

DYNAGLAS®

CORRUGATED POLYCARBONATE PANELS

Technical and Installation Guide

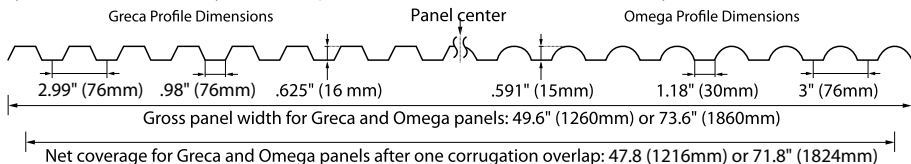
<i>Technical Specifications and Tolerances</i>	1
<i>Panel Dimensions</i>	2
<i>Light Transmission & Condensate Control</i>	2
<i>UV Resistance, Impact Strength, Hail Resistance</i>	3
<i>Energy Efficiency and Other Considerations</i>	4
<i>General Installation Information</i>	5
<i>Purlin Spacing and Panel Loading Guidelines</i>	6
<i>Fasteners & Accessories and Lap Fastener Installation</i>	7
<i>Fastening Requirements & Spacing and Expansion/Contraction</i>	8
<i>Elimination of Condensation Drip at Purlins</i>	9
<i>Re-Covering Existing Greenhouses</i>	9
<i>Compatible Shade Compounds & Fabrics</i>	10
<i>Cleaning and Care of DynaGlas</i>	10
<i>Calculating Square Footage of DynaGlas Panels</i>	11

DynaGlas Technical Specifications

Dimensions		Value (English (Metric))		
Panel Widths (gross)	49.6" or 73.6" (1260 mm or 1870 mm)			
Panel Widths (net after one corrugation overlap)	47.8" (±4 ft) or 71.8" (±6 ft) (1216 mm or 1824 mm)			
Panel Lengths (custom cut to specification)	3' to 38' (914 mm to 11580 mm)			
Corrugation/Wave Depth	Greca 0.625" (16 mm) Omega .591" (15mm)			
Corrugation/Wave Pitch	2.99" (76 mm)			
Weight	Greca .24 lbs./sf (1220 g/m ²) Omega Greca .23 lbs./sf (1104 g/m ²)			
Thickness	0.03" (0.8 mm)			
Number of Corrugations/Waves	17 (49.6" panel) or 25 (73.6" panel)			
Thermal		Value (English (Metric))		Test Method
Optimal Service Temperature Range	- 40° F to +212° F (- 40° C to +100° C)			
Maximum Service Temperature	270° F (132° C)			
Minimum Service Temperature	- 103° F (- 75° C)			
Heat Deflection Temperature Load, 275° F (psi)	275			ASTM D-648
R / U-Factor and K-Value	R = .83 / U 1.20 = (K = 5.8 W/m ² K)			
Coefficient of Linear Thermal Expansion	3.6 x 10 ⁻⁵ in./in./°F (6.5 x 10 ⁻⁵ cm/cm/°C)			ASTM D-696
Thermal Conductivity BTU/lb. (F°)	1.4			ASTM C-177
Mechanical				
Tensile Strength at Yield, 2 in./min. (psi)	9,000		ASTM D-638	
Tensile Strength at Break, 2 in./min. (psi)	9,500		ASTM D-638	
Elongation at Yield, 2 in./min. (%)	> 6 %		ASTM D-638	
Elongation at Break, 2 in./min. (%)	> 80 %		ASTM D-638	
Tensile Modulus, 0.04 in./min. (psi)	340,000		ASTM D-638	
Flexural Modulus 0.052 in./min. (psi)	310,000		ASTM D-790	
Flexural Strength at Yield, 0.052 in./min. (psi)	13,500		ASTM D790	
Shear Strength (psi)	6,180		Factory Test	
Izod Impact Strength, Notched (73° F), ft./lb./in.	18		ASTM D-256	
Rockwell Hardness, R Scale	118		ASTM D-785	
Impact Resistance (falling dart)	444 in. lbs. (50 joules)		ISO 6603/1	
OSHA point-29	Passed 200 lb.		CFR 1910.23 (e) (8)	
Uplift	Passed UL 90		UL 580	
Longitudinal Bending Radius	16' (4.9 m) recommended; 13' (4 m) min.			
Optical				
Light Transmission/Diffusion	Light Transmission	Diffusion		
Clear (DynaGlas Plus)	92 %	>1%		
LDT	90.5 %	10%		
SolarSoft 90™	90 %	40%		
SolarSoft 85™	85 %	100%		
Translucent White	42 %	100%		
Transparent Gray	35 %	10%		
UV Light Transmission (all products)	< 1 %			
UV Protection (co-extruded; not laquer or laminate)	DG SE & Plus, 1 side; DG UV2™ both sides		Factory Test	
Yellowness Index	< 1			
Solar Heat Gain, ft. ² (BTU/hr.)				
Clear	218			
Clear LDT	215			
White-Opal	128			
Gray	120			
Other				
Flammability Rating	CC2 (CC1 available if required)		ASTM D-635-91	
Self Ignition	1030° F (554° C)		UBC Standard 52-3	
Flash Ignition	840° F (449° C)		UBC Standard 52-3	
Smoke Density (%)	51		ASTM D-2843	
Smoke Developed	47.0		UL 723 (ASTM E-84)	
Flame Spread	4.7 (Class A)		UL 723 (ASTM E-84)	
Condensation Control	Built-in; proprietary (10-year warranty)		Factory Test	
Tolerances				
Thickness	0.030" to 0.032" (0.77 mm to 0.83 mm)		Factory Test	
Length	0 to + 0.5" (0 to +15 mm)		Factory Test	
Width	± .4" (± 10 mm)		Factory Test	
Visual Defects (inclusions, bubbles, black specks, gel, etc.)	If defect is not visible by inspection from a distance of 1 meter, it is not considered to be a defect. Surface abrasion may occur in transit. This is not considered a defect as DynaGlas is not intended for "architectural optical clarity" applications. This type of abrasion will not affect durability.			

