



Greenhouse Kits and Polycarbonate Multi Layers Sheets

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SECTION 08840

PLASTIC GLAZING

For best results, display hidden notes to specifier.

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Multi-layered extruded cellular polycarbonate panels.
- B. Installation accessories and materials.

1.2 RELATED SECTIONS

- A. Section 05120 - Structural Steel.
- B. Section 07620 - Sheet Metal Flashing and Trim.
- C. Section 08630 - Metal-Framed Skylights.
- D. Section 08910 - Metal-Framed Curtain Wall.

1.3 REFERENCES

- A. ASTM C 1036 - Standard Specification for Flat Glass; 2001.
- B. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 1997b.
- C. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position; 1998.
- D. ASTM D 1003 - Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics; 2000.
- E. ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics; 1996 (Reapproved 2001).
- F. ASTM D 2843 - Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics; 1999.
- G. ASTM D 5420 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact); 1998a.
- H. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2001.
- I. ASTM E 313 - Standard Practice for Calculating Yellowness and

Whiteness Indices from Instrumentally Measured Color
Coordinates; 2000.

1.4SUBMITTALS

- A.Submit under provisions of Section 01300.
- B.Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1.Catalogs of material properties and solar performance.
 - 2.Preparation, site care, and cleaning and maintenance instructions and recommendations.
 - 3.Storage and handling requirements and recommendations.
 - 4.Installation methods and guidelines.
 - 5.Chemical resistance data sheet.
- C.Shop Drawings: Show layout of panels, jointing, anchorages, and trim.
- D.Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E.Verification Samples:
 - 1.Panels: Two samples, minimum size 3 inches (76 mm) by 6 inches (152 mm), of each specified product, color, and thickness.
 - 2.Accessories: Two samples, 6 inches (150 mm) long, of installation accessories.

1.5QUALITY ASSURANCE

- A.Manufacturer's Qualifications: ISO 9002 and 14001 certified.

1.6DELIVERY, STORAGE, AND HANDLING

- A.Deliver panels in enclosed wooden crates.
- B.Store panels in dry, shaded, and well ventilated area until ready for installation. Prevent dirt or debris from entering cellular structure.
- C.Store panels at slant of 5 to 10 degrees from vertical after removal from crates.
- D.Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7PROJECT CONDITIONS

- A.Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.8WARRANTY

- A. Provide manufacturer's standard 10 year warranty for sheets of minimum thickness of 1/4 inch (6 mm) against loss in light transmission in excess of 6 percent of the original value when tested per ASTM D 1003, and against a change in yellowing index in excess of 10 delta from the original value when tested per ASTM E 313.
- B. Provide manufacturer's standard 10 year warranty for sheets of minimum thickness of 1/4 inch (6 mm) against breakage due to hail, for hail up to 0.79 inch (20 mm) in diameter.

PART 2PRODUCTS

2.1MANUFACTURERS

A. Acceptable Manufacturer: Polygal, Inc.; P.O. Box 410592, Charlotte, NC 28241. ASD. Tel: (704) 588-3800. Fax: (704) 588-7400. Email: sales@polygalusa.com www.polygalusa.com

B. Substitutions: Not permitted.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2MATERIALS

- A. General Requirements: Provide glazing panels of extruded polycarbonate cellular sheet with UV-stabilized co-extruded outer layer; removable protective film on outer surface.
 - 1. Determine light transmission in accordance with ASTM D 1003.
 - 2. Panel Length: Provide panels of sufficient size to span purlins and rafters without requiring joining, up to 36 feet (10.97 meters).
 - 3. Thermal Expansion: Maximum of 1/8 inch (3 mm) per 3 feet (914 mm), for clear and ice colors; maximum of 1/4 inch (6 mm) per 4 feet (1219 mm), for bronze; 100 degrees F (56 degrees C) temperature differential.
 - 4. Provide anti-fog coating.
 - 5. Dimensional Tolerances at 75 degrees F (24 degrees C):
 - a. Thickness: Comply with ASTM C 1036 for Type I, Transparent Flat Glazing.
 - b. Flatness, Warp, and Overall Bow: Comply with ASTM C 1048.
 - 6. Provide factory cut panels in required dimensions, with clean cuts without chips or other deformities; without debris, grease, oil, or other materials lodged inside cells.
- B. Glazing Panels: Polygal Standard.
 - 1. Panel Width: 48 inches (1219 mm).
 - 2. Panel Width: 72 inches (1829 mm).
 - 3. Panel Width: 47.25 inches (1200 mm).

