

REPUBLIC OF THE PHILIPPINES DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS OFFICE OF THE SECRETARY MANILA

JAN 07 2010



SUBJECT

: DPWH Standard Specification for Polycarbonate Sheets/Panels, Item 1036

In line with the mandate of the Department in providing effective standard specifications to be used in the implementation of various infrastructure projects and in view of the need of setting standard specifications for polycarbonate sheets/panels, the attached DPWH Standard Specification for Polycarbonate Sheets/Panels, Item 1036, Is hereby prescribed, for the guidance and compliance of all concerned.

This specification shall form part of the DPWH Standard Specifications for Public Works Structures (Volume III – Buildings, Ports and Harbors, Flood Control and Drainage Structure and Water Supply Systems).

This order shall take effect immediately.

/ICTOR A. ØOMINGO

Acting Secretary



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DPWH STANDARD SPECIFICATIONS FOR

ITEM 1036 - POLYCARBONATE SHEETS/PANELS

1036.1 Description

This Item shall consist of furnishing all polycarbonate sheet/panel materials, tools and equipment, plant including labor required in undertaking the proper installation, complete as shown on the Plans and in accordance with this Specification.

Polycarbonate sheets/panels can be used for stage backdrops, wall partitions, skylight roofing, canopies, car garage and walkways.

1036.2 Material Requirements

1036.2.1 Polycarbonate Sheets/Panels

Polycarbonate sheets shall be made up of polycarbonate resin in accordance with the characteristics indicated on Table 1 and, physical and structural properties indicated on Table 2 for applications requiring material which offers high light transmission, thermal insulation, light in weight yet strong, high shock resistance, flame retardance, great economy, vandal resistance and design flexibility. Profile section shall be as indicated on the approved Plans. Desired color shall be subjected to the approval of the Architect/Engineer.

Table 1 – Physical Characteristics of Polycarbonate Resin

Characteristics	
Mass volume (ISO 1183, Method A)	1190 kg/mc
Ash content (ISO 3451-5, Method A)	$0.13 \pm 0.02\%$
Properties in fraction (ISO 527) load breaking point:	60 ± 7%
Stretch at breaking point:	100 ± 15%
Shock resilience traction (NF T51-111)	$700 \pm 120 \text{ KJ/m}^2$
Panel elasticity flexion at 20°C:	5.3 MPa
Vicat Point (ISO 306, Method B)	150 ± 8℃
Light transmission	80 + 0-17% for uncolored translucent
	48% for opaque translucent
Yellowness index	0.5 to 1.2
Dilation coefficient at 20°C	6.5 10-5 m/m.K
Thermal conduction coefficient	0.23 W/m.K
Thermal transmission coefficient (ASTM C 236)	1.55 W/m² .K

Table 2 – Physical and Structural Propertie	es of Polycarbonate Panels
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Mechanical Properties:	
Tensile Strength, max.	
Flexural Modulus, max.	400000 psi
Flexural Strength, max.	12500 psi
Impact Strength (Izod) 68°F, max	
impact Strength (Izod) 32°F, max.	12 ft-Ib/in
Elongation, max.	
% Light Transmission (Clear), max.	
Deflection Temperature, max.	

1036.2.2 Polycarbonate sheet/panel thickness shall correspond to the relative span available locally and shall be subjected to the approval of the Architect/Engineer.

1036.2.3 Fastening hardware shall be of screws that are compatible with polycarbonate sheeting. The choice of type and nature of screws shall be the responsibility of the Contractor installing the material and should be adapted with accordance to the type of supports being used.

1036.2.4 Foam infills are recommended and shall be available for all profiles and flashing situations. Sealants, especially silicone, are incompatible with polycarbonate. Use the appropriate flashings and infill strips and shall provide weather and vermin proofing. Ideally, a metal flashing (lead, aluminum or zinc) should be used since these do not interfere with the thermal movement of the sheet. Self-adhesive flashings can be used but preferably in short lengths – max. 2m – with an overlap of 150 mm. Use few adhesive flashings which do not have an adverse effect on polycarbonate.