Panel Dimensions

DynaGlas Plus Clear and SolarSoft™ is available in either 49.6" (47.8" net width) or 73.6" (71.8" net width). DynaGlas Plus White, Gray, and all SE products are available in 49.6" width only.



Light Transmission

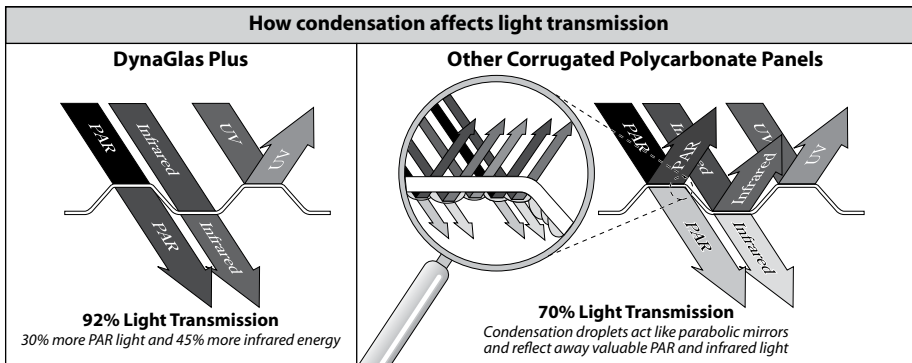
DynaGlas offers the same sparkling clarity as glass. But because DynaGlas requires no shade casting glazing system, DynaGlas transmits as much as 7% more light than glass. DynaGlas Plus SolarSoft 85™ offers high light transmission (85%), but also offers 100% light diffusion, helping to spread light throughout the greenhouse and reduce shadows.

DynaGlas Plus Clear, SolarSoft 90™ and SolarSoft 85™ compared		
<p>Clear</p> <p>92% Light Transmission 2% Light Diffusion</p> <p><i>(Clear DynaGlas Plus offers glass-like clarity and maximum light transmission)</i></p>	<p>SolarSoft 90™</p> <p>90% Light Transmission 40% Light Diffusion</p> <p><i>(Diffused light helps to reduce shadows cast by structural members; SolarSoft 90 is nearly clear in appearance, with a slightly milky cast to it)</i></p>	<p>SolarSoft 85™</p> <p>85% Light Transmission 100% Light Diffusion</p> <p><i>(High light diffusion reduces shadows cast by structure. Light spreads throughout greenhouse, envelops plants in valuable PAR light and penetrates plant canopy)</i></p>

Proven Condensate Control

Test results confirm that during condensate formation periods, DynaGlas Plus transmits 30% more PAR light and 45% more infrared energy than corrugated polycarbonate panels without effective condensate control. DynaGlas Plus' built-in condensate control is much more effective than other manufacturer's simple spray-on solutions or aftermarket surfactant coatings, which typically wear off after a few short months.

DynaGlas Plus is the only product with nearly two decades of actual field-proven performance without any loss of effectiveness. In fact, DynaGlas Plus comes with a 10-year condensate control performance warranty.* DynaGlas Plus prevents condensation droplets from forming on the interior surface of the panel. Droplets act like miniature parabolic mirrors and reflect valuable light back into the atmosphere.



* Condensation Control Warranty details provided upon request. Condensation Control Warranty applies to DynaGlas Plus panels only and not to DynaGlas SE panels.

UV Resistance

DynaGlas Plus is exceptionally resistant to weathering. Co-extruded UV protection ensures against loss of light transmission due to yellowing. DynaGlas has a 10-year warranty* against yellowing and loss of light transmission due to UV degradation, providing solid protection against manufacturing defects. However, independent lab tests indicate that DynaGlas can be expected to perform well for 25 - 30 years or more. In fact, after being introduced more than 20 years ago in North America, DynaGlas has never encountered a single claim for yellowing or loss of light transmission and early users of the product attest that the panels look like new.

Open-Roofs, Retractable Roofs and Outdoor Partition Walls

For open-roofs, retractable roofs, and outdoor partitions, use DynaGlas Plus UV2™ with double-sided UV protection. Without UV2, the panels will fail prematurely in these environments.

Impact Strength

DynaGlas Plus is lightweight and flexible yet it is virtually unbreakable. DynaGlas carries a solid 5-year warranty* against breakage due to hail. What's more, DynaGlas will likely provide better long-term hail protection than any other greenhouse covering. In fact, laboratory tests prove that **8-year old DynaGlas is at least than 30 times more impact-resistant than 3 mm tempered glass.**

Comparative Hail Resistance Investigation

Impact energy ("E") is measured in terms of "joules", which is a product of the mass of a projectile multiplied by its velocity, $E = 1/2 * m * v^2 * .001$. The following table indicates the impact energy generated by various size hail stones. The difference between the indicated velocities is due to the fact that the velocity of hail stones is affected slightly by their diameter.