4. Panel Width: _____.
5. Panel Thickness: 5/32 inches (4 mm).
- a. Rib Pitch: 0.224 inches (5.7 mm) on center.
- b. Weight: 0.16 pounds per square foot (0.78 kg per square meter).
- c. Minimum Radius for Cold Bent Arches: 2 feet 3 inches (0.7 meters).
- d. U-Factor, Winter Night: 0.69 Btu per hour-square feet-degree F (3.92 Watt per square meter-degree K).
- e. Color: Bronze; 42 percent light transmission.
- f. Color: Ice; 32 percent light transmission.
- g. Color: Clear; 82 percent light transmission.
6. Panel Thickness: 1/4 inches (6 mm).
- a. Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
- b. Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
- c. Flame Spread: 10, when tested in accordance with ASTM E 84.
- d. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
- e. Rib Pitch: 0.224 inches (5.7 mm) on center.
- f. Weight: 0.27 pounds per square foot (1.32 kg per square meter).
- g. Impact Resistance: 1.54 foot-pound (2.09 N-m), tested per ASTM D5420, with weight of 0.266 foot-pound (0.361 N-m).
- h. Minimum Radius for Cold Bent Arches: 3 feet 5 inches (1.05 meters).
- i. U-Factor, Winter Night: 0.63 Btu per hour-square feet-degree F (3.58 Watt per square meter-degree K).
- j. Color: Bronze; 42 percent light transmission.
- k. Color: Ice; 42 percent light transmission.
- l. Color: Clear; 80 percent light transmission.
7. Panel Thickness: 5/16 inches (8 mm).
- a. Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
- b. Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
- c. Flame Spread: 15, when tested in accordance with ASTM E 84.
- d. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
- e. Rib Pitch: 0.433 inches (11 mm) on center.
- f. Weight: 0.33 pounds per square foot (1.61 kg per square meter).
- g. Impact Strength: 1.82 foot-pound (2.47 N-meter), when tested in accordance with ASTM D 5420, with weight of 0.348 foot-pound (0.472 N-meter).
- h. Minimum Radius for Cold Bent Arches: 4 feet 7 inches (1.4 meters).
- i. U-Factor, Winter Night: 0.60 Btu per hour-square feet-degree F (3.41 Watt per square meter-degree K).
- j. Color: Bronze; 42 percent light transmission.
- k. Color: Ice; 32 percent light transmission.

1. Color: Clear; 80 percent light transmission.
8. Panel Thickness: 3/8 inches (10 mm).
 - a. Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
 - b. Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
 - c. Flame Spread: 20, when tested in accordance with ASTM E 84.
 - d. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
 - e. Rib Pitch: 0.433 inches (11 mm) on center.
 - f. Weight: 0.35 pounds per square foot (1.71 kg per square meter).
 - g. Impact Strength: 2.43 foot-pound (3.29 N-meter), when tested in accordance with ASTM D 5420, with weight of 0.410 foot-pound (0.556 N-meter).
 - h. Minimum Radius for Cold Bent Arches: 5 feet 9 inches (1.75 meters).
 - i. U-Factor, Winter Night: 0.53 Btu per hour-square feet-degree F (3.01 Watt per square meter-degree K).
 - j. Color: Bronze; 42 percent light transmission.
 - k. Color: Ice; 32 percent light transmission.
 - l. Color: Clear; 79 percent light transmission.
9. Panel Thickness: 5/8 inches (16 mm).
 - a. Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
 - b. Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
 - c. Flame Spread: 85, when tested in accordance with ASTM E 84.
 - d. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
 - e. Rib Pitch: 0.787 inches (20 mm) on center.
 - f. Weight: 0.55 pounds per square foot (2.69 kg per square meter).
 - g. Impact Strength: 2.70 foot-pound (3.66 N-meter), when tested in accordance with ASTM D 5420, with weight of 0.574 foot-pound (0.778 N-meter).
 - h. Minimum Radius for Cold Bent Arches: 9 feet 2 inches (2.8 meters).
 - i. U-Factor, Winter Night: 0.41 Btu per hour-square feet-degree F (2.33 Watt per square meter-degree K).
 - j. Color: Bronze; 42 percent light transmission.
 - k. Color: Ice; 32 percent light transmission.
 - l. Color: Clear; 70 percent light transmission.
- C. Glazing Panels: Polygal Triple-Clear; extruded polycarbonate cellular sheet with UV-stabilized co-extruded outer layer.
 1. Panel Width: 72 inches (1829 mm).
 2. Panel Width: 48 inches (1219 mm).
 3. Panel Thickness: 5/16 inches (8 mm).
 4. Rib Pitch: 0.787 inches (20 mm) on center.
 5. Weight: 0.39 pounds per square foot (1.9 kg per square meter).
 6. Minimum Radius for Cold Bent Arches: 6 feet (1.83 meters).