1036.3 Construction Requirements

1036.3.1 Handling and Cleaning of Sheets

Sheets can be cleaned with warm soapy and a soft sponge. This should be done regularly. Large areas shall be professionally washed by high-pressure water jet, possibly adding a mild compatible detergent and/or a steam jet. Take care not to scrape or scratch the sheet. Rinse thoroughly. Avoid dry cleaning.

1036.3.2 Installation Procedure

Before any installation works is commenced, the underside masking of the sheets/panels shall be removed.

1036.3.2.1 Never step on the sheets between the purlins or in the middle of a framed glazing. In emergency, step only on the line of purlins or of structural forming.

1036.3.2.2 The Contractor shall ensure that the roof pitch is at a minimum of 5° (87 mm per 1000 mm), to provide correct water run-off. If a flatter pitch is required, additional weather proofing shall be required and shall be subjected to the approval of the Architect/Engineer. Allow an overhang of 50 mm at the roof edge or gutter line. To avoid damage in high wind areas, do not exceed 50 mm. For roof laying start with the lower sheets first.

1036.3.2.3 The lengths of polycarbonate sheets/panels should overlap 200 mm. Side overlaps differ for each other profile as indicated on the approved Plans.

1036.3.2.4 Polycarbonate sheets/panels can be bended without heating and should be bended along the rib channels in the direction of the slope.

1036.3.3 Fastening and Spacings

Before drilling, make a small hole with a nail of bradawl to avoid drill travel. Holes should be approximately 3 mm larger than the stem of the fixing button to allow for expansion and should be positioned at least 40 mm from the edge of the sheets.

Screens should be fastened depending on the profile indicated on the Plans. An electric screwdriver with an adjustable clutch should be used to tighten the screws. Avoid over tightening which might induce undue internal stresses, causing premature failure and buckling to the sheet. The Contractor shall pay attention to insert the screws perpendicular to the material face, as inclined insertion could damage the sheet and/or result in leaks. Allow for expansion and contraction while still fixing firmly.

1036.3.4 Sealing

The Contractor shall ensure the use of the proper type of sealing tape according to the glazing form used, verifying that the prepared sheets are mounted correctly. In case of curved installation, where both open ends are situated at the bottom – apply the ventilated tape on the both ends. Incorrect sealing will damage the sheets and void the warranty.

1036.3.5 Cutting

Polycarbonate sheets/panels shall be cut with standard wood or metal workshop equipment. Saw blades designed especially for plastic yield best results. A circular saw (fixed or portable, with small teeth suited for hardware), rotating at high speed band saw or a jig saw (best for short, complex cuts) can all be used, taking care to advance the blade slowly. A hand and hacksaw may also be used for local cutting. Ensure that the sheet is properly supported before cutting.

1036.3.6 Removing Protective Film

When masking, drilling and cutting has been completed, peel back approximately 50 mm of film all round both faces. Premature removal of protective polyethylene film

may result in damage to the sheet during handling. The protective polyethylene film should only be fully removed when installation is complete.

1036.3.7 Storage and Protection

Sheets/panels shall be padded, packaged and flattened out in good condition during storage and transport. Store sheets on a flat surface in a well-protected area away from direct sunlight. Prevent moisture getting between stored sheets. Avoid chemicals, paint, adhesives and other synthetic materials that are not compatible with polycarbonate sheeting. All sheets shall be shipped with protective polyethylene film.

1036.4 Method of Measurement

The work done under this Item shall be measured in linear meter of covered or installed with polycarbonate roofing and/or walling and accepted to the satisfaction of the Engineer/Architect.

1036.5 Basis of Payment

The actual length of polycarbonate roofing and/or walling in linear meter provided in Section 1036.4 shall be paid for at the unit bid or contract unit price which payment shall constitute full compensation including labor, materials, tools and incidents necessary to complete this Item.

Payment shall be made under:

Pay Item

Description

Unit of Measurement

1036Polycarbonate Sheets/PanelsLinear Meter