Hail Diameter	Mass	Velocity		Impact Energy
25 mm (1")	7.4 grams	30.0 m/s	67 mph	3.33 joules
38 mm (1-1/2")	25.8 grams	33.7 m/s	76 mph	14.65 joules
51 mm (2")	58.8 grams	37.3 m/s	84 mph	40.90 joules

Impact Resistance of Glass and Corrugated Polycarbonate

The following table presents the results obtained when subjecting double strength glass, 3 mm and 4 mm tempered glass and DynaGlas corrugated polycarbonate to 9.8 gram (nylon) and 38.0 gram (aluminum) projectiles at various velocities, closely simulating the action of hail stones.

Glazing Material	Projectile Mass (grams)	Velocity		Impact Energy (joules)	Results
		m/s	mph		
Double Strength Glass	9.8	10	22	0.5	• Sample shattered
3 mm Tempered Glass	9.8	18	39	1.6	• No breakage
	9.8	20	45	2.0	• Sample Shattered
4 mm Tempered Glass	9.8	25	56	3.1	• No Breakage
	9.8	30	67	4.4	• Sample shattered
DynaGlas <i>(Note: 8 year old panels used for tests)</i>	38.0	60	135	68.4	• No breakage • Slight dent only • No starring

Summary of Test Results

- 1.) Double strength glass *failed* to resist an impact load equivalent to that of small hail stones.
- 2.) 3 mm tempered glass *failed* to resist an impact load equivalent to that of 1" diameter hail stones.
- 3.) 4 mm tempered glass just did resist an impact load equivalent to that of 1" diameter hail stones.
- 4.) DynaGlas was more than 34 times as impact resistant as 3 mm tempered glass and 15 times as resistant as 4 mm tempered glass. Additionally, DynaGlas had a safety factor of about +.7 with respect to an impact force equivalent to 2" diameter hail, the failure mode being just denting, not breaking or starring.

* Detailed "Warranty on Light Transmitting Capacity Due to Excessive Yellowing" and "Warranty Against Breakage Due to Hail" available on request.

Compared to Twin-wall

One of the disadvantages of polycarbonate and acrylic multi-wall sheet is that it requires a rafter support every four or six feet for polycarbonate panels (depending on panel width), and every four feet for acrylic panels. This results in light transmission loss of as much as 5%. Additionally, multi-wall materials suffer from loss of light due to reflection of the sun's rays in the early morning and evening hours (see illustration below).

U-Factor

The insulating characteristics of glazing materials is a complex subject, involving much more than simple U-factors. Typical U-factors for some glazing materials are: Fiberglass, 1.25; DynaGlas Plus, 1.20; Glass, 1.16; Structured Sheet, .60. However, a glass greenhouse suffers additional heat loss through conduction at the metal glazing rafters and through infiltration at glass laps, especially under windy conditions.

It is important to note that DynaGlas Plus incorporates two important features which result in heat gain: 1.) A built-in proprietary condensate control mechanism (see illustration on the bottom of page two), and 2.) A heat- and strength-enhancing surface contour which reduces the reflection of solar energy (see illustration below).

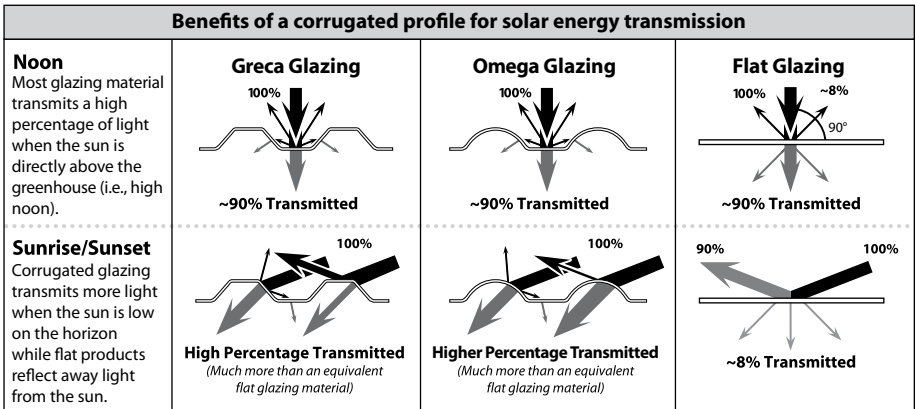
DynaGlas Plus' efficient condensate control mechanism eliminates the millions of droplets

which would otherwise reflect away solar energy. Test results show that, during colder periods, DynaGlas Plus transmits up to 45% more heat energy than standard corrugated polycarbonate panels.

DynaGlas Plus' contoured shape reduces the problem of the reflection of solar energy on flat surfaces due to the low angle at which the sun's rays strike these surfaces during early morning and evening hours, especially during the colder months. With DynaGlas Plus, many of these rays strike the panels perpendicular to the slanted vertical corrugation walls, facilitating their transmission into the greenhouse interior.

The Ideal Greenhouse

In terms of energy conservation, the ideal greenhouse is a DynaGlas Plus house fitted with an Energy/Shade Curtain System. While the installed cost of this combination is very comparable to that of twin-wall sheet construction *without* a curtain, its insulating effect is far superior. Depending on the type of material selected, **annual energy savings of up to 50% may be realized.** And there is the additional important benefit of being able to shade the greenhouse during warmer periods with fully automated light and temperature controls. This combination of high light transmission and fully automated control over heat loss and shading provides growers with maximum year-round versatility.