- 7.U-Factor, Winter Night: 0.50 Btu per hour-square feet-degree F (2.84 Watt per square meter-degree K).
- 8.Color: Clear; 77 percent light transmission.

D.Glazing Panels: Polygal Titan; extruded polycarbonate cellular sheet with UV-stabilized co-extruded outer layer; triple wall configuration with x-brace inner structure; blocking UV transmission up to 385 nanometers.

- 1.Panel Width: 47.25 inches (1200 mm).
- 2.Rib Pitch: 0.630 inches (16 mm) on center.
- 3.Color: Bronze; 42 percent light transmission.
- 4.Color: Ice; 32 percent light transmission.
- 5.Color: Clear; 61 percent light transmission.
- 6.Panel Thickness: 5/8 inches (16 mm).
- 7.Flammability: Horizontal burn rate of 1.375 inch (35 mm) or less, when tested in accordance with ASTM D 635.
- 8.Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
- 9.Weight: 0.55 pounds per square foot (2.69 kg per square meter).
- 10.Minimum Radius for Cold Bent Arches: 9 feet 2 inches (2.8 meters).
- 11.U-Factor, Winter Night: 0.39 Btu per hour-square feet-degree F (2.21 Watt per square meter-degree K).

E.Glazing Panels: Polygal Thermogal; extruded polycarbonate cellular sheet with UV-stabilized co-extruded outer layer; triple wall configuration with x-brace inner structure.

- 1.Panel Width: 47.25 inches (1200 mm).
- 2.Panel Thickness: 1 inch (25 mm).
- 3.Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
- 4.Rib Pitch: 0.984 inches (25 mm) on center.
- 5.Weight: 0.72 pounds per square foot (3.52 kg per square meter).
- 6.Minimum Radius for Cold Bent Arches: 14 feet 9 inches (4.5 meters).
- 7.U-Factor, Winter Night: 0.31 Btu per hour-square feet-degree F (1.76 Watt per square meter-degree K).
- 8.Color: Bronze; 20 percent light transmission.
- 9.Color: Ice; 20 percent light transmission.
- 10.Color: Clear; 55 percent light transmission.

F.Glazing Panels: Polygal RFX; extruded polycarbonate cellular sheet with UV-stabilized co-extruded outer layer; outer layer in patented prism design to reflect high angle light but transmit low angle light.

- 1.Panel Width: 47.25 inches (1200 mm).
- 2.Panel Thickness: 5/8 inches (16 mm).
- 3.Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
- 4.Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
- 5.Flame Spread: 85, when tested in accordance with ASTM E 84.

6. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
7. Rib Pitch: 0.787 inches (20 mm) on center.
8. Weight: 0.62 pounds per square foot (3.03 kg per square meter).
9. Minimum Radius for Cold Bent Arches: 9 feet 2 inches (2.8 meters).
10. U-Factor, Winter Night: 0.41 Btu per hour-square feet-degree F (2.33 Watt per square meter-degree K).
11. Reflectivity: Minimum 40 percent, perpendicular to panel.
12. Color: Bronze; 42 percent light transmission.
13. Color: Clear outer layer, non-glare opal inner layer; 32 percent light transmission.
14. Color: Clear outer layer, clear inner layer; 38 percent light transmission.

G. Glazing Panels: Polygal Primalite; extruded polycarbonate cellular sheet with UV stabilized and heat reflective co-extruded outer layer.

