
PETG (Polyethylene Terephthalate Glycol) Sheet – Technical Material Specification

1.0 Material Overview & Common Uses

PETG (Polyethylene Terephthalate Glycol) is an amorphous thermoplastic polyester known for its excellent impact resistance, clarity, and ease of fabrication. It is a glycol-modified variant of PET, which reduces crystallization and improves processing characteristics. PETG sheet is widely used in point-of-purchase displays, signage, machine guards, medical enclosures, and food contact applications due to its FDA compliance and UV stability.

Common industrial applications include: retail displays, protective glazing, thermoformed parts, medical device housings, and chemical-resistant liners. It is often specified as an alternative to acrylic or polycarbonate when higher impact strength than acrylic or better chemical resistance than polycarbonate is required.

2.0 Core Technical Properties & Sizing

- Density: 1.27 g/cm³ (nominal)
- Tensile strength at yield: 50 MPa (ASTM D638)
- Flexural modulus: 2.1 GPa (ASTM D790)
- Izod impact strength (notched): 100 J/m (ASTM D256)
- Heat deflection temperature (HDT) at 1.82 MPa: 70°C
- Vicat softening point: 85°C
- Light transmission (clear grade): 88% (ASTM D1003)
- Standard sheet sizes: 1220 mm x 2440 mm (4 ft x 8 ft), 1524 mm x 3048 mm (5 ft x 10 ft)
- Thickness range: 0.5 mm to 25 mm (standard increments: 1.5 mm, 3 mm, 4.5 mm, 6 mm, 9.5 mm, 12.7 mm)
- Thickness tolerance: ±0.25 mm for sheets up to 6 mm; ±0.5 mm for sheets 6 mm to 12.7 mm; ±0.75 mm for sheets above 12.7 mm
- Flatness tolerance: 3 mm over 1 m length (unconstrained)
- Hardness: Rockwell R115 (ASTM D785)

3.0 Processing, Machinability & Application

PETG is highly machinable and can be cut, drilled, routed, and thermoformed with standard woodworking or metalworking tools. It does not require post-processing annealing for most applications. For best results, use sharp carbide or high-speed steel (HSS) tooling with a 10-15 degree rake angle. Avoid excessive heat buildup to prevent gumming or melting.

- Sawing: Use carbide-tipped blades with 10-12 teeth per inch (TPI) for sheet thickness up to 6 mm; for thicker sheets, use 6-8 TPI. Feed rate: 3-5 m/min for circular saws.
- Drilling: Use standard twist drills with a 118-degree point angle. For holes over 6 mm diameter, use a step drill or peck drilling to reduce heat. Spindle speed: 1500-2500 RPM. Feed: 0.1-0.2 mm/rev.
- Routing: Use single-flute or two-flute carbide upcut spiral bits. Spindle speed: 12,000-18,000 RPM. Feed rate: 2-4 m/min for 6 mm sheet. Climb milling recommended for clean edges.

- Thermoforming: Preheat sheet to 150-170°C (302-338°F) in a convection oven. Dwell time: 2-4 minutes per mm of thickness. Use silicone or aluminum molds. Shrinkage: 0.5-1.5% depending on draw ratio.
- Gluing: Use solvent-based adhesives such as methylene chloride or specialized PETG cements. Apply sparingly and clamp for 5-10 minutes. Full cure in 24 hours at 20°C.
- Printing: PETG accepts screen printing, UV printing, and digital printing with proper surface treatment (flame or corona treatment recommended for adhesion).
- Laser cutting: CO2 laser (10.6 µm) at 100-200 W. Cutting speed: 10-30 mm/s for 3 mm sheet. Edge may yellow; use compressed air assist to reduce discoloration.

4.0 Common Defects & Quality Control

- Reject if surface scratches exceed 0.1 mm depth or are visible from 1 m distance under normal lighting.
- Reject if internal bubbles or voids are larger than 0.5 mm in diameter or more than 3 per 100 cm².
- Reject if thickness variation exceeds ±0.5 mm for sheets up to 6 mm, or ±1.0 mm for thicker sheets, measured at four corners and center.
- Reject if sheet is out-of-square by more than 2 mm over 1 m diagonal.
- Reject if warpage exceeds 5 mm over 1 m length when laid flat on a reference surface.
- Reject if discoloration (yellowing or cloudiness) is visible under standard lighting conditions.
- Reject if contamination (dust, oil, or foreign particles) is embedded in the sheet surface.
- Acceptable surface finish: Gloss level 90+ GU (60° angle) for clear grades; matte grades as specified.

5.0 Storage, Handling & WHMIS Guidelines

- Store sheets vertically in a dry, clean environment at 15-25°C (59-77°F) and relative humidity below 60%.
- Keep protective film intact until fabrication to prevent surface damage. Remove film within 30 days of receipt to avoid adhesive residue.
- Shelf life: 12 months from date of manufacture when stored as recommended. FIFO rotation mandatory.
- Avoid direct sunlight and UV exposure during storage to prevent yellowing.
- WHMIS classification: Not classified as a hazardous material under WHMIS 2015. However, dust generated during machining may be a respiratory irritant.
- Mandatory PPE during fabrication: Safety glasses with side shields, cut-resistant gloves (ANSI A2 or higher), and dust mask (N95) when sanding or machining.
- Fire hazard: PETG is combustible. Keep away from open flames and high-temperature sources. Use Class A or B fire extinguishers.
- Disposal: Recycle as plastic #1 (PET) where facilities exist. Incinerate with energy recovery in permitted facilities. Do not landfill.

Regulatory Disclaimer: This document is a generic technical material specification provided for educational purposes. The end-user assumes all liability for reviewing, adapting, and validating all tolerances, properties, and safety protocols against specific OEM data sheets and local regulations before deployment.