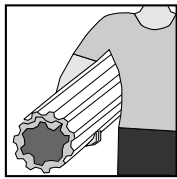
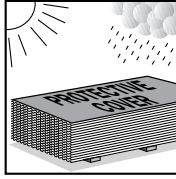
General Installation Information

DynaGlas is unsurpassed in the ease with which it is installed on all types of greenhouse framing systems. Nevertheless, there are some important guidelines that need to be followed in order for panel installation to be accomplished quickly and properly.

Note: *Palram shall not be responsible for problems arising from a failure to observe the following instructions.*

Storage & Handling

Panels can be stored outdoors without suffering damage from rain or snow. However, panels must not be exposed to direct sunlight while they are stacked. Stacks of three or more panels act as a solar heat collector and may incur heat stress damage, which is not covered by warranty. Do not stack or place heavy objects on the panels.



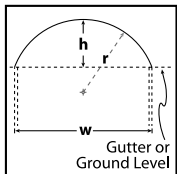
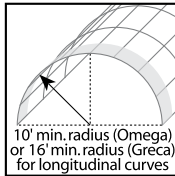
Panels are lightweight, flexible and can be rolled up for easier handling. Long panels should be carried by two people, especially in windy conditions.

Avoiding Panel Deformation

Any local deformation due to inadvertent and excessive local pressure or to vandalism should be reversed as soon as possible to avoid eventual local stress crazing. **To avoid panel deformation and risk of injury, under no circumstances should DynaGlas be walked on, whether on the ground or on the roof after installation.**

Arched Construction

DynaGlas is sufficiently flexible to allow panels to conform to arched construction. It is recommended that panels be affixed to curved surfaces where the curve radius is greater than 10' for Omega panels, and 16' for Greca panels (see next page for more information). Affixing the panel to tighter radii surfaces may result in local stress crazing and deterioration over time.



Determining the Radius of an Arch

Obtain the measurements of "h" (height of arch) and "w" (width of arch) as indicated in the illustration at left. Using these measurements, determine the value of "r" (radius of arch)

using the following equation:

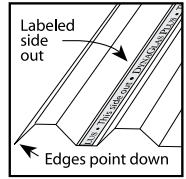
$$r = \frac{h}{2} + \frac{w^2}{8h}$$

DynaGlas at Ground Level

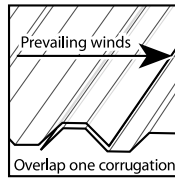
For maximum economy, installation ease, and pest control, DynaGlas panels can simply be extended approximately 6" below ground level.

Positioning

DynaGlas panels have a UV-protected exterior surface and a condensate-controlling interior surface. Panels are to be installed with the labeled side out (exposed to the weather) as indicated by the sticker affixed to the UV-protected side of the panel. If the label has been removed, install panels with the edges pointing down, not up.



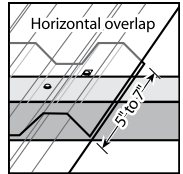
To ensure a full 4' or 6' net coverage, panels should be stretched slightly across the width during installation.



Overlaps

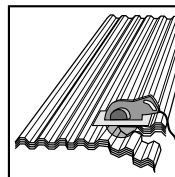
Panels overlap vertically by one corrugation and should be overlapped away from prevailing winds. Vertical laps are fastened together by means of Self-Grip Lap Fasteners (see next page for installation details).

For horizontal overlaps, the upper panel should overlap the lower panel by 5" to 7". Horizontal overlaps should be centered over purlins or girts. Sealants are not required between overlapping panels. The use of sealants or caulking will only result in unsightly dirt streaks within a short period of time.



Minimum Roof Slope for Effective Condensate Control

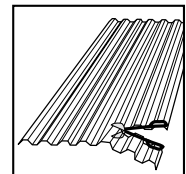
DynaGlas Plus has extremely effective built-in condensate control properties on the interior surface of the panel. To ensure proper condensation flow after installation, a minimum roof slope of 15% (approximately 2" per foot) must be maintained.* (Note: DynaGlas "SE" is intended for use on side, end, and partition walls.)



Cutting DynaGlas



DynaGlas can be cut several panels at a time with a power circular saw equipped with a standard woodworking blade (fine-tooth, hollow ground, 10 to 12 teeth per inch).

Single panels can be cut with standard shears or snips. A saber saw equipped with a fine-tooth blade can also be used, but proper support of the panel is recommended.



* Also see section titled "Elimination of Condensation Drip at Purlins" on page 9.

Distance Between Purlins/Load Guidelines*

Corrugation Profile	Sheet Thickness		Load			Distance between roof purlins		Distance between wall purlins	
	In.	mm	PSF	Kg/m ²	Wind	In.	mm	In.	mm
Greca 	.031	0.8	18.45	90	82	48	1200	48	1200
			24.63	120	96	40.5	1050		
Omega 	.031	0.8	30.75	150	106	36	900		

*** Important notes about the Load Guidelines shown above**

- The dimensions depicted above do not supersede the requirements of local construction codes. The distances depicted above were calculated based on the structural properties with the following factors being taken into consideration: sheet deflection, potential wind load, potential snow load, hail and application load according to usual construction practice.
- When designing a new roof, it is strongly recommended that the slope be above 10% (5.7°). (Consult your local Palram Dealer when recovering an existing greenhouse whose slope is shallower than its value).
- The recommended maximum panel length is 21 feet. The recommended maximum distance between the edge and the first purlin is 3 feet, or the value dictated by the design engineer.