1. Panel Width: 47.25 inches (1200 mm).
2. Panel Thickness: 5/8 inches (16 mm); triple wall configuration.
 - a. Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
 - b. Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
 - c. Flame Spread: 85, when tested in accordance with ASTM E 84.
 - d. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
 - e. Rib Pitch: 0.787 inches (20 mm) on center.
 - f. Weight: 0.55 pounds per square foot (2.69 kg per square meter).
 - g. Minimum Radius for Cold Bent Arches: 9 feet 2 inches (2.8 meters).
 - h. U-Factor, Winter Night: 0.41 Btu per hour-square feet-degree F (2.33 Watt per square meter-degree K).
 - i. Color: Ice; 32 percent light transmission.
3. Panel Thickness: 1 inch (25 mm); triple wall configuration with x-brace inner structure.
 - a. Rib Pitch: 0.984 inches (25 mm) on center.
 - b. Weight: 0.72 pounds per square foot (3.52 kg per square meter).
 - c. Minimum Radius for Cold Bent Arches: 14 feet 9 inches (4.5 meters).
 - d. U-Factor, Winter Night: 0.31 Btu per hour-square feet-degree F (1.76 Watt per square meter-degree K).
 - e. Color: Clear; 18 percent light transmission.

H. Glazing Panels: Polygal Triple-Clip; extruded polycarbonate cellular sheet with UV stabilized co-extruded outer layer; triple layer configuration with edge channels for anchorage using manufacturer's snap-in profiles and using no gaskets or sealant.

1. Panel Width: 24 inches (610 mm) on center.
2. Panel Thickness: 5/8 inches (16 mm).
3. Flammability: Horizontal burn rate of 1 inch (25 mm) or less, when tested in accordance with ASTM D 635.
4. Self Ignition Temperature: 986 degrees F (530 degrees C), when tested in accordance with ASTM D 1929.
5. Flame Spread: 85, when tested in accordance with ASTM E 84.
6. Smoke Developed Index: Less than 450 when tested in accordance with ASTM E 84; less than 75 when tested in accordance with ASTM D 2843.
7. Rib Pitch: 0.787 inches (20 mm) on center.
8. Weight: 0.55 pounds per square foot (2.69 kg per square meter).
9. Weight with Profiles: 0.69 pounds per square foot (3.37 kg per square meter).
10. Minimum Radius for Cold Bent Arches: 13 feet (3.96 meters).
11. U-Factor, Winter Night: 0.41 Btu per hour-square feet-degree F (2.33 Watt per square meter-degree K).
12. Color: Bronze; 42 percent light transmission.
13. Color: Ice; 32 percent light transmission.
14. Color: Clear; 70 percent light transmission.

I. Anchorage System: Polygal Triple-Clip system; aluminum base profile screw-attached to rafter; glazing panel snapped into base profile; polycarbonate cap profile; watertight connection.

J. Edge Trim, Panel Connectors, Ridges, and Anchorage Profiles: Polycarbonate, color to match panels, shapes as indicated on drawings or as required to suit application

K. Glazing Gaskets: Neoprene, Silicone, EPDM rubber or PVC; verify compatibility of PVC gaskets with polycarbonate before use.

L. Glazing Sealants: Polybutylene glazing tape, silicone non-hardening sealant, one- or two-part polysulfide non-hardening sealant; verify compatibility of sealant or tape with polycarbonate with manufacturer of sealant or tape and with manufacturer of polycarbonate sheets; do not use amine or benzamid curing silicone sealants.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C.Examine crates for damage immediately upon delivery.

D.Examine panels for damage prior to installation.

3.2PREPARATION

A.Clean surfaces thoroughly prior to installation.

B.Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C.Treat open ends of panels upon opening crates to prevent dirt or other material from entering glazing.

D.Verify openings are correct size.

3.3INSTALLATION

A.Install in accordance with manufacturer's instructions

B.Install with extruded ribs vertical with "Exposure Side" to exterior, as indicated on protective film.

C.Remove chips and dust from internal cells with compressed air. Seal open ends.

D.Just prior to installation expose glazing edges by peeling back protective film sufficient for edge bite.

E.Drill holes minimum 1-1/2 inches (38 mm) from edge, to allow for thermal expansion.

F.Install in accordance with manufacturer's recommendations for edge bite and expansion allowance.

1.Minimum Edge Engagement: 1/2 inch (13 mm).

2.Minimum Edge Engagement: 3/4 inch (13 mm).

3.Rabbit Depth: Edge engagement plus allowance for thermal expansion.

G.Remove protective film upon completion of installation.

3.4PROTECTION

A.Protect installed products until completion of project.

B.Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION