Technical Data Sheet (TDS) - DPQA0001107-001
PMMA vs PC vs PET vs Chemically Toughened Glass

Substrate Selection Guide

This guide supports early-stage substrate selection for display cover lenses and transparent windows. Final material choice should be validated against mechanical, optical, environmental, and regulatory requirements.

Quick Selection Rule

- Choose PMMA for optical clarity and cosmetic appearance in low-impact environments.
- Choose PC for impact resistance and durability.
- Choose PET for thin, flexible, cost-sensitive applications.
- Choose chemically toughened glass for premium optics, scratch resistance, and long-term stability.

Comparison Overview

Attribute	PMMA (Acrylic)	PC (Polycarbonate)	PET	Chemically Toughened Glass
Optical Clarity	Excellent	Very good	Good	Excellent
Light Transmission	High	High	Moderate–high	High
Impact Resistance	Low–moderate	Very high	Moderate	High
Scratch Resistance	Moderate	Low (unless coated)	Low	Excellent
Surface Hardness	Moderate	Low	Low	Very high
Thickness Range	Thin–thick	Thin–thick	Very thin	Thin–medium
Weight	Low	Low	Very low	High
Dimensional Stability	Good	Good	Moderate	Excellent
Temperature Resistance	Moderate	High	Limited	High
UV Stability	Good	Moderate (UV grades required)	Moderate	Excellent
Chemical Resistance	Moderate	Moderate	Moderate	Excellent
Fire Behaviour	Combustible	Combustible	Combustible	Non-combustible
Cost Level	Low–moderate	Moderate	Low	High
Perceived Quality	Good	Industrial	Functional	Premium

Typical Use Cases

PMMA (Acrylic)

- Consumer displays
- Decorative or cosmetic panels
- Indoor applications with low impact risk
- Where optical clarity and cost are priorities

PC (Polycarbonate)

- Industrial and transportation HMIs
- Impact-prone environments
- Outdoor and ruggedised applications
- Where safety and toughness dominate

PET

- Thin overlay windows
- Printed graphic interfaces
- Cost-sensitive, high-volume applications
- Flexible or semi-flexible designs

Chemically Toughened Glass

- Medical and diagnostic equipment
- High-end industrial instrumentation
- Applications requiring scratch resistance and long-term optical stability
- Premium, safety-conscious designs

Processing & Integration Considerations

Consideration	PMMA	PC	PET	Chemically Toughened Glass
CNC machining	Excellent	Excellent	Excellent	Excellent (pre-toughening)
Printing (screen / digital)	Excellent	Excellent	Excellent	Compatible
Optical lamination	Compatible	Compatible	Compatible	Compatible
Coating compatibility	Excellent	Excellent	Limited	Excellent
Post-processing flexibility	High	High	High	Limited post toughening

Design Guidance

- PMMA is chosen too often for applications that should use PC or glass — impact risk must be honestly assessed.
- PC solves mechanical problems but usually requires coatings to meet optical and scratch requirements.
- PET should be selected deliberately for thin, functional interfaces — not as a downgrade substitute.
- Chemically toughened glass should be used when lifetime performance, surface durability, and perceived quality matter.

General Note

No single substrate is “best.”
The correct choice depends on risk, environment, expected lifetime, and user interaction. Early selection using this guide reduces redesign, re-quoting, and late-stage cost escalation.

Common Wrong Choices (Avoid These Early)

PMMA specified where impact risk exists

PMMA is frequently chosen for optical clarity, then fails in service due to cracking or shattering. If the product can be dropped, struck, or vandalised, PMMA is usually the wrong choice.

PC selected without acknowledging scratch risk

Polycarbonate solves impact problems but introduces surface durability issues. If coatings are not specified early, field wear and cosmetic complaints are likely.

PET used as a cost-down substitute for PMMA or PC

PET is appropriate for thin, functional overlays. It is not a like-for-like replacement for rigid substrates and will underperform if used outside its design intent.

Glass rejected solely on weight or breakage assumptions

Chemically toughened glass is often dismissed prematurely. In many applications it provides superior lifetime performance, surface durability, and perceived quality compared to polymers.

Coatings added late to compensate for substrate choice

Coatings should support a correct substrate decision, not rescue a poor one. Late-stage coating changes increase cost, lead time, and technical risk.

Design Reminder

Substrate selection should be driven by environment, user interaction, and service life, not by familiarity or unit cost alone. Early correct selection reduces redesign, re-quotation, and downstream failure risk.