Panel Overlaps**Horizontal Overlap**

Overlap 5-7 inches with a minimum distance of 2-3 inches of each end of the sheet overlapping the center-line of a supporting purlin. Fasten to purlin at center-line (see previous page for illustration).

Vertical Overlap

Overlap panels by one corrugation (see previous page for illustration).

Supporting Panel Edges

Panel edges should not extend more than 4 inches past the structure's edge support.

Applying panels to and Arched Radius

When covering curved structures, it is possible to set sheets on an arched framework so they will arch within the range of elasticity of the sheets without inducing stress. The minimum allowable radius of the arch is 10 feet for Omega and 16 feet for Greca panels. See previous page for illustration and equation for determining the radius of an arch.

Fasteners & Accessories

To simplify installation and ensure optimum performance on all types of greenhouses, a wide variety of fastening accessories are available for installing DynaGlas. **Note: It is imperative that only neoprene or EPDM washers be used with DynaGlas. Foam closures and washers made of plasticized PVC are highly aggressive to DynaGlas and should not be used.** These and other types of washers may eventually cause panel deterioration at fastening points, which is not covered by warranty. Fasteners, washers, and foam closures purchased from sources other than Palram should be tested for compatibility and approved for use with polycarbonate by the manufacturer of the respective product. Always confirm that your Authorized Palram Dealer has either: a.) supplied you with Palram-supplied fasteners and accessories, or b.) has supplied you with fastening and accessory products that have been tested and approved for use by the product's respective manufacturer.

Self-Drilling Tapping Screws with umbrella washers are used for metal substructures..



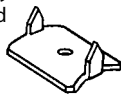
purlins. Designed specifically for DynaGlas panel height.

Woodgrip Screws with umbrella washers are used for wood substructures.



Self-Grip Lap Fasteners are used to fasten the vertical edges of panels together.

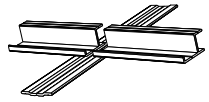
Self-Grip Lap Fastener Assembly consists of a Self-Grip Lap Nut and a tapping screw with a weather-seal washer (see illustration below for usage information).



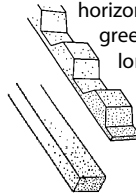
Aluminum No-Drip Spacers may be used to elevate the panels off of the substructure in order to minimize condensation drip at the

Palram's patented **DrainAway™ Greenhouse Re-Covering System**

can be used to equip or retrofit nearly any greenhouse with DynaGlas Plus. The System consists of Collectors and Drains which are fastened to the substructure. See "Re-Covering Existing Greenhouses" for more information.



Foam Closure Strips may be used to seal the horizontal and vertical corners of the greenhouse. Palram Closures are long-lasting and compatible with DynaGlas. The Closures feature a custom profile which matches the depth and pitch of the DynaGlas corrugation.



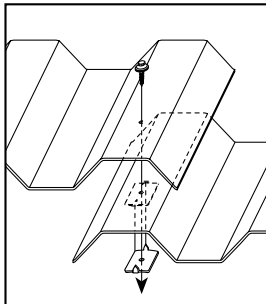
Self-Grip Lap Fastener Installation

Vertically overlapping DynaGlas panels are fastened together by means of a Self-Grip Lap Fastener Assembly, consisting of a Self-Grip Lap Fastener Nut and a Self-Tapping Screw.

Affixing Lap Fastener Nuts to Panels

Lap Fastener Nuts are installed while panels are still on the ground. On one vertical edge of a panel, mark required Lap Fastener locations approximately 18" to 20" apart, including one Lap Fastener close to each purlin. When stacked, several panels requiring the same Lap Fastener spacing can be marked at the same time. Lift the uppermost panel in the stack and place a Lap Fastener Nut so that it rests on the second panel in the stack with the tabs facing up. With the Lap Fastener Nut in position, lay the uppermost panel down again. Lightly tap the uppermost panel from the top until the

pointed tabs protrude through from the underside, then bend the tabs over. Repeat at each required Lap Fastener location on each panel.



Fastening Lapped Panels Together

After the panels are positioned on the substructure, overlapping panel edges are fastened together by means of self-tapping screws which are screwed through both panels and into the Lap Fastener Nut, which is attached to the underside of the bottom panel. Whenever panels are fastened directly to the substructure, an additional Lap Fastener must be also be installed close to the

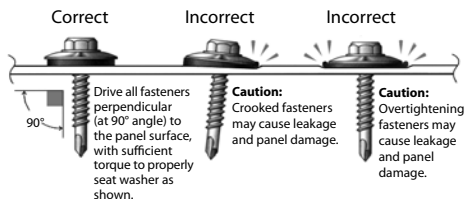
purlin or girt. Note: It is not necessary to apply sealants between overlapping panels. Sealants are not required, and will only result in unsightly dirt streaks within a short period of time.

Fastening Requirements

DynaGlas panels are always to be fastened to horizontal members ("purlins" in the roof, "girts" in the walls), never to vertical members; the latter do not provide the required cross support. Depending on the intensity of area wind and snow loads, purlins and girts should be spaced approximately 4' apart (see page 6 for more detail). When high snow buildups are expected in gutters between houses, the distance to the first purlin should be approximately 3'.

