabrication techniques.

Self-Ignition Temperature:

ASTM D1929: Greater than 650°F

Density of Smoke:

ASTM D2843: Less than 75%

Flammability Classification:

ASTM E-84: Smoke less than 450; Flame spread less than 75.

Impact Resistance: Provide Solid Polymer Panels that comply with the following requirements:

1. Impact Strength, Un-notched (23°), ASTM D4812: No breakage
2. Impact Strength, Notched (23°), ASTM D526:88J/m (1/16")

Allowable Tolerances:

Maximum Deflection: 1/16" over 12"

Sheet Dimensions: +/-1/8"

Mockups: Build mock-ups to verify Chrysalis selections made under sample submittals and to demonstrate aesthetic effects.

Build mock-up of each type of Solid Polymer Panel and/or Fabrication.

Approved mockups may become part of the completed work if undisturbed at time of substantial completion.

## **PART 2 PRODUCTS**

### 2.01 MANUFACTURERS

Basis of Design Product: The design of Solid Polymer Panel and/or Fabrications is based on Chrysalis HD as provided by Duraglas Inc. Products from other manufacturers must be approved by the architect or designer prior to bidding in accordance with the instructions to bidders and Division 1 Section "Product Requirements."

Fire-test response characteristics noted in Part 1 Section 1.04 must be substantiated with original test results for manufacturer's products.

Provide products specified in each Solid Polymer Panel and/or Fabrication Product Data Sheet at end of this Section.

### 2.02 MATERIALS

CHRYSLIS HD Architectural Resin Panels: Engineered polyester resin, glycol modified.

Sheet Size: Maximum 4'x8'

Thickness: Minimum 1/8"

Interlayer Materials: Compatible with polyester and bonding processes to create a solid sheet of material when complete.

### 2.03 FABRICATION

General: Fabricate Solid Polymer Panels to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings. Comply with manufacturer written recommendations for fabrication.

Machining: Acceptable means of machining are listed below. Ensure that material is not chipped, heat strained or warped by machining operations.

Sawing: Select equipment and blades suitable for type of cut required.  
Drilling: Drills specifically designed for use with plastic products. Milling: Climb cut where possible.  
Routing  
Shearing and Punching: Not acceptable on 1/8" or greater.  
Die Cutting: Acceptable only on material 1/8" or less.

Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer written instructions.  
Cold Bending (Standard 72 degrees F, Standard pressure)  
Hot Bending  
Thermoforming (un-coated material only)  
Drape Forming  
Matched Mold Forming  
Mechanical Forming

## 2.04 MISCELLANEOUS MATERIALS

General: Provide products of material, size and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.  
Cleaner: Type recommended by manufacturer.  
Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly, such as light fixtures.  
Bonding Cements: Solvent or adhesives, suitable for use with product and application.  
Drilled-Panel Wall Anchors: Décor Cable, PVC Wall Anchor. Provide extensions to accommodate thicknesses scheduled or illustrated.

## **PART 3 - EXECUTION**

### 3.01 EXAMINATION

Examine substrates, areas and conditions where installation of Solid Polymer Panels and/or Fabrications will occur, with Installer present, for compliance with manufacturer requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

Sawing: Select equipment and blades suitable for type of cut required.  
Drilling: Drills specifically designed for use with plastic products.  
Milling: Climb cut where possible.  
Routing  
Shearing and Punching: Not acceptable on 1/8" or greater material.  
Die Cutting: Acceptable only on material 1/8" or less.

Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer written instructions.  
Cold Bending (Standard 72 degrees F, Standard pressure)  
Hot Bending  
Thermoforming (un-coated material only)  
Drape Forming  
Matched Mold Forming  
Mechanical Forming

### 3.02 INSTALLATION

General:  
Comply with manufacturer's instructions for the installation of Solid Polymer Panels and/or Fabrications.  
Fabricate off-site to greatest completion possible.  
Utilize fasteners, adhesives and bonding agents as recommended by the manufacturer depending on installation. Material that is damaged as a result of installation or fabrication methods will not be accepted or warranted.  
Install components in accordance with approved technical drawings and product data.

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Form joints using manufacturer's recommended procedures. Panel seams should not align with substrate seams.

## 3.03 CLEANING AND PROTECTION

Protect surfaces from damage until date of substantial completion.

End of Section 06650

Product: CHRYSALIS HD

Color: [Replace with color name]

Gauge: 1/8", 3/16", 3/8", 1/2" [As indicated on drawings; as required to meet deflection requirements]

Surface Finish: Gloss

UV Protection: [required][not required]

Expansion/Contraction Allowance:

Edge Seal: [not required][required]

Orientation: Vertical

## PRODUCT DATA SHEET - SOLID POLYMER PANELS and/or FABRICATIONS

Product: CHRYSALIS HD

Color: [Replace with color name]

Gauge: 1/8", 3/16", 3/8", 1/2" [As indicated on drawings; as required to meet deflection requirements]

Surface Finish: Gloss

UV Protection: [required] [not required]

Expansion/Contraction Allowance:

Edge Seal: [not required] [required]

Orientation: Vertical