In order to avoid excessive local stress, it is important that DynaGlas not be fastened down too tightly. Screws should be tightened only to the point where the washer is seated firmly, no tighter. A power screwdriver with adjustable torque is strongly recommended.

DynaGlas panels can be fastened directly to purlins when the purlins have drip channels or when condensate drip at the purlins is not a problem (also see page 9).



If a structure is equipped with a DrainAway™ Condensate Control System, panels are fastened directly to the horizontal Collector members at the corrugation valleys.

Without a DrainAway System, if condensate drip at purlins should be minimized, and the purlins do not have drip channels, No-Drip Spacers must be placed between the purlins and the panels. The panels are then fastened at the top of the corrugation with 2" woodgrip or self-drilling screws.

At the side and end walls, DynaGlas can be fastened directly to all girt members at the corrugation valleys.

Action for Thermal Expansion/Contraction

Pre-drilling holes for fasteners is recommended (1/16" larger than diameter of screw shank). In case of dark colored sheets pre-drill even larger holes, and use larger diameter washers (i.e., 19mm Umbrella Washer).

To ensure against problems caused by thermal expansion/contraction, install the sheets at ambient temperatures of 50°-77° F (10°-25° C). Do not install sheets (especially colored sheets) during colder or hotter periods. Doing so may result in panel "waviness" between purlins or, in extreme cases, panel damage.

When panel ends are inserted into a recessed channel, allow a gap of 1/8"-1/4" between the end of the panel and the back wall of the channel to allow for expansion of the panel.

Fastener Location	Req'd Fastener	Required Spacing
At gutters, eaves, aluminum vent bottom rails and at sills; at aluminum ridge, vent header and vent top rail without channel recesses for receiving DynaGlas.	#10 x 1" WG* or #12 x 1" SDTS**	Every corrugation at corrugation valley (4 fasteners per lineal foot of supporting member)
At aluminum ridge, vent header and vent top rail with channel recesses for receiving DynaGlas.	#10 x 1" WG or #12 x 1" SDTS	Every third corrugation at corrugation valley (1.5 fasteners per lineal foot of supporting member)
At purlins with condensation collection troughs, DrainAway Collectors and side wall girts; when fastening DynaGlas directly to wood members without using No-Drip Spacers.	#10 x 1" WG or #12 x 1" SDTS	Every third corrugation at corrugation valley (also see page 9 for more info) (1.5 fasteners per lineal of supporting member)
At wood or metal purlins when using No-Drip Spacers (No-Drip Spacers are not used at gutter or ridge).	#10 x 2" WG or #12 x 2" SDTS	Every third corrugation. at corrugation crown (also see page 9 for more info). (1.5 fasteners per lineal of supporting member)
At vertical panel laps (using Self-Grip Lap Fastener assembly)	#10 x 1" WG (included in Self-Grip Lap Fastener Assembly)	Every 18" to 20" (Approximately 1 assy. per 6 square feet of DynaGlas being used)

* WG = Woodgrip Screw

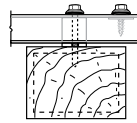
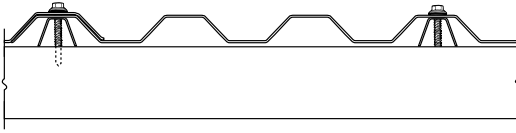
**SDTS = Self Drilling Tapping Screw

Note: DynaGlas corrugation pitch is 3" O.C.

Elimination of Condensation Drip at Purlins

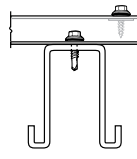
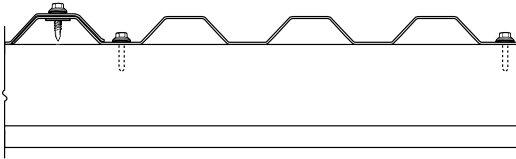
DynaGlas Plus provides extremely effective built-in condensate control on the interior surface of the panel that forces condensate to flow down the interior surface of the panel. The following fastening methods help to prevent condensate from dripping at purlin members.

Palram No-Drip Spacers for DynaGlas



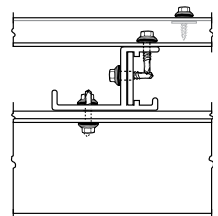
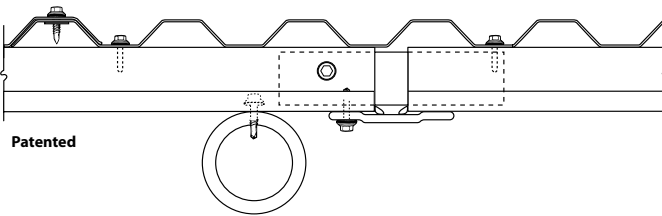
Elevate panels off flat surface purlins (wood or metal) with No-Drip Spacers. Fasten at corrugation crown using 2" woodgrip or tapping screws.

Purlin with Built-In Condensate Control Trough



Fasten panels at corrugation valley to purlin with built-in condensate trough using $\frac{3}{8}$ " self-drilling tapping screws with weatherseal washers.

Palram Patented DrainAway System (also see info in section below)



DrainAway Collector purlins are applied to roof bows, trusses, or existing purlins every 4' (or less) up the roof slope. Collectors can span 6' between roof bows without additional support. DynaGlas Plus is fastened to the Collectors. The Collectors' built-in channels receive the condensate and carry it to the Drain members which lead the condensate down to the bottom of the roof slope (see Palram's brochure, "Palram DrainAway Greenhouse Re-Covering System" for complete information). **Note:** DrainAway components can be used easily and effectively on virtually any type of structure. Contact Palram or your Authorized Palram Dealer for details and a quotation.

Re-Covering Existing Greenhouses Using the DrainAway Re-Covering System

You may be thinking about re-covering your greenhouse with DynaGlas Plus but haven't found a convenient, cost-effective way to do the job. Well, your search is finally over. Palram is proud to make available the patented DrainAway® Greenhouse Re-Covering System.

The DrainAway System is an aluminum System designed to easily and cost-effectively facilitate the re-covering of any greenhouse, whether glazed with glass, rigid plastic or poly film. Whether it was built last year, or last century. Plus, DrainAway equips your greenhouse with a complete condensation collection and removal System.

Visit www.palramhort.com/drainaway/drainaway.html, or give us a call. Together with your nearest Authorized Dealer, we'll put together a quote and provide detailed drawings for your application — and at a price that will make you fall in love with that old greenhouse of yours all over again.

Shade Compounds

IMPORTANT NOTE: *Many typical greenhouse shading compounds are aggressive to polycarbonate. WARNING: Shading materials containing vinyl binders or organic solvents are aggressive to DynaGlas and should be avoided.*

Contact the manufacturer of the shade compound you wish to use and gain their approval for use with polycarbonate.

over the manufacturing of commercially available shade compounds – *or subsequent changes to those products over time* – and therefore cannot recommend any particular product for use.

Shade compound manufacturers are encouraged to contact Palram for assistance in developing a compatibility testing program.

Palram can perform preliminary tests to determine aggressiveness to polycarbonate.

Cleaning and Care of DynaGlas

It is recommended that the exterior of DynaGlas Plus panels be washed and rinsed annually to provide maximum performance and extended service life.

Cleaning Procedures

1. Rinse sheet with lukewarm water.
2. Wash sheet with mild soap and lukewarm water.
3. Use sponge or soft cloth and gently wash to loosen remaining dirt and grime.

DO NOT SCRUB, USE BRUSHES OR

ABRASIVE CLEANERS: the interior and exterior surfaces are not scratch resistant.

4. Repeat rinse and dry with a soft cloth to prevent water spotting.

Cautions:

- Do not use abrasive or alkaline cleaners.
- Never scrape with razor blades or other sharp instruments.
- Benzine, leaded gasoline, acetone or carbon tetrachloride should never be used.
- Do not clean in hot sun or at elevated temperatures.

Samples can be submitted for testing (2 to 4 oz. is all that is required) should be shipped to:

IMPORTANT: Include as much information about the product as possible, as well as a **return address and a contact name and phone number.** Also notify your Dealer of the shipment.

Shade and Energy Curtain Fabrics

Most exterior webbed shade fabrics will not damage DynaGlas. It is suggested that fabrics be submitted to Palram for testing and approval prior to use.

Many energy/shade curtain fabrics are compatible with DynaGlas, provided a 4" minimum clearance is maintained between the DynaGlas panels and the fabric.

Fresh Paint Splashes, Grease and Glazing Compound Removal

Before drying, these conditions can easily be remedied by rubbing lightly with a good grade of VM&P naphtha, isopropyl alcohol, or butyl cellosolve.

Afterwards, a warm final wash should be made using a mild soap or detergent solution and a thorough rinsing with clean water.

Label and Sticker Removal

The use of kerosene, VM&P naphtha, standard solvents or petroleum spirits are generally effective in removing labels and stickers. A warm wash and rinse should always follow the use of these products.

In cases where the sticker material, such as vinyl, does not allow the penetration of solvent, the application of heat (a hair dryer, for example) will soften the adhesive and promote removal. **Caution:** *Excessive heat can cause surface damage.*

Calculating Square Footage of DynaGlas Panels

Calculating Square Footage of DynaGlas Panels

Determine the length of DynaGlas panel to be ordered in feet and inches. Locate the gross area of the panel on the table below. Multiply the gross area of the panel by the number of panels needed. *(Note: If the required panel length cannot be found on the DynaGlas Panel Gross Area table, use the following formula to arrive at the correct panel gross area):*

$$\frac{\text{Panel length in inches} \times \text{DynaGlas panel gross width in inches}}{\div 144} \rightarrow (\text{Inches in a square foot})$$

= Panel Gross Area

Using the DynaGlas Panel Gross Area Table

First determine whether 4' wide or 6' wide panels are being used. Reference the upper table when calculating the square footage of 4' wide panels. Use the bottom table when calculating the square footage of 6' wide panels. Second, determine the length of the desired panel in "feet and inches". Scroll down the left side of the table until you reach the desired length in feet, then scroll across the table until you reach the desired additional inches. **The square footage of a 4' x 17'-6" panel has been circled as an example.**

		4' Wide DynaGlas Panel Gross Area (Sq. Ft.)											
Length Feet	Inches	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
4'		16.5	16.9	17.2	17.6	17.9	18.3	18.6	18.9	19.3	19.6	20.0	20.3
5'		20.7	21.0	21.4	21.7	22.0	22.4	22.7	23.1	23.4	23.8	24.1	24.5
6'		24.8	25.1	25.5	25.8	26.2	26.5	26.9	27.2	27.6	27.9	28.2	28.6
7'		28.9	29.3	29.6	30.0	30.3	30.7	31.0	31.3	31.7	32.0	32.4	32.7
8'		33.1	33.4	33.8	34.1	34.4	34.8	35.1	35.5	35.8	36.2	36.5	36.9
9'		37.2	37.5	37.9	38.2	38.6	38.9	39.3	39.6	40.0	40.3	40.6	41.0
10'		41.3	41.7	42.0	42.4	42.7	43.1	43.4	43.7	44.1	44.4	44.8	45.1
11'		45.5	45.8	46.2	46.5	46.8	47.2	47.5	47.9	48.2	48.6	48.9	49.3
12'		49.6	49.9	50.3	50.6	51.0	51.3	51.7	52.0	52.4	52.7	53.0	53.4
13'		53.7	54.1	54.4	54.8	55.1	55.5	55.8	56.1	56.5	56.8	57.2	57.5
14'		57.9	58.2	58.6	58.9	59.2	59.6	59.9	60.3	60.6	61.0	61.3	61.7
15'		62.0	62.3	62.7	63.0	63.4	63.7	64.1	64.4	64.8	65.1	65.4	65.8
16'		66.1	66.5	66.8	67.2	67.5	67.9	68.2	68.5	68.9	69.2	69.6	69.9
17'		70.3	70.6	71.0	71.3	71.6	72.0	72.3	72.7	73.0	73.4	73.7	74.1
18'		74.4	74.7	75.1	75.4	75.8	76.1	76.5	76.8	77.2	77.5	77.8	78.2
19'		78.5	78.9	79.2	79.6	79.9	80.3	80.6	80.9	81.3	81.6	82.0	82.3
20'		82.7	83.0	83.4	83.7	84.0	84.4	84.7	85.1	85.4	85.8	86.1	86.5
21'		86.8	87.1	87.5	87.8	88.2	88.5	88.9	89.2	89.6	89.9	90.2	90.6
22'		90.9	91.3	91.6	92.0	92.3	92.7	93.0	93.3	93.7	94.0	94.4	94.7
23'		95.1	95.4	95.8	96.1	96.4	96.8	97.1	97.5	97.8	98.2	98.5	98.9
24'		99.2	99.5	99.9	100.2	100.6	100.9	101.3	101.6	102.0	102.3	102.6	103.0
25'		103.3	103.7	104.0	104.4	104.7	105.1	105.4	105.7	106.1	106.4	106.8	107.1
		6' Wide DynaGlas Panel Gross Area (Sq. Ft.; Clear and LDT DG Plus only, not DG SE)											
Length Feet	Inches	0"	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"
4'		24.5	25.0	25.6	26.1	26.6	27.1	27.6	28.1	28.6	29.1	29.6	30.2
5'		30.7	31.2	31.7	32.2	32.7	33.2	33.7	34.2	34.8	35.3	35.8	36.3
6'		36.8	37.3	37.8	38.3	38.8	39.4	39.9	40.4	40.9	41.4	41.9	42.4
7'		42.9	43.4	44.0	44.5	45.0	45.5	46.0	46.5	47.0	47.5	48.0	48.6
8'		49.1	49.6	50.1	50.6	51.1	51.6	52.1	52.6	53.2	53.7	54.2	54.7
9'		55.2	55.7	56.2	56.7	57.2	57.8	58.3	58.8	59.3	59.8	60.3	60.8
10'		61.3	61.8	62.4	62.9	63.4	63.9	64.4	64.9	65.4	65.9	66.4	67.0
11'		67.5	68.0	68.5	69.0	69.5	70.0	70.5	71.0	71.6	72.1	72.6	73.1
12'		73.6	74.1	74.6	75.1	75.6	76.2	76.7	77.2	77.7	78.2	78.7	79.2
13'		79.7	80.2	80.8	81.3	81.8	82.3	82.8	83.3	83.8	84.3	84.8	85.4
14'		85.9	86.4	86.9	87.4	87.9	88.4	88.9	89.4	90.0	90.5	91.0	91.5
15'		92.0	92.5	93.0	93.5	94.0	94.6	95.1	95.6	96.1	96.6	97.1	97.6
16'		98.1	98.6	99.2	99.7	100.2	100.7	101.2	101.7	102.2	102.7	103.2	103.8
17'		104.3	104.8	105.3	105.8	106.3	106.8	107.3	107.8	108.4	108.9	109.4	109.9
18'		110.4	110.9	111.4	111.9	112.4	113.0	113.5	114.0	114.5	115.0	115.5	116.0
19'		116.5	117.0	117.6	118.1	118.6	119.1	119.6	120.1	120.6	121.1	121.6	122.2
20'		122.7	123.2	123.7	124.2	124.7	125.2	125.7	126.2	126.8	127.3	127.8	128.3
21'		128.8	129.3	129.8	130.3	130.8	131.4	131.9	132.4	132.9	133.4	133.9	134.4
22'		134.9	135.4	136.0	136.5	137.0	137.5	138.0	138.5	139.0	139.5	140.0	140.6
23'		141.1	141.6	142.1	142.6	143.1	143.6	144.1	144.6	145.2	145.7	146.2	146.7
24'		147.2	147.7	148.2	148.7	149.2	149.8	150.3	150.8	151.3	151.8	152.3	152.8
25'		153.3	153.8	154.4	154.9	155.4	155.9	156.4	156.9	157.4	157.9	158.4	159.0

Note: Orders can include panels longer than 20 feet but may subject to freight surcharge or full-truckload freight rate (dependent on delivery location and carrier rates).

Authorized DynaGlas Dealer