Technical Data Sheet (TDS) – DPQA0001099-001
Anti-Reflection (AR) Hard Coat on PMMA (Cast Acrylic)

Material Description

Anti-Reflection (AR) Coating applied via vacuum vapour deposition enhances the optical performance of cast PMMA by significantly reducing surface reflections and improving light transmission. The coating is engineered for applications where glare reduction, high clarity, and optical contrast are critical, without sacrificing abrasion resistance or cleanability.

Substrate

- Cast acrylic (PMMA)
- Typical thickness range: 1.0–10.0 mm
- Coating applied to one or both surfaces

Physical Properties

Property	Test Method	Units	Typical Value
Coating Thickness	Internal	nm	80-150
Adhesion (cross-hatch)	ISO 2409	Class	0
Pencil Hardness	ISO 15184	-	5H
Surface Energy	ASTM D2578	mN/m	>38

Optical Properties

Property	Test Method	Units	Typical Value
Light Transmission	ASTM D1003	%	>96
Haze	ASTM D1003	%	<1
Reflectance	internal	%	<1
Refractive Index	ISO 489/A	-	~1.49
Optical Distortion	Internal	-	None

Note

All values shown are typical and subject to variation depending on substrate grade, thickness, and processing.

Anti-reflection performance is influenced by viewing angle, surface cleanliness, and ambient lighting conditions.

Material selection should be validated through customer-specific testing to ensure optical consistency and environmental durability.

Mechanical Properties

Property	Test Method	Conditions	Typical Value
Scratch Resistance	ISO 1518	-	Improved
Abrasion Resistance	Taber CS-10F	500 cycles	<3% haze
Impact Resistance	ISO 179	kJ/m²	18
Edge Chipping Sensitivity	Internal	-	Moderate

Thermal Properties

Property	Test Method	Units	Typical Value
Service Temperature Range	-	°C	−40 to +80
Vicat Softening Temperature	ISO 306	°C	>110
Coefficient of Thermal Expansion (CTE)	ASTM D696	mm/m·°C	0.077

Fire Performance

Fire performance is governed by the PMMA substrate:

• UL 94 HB (typical)
• Compatible with BS 476 Part 7 Class 3
• AR coating does not materially alter the fire rating

Chemical Resistance (General)

- Resistant to:
  - Dilute acids
  - Alcohols
  - Mild detergents

- Limited resistance to:
  - Oils
  - Fuels

- Not recommended for:
  - Ketones
  - Aromatic solvents
  - Chlorinated solvents

Processing and Fabrication

Process	Compatibility
CNC machining	Excellent (post-coating preferred)
Laser cutting	Excellent
Screen printing	Compatible
Digital printing	Compatible
Optical lamination	Compatible
Bonding systems	Must be validated

Typical Applications

- High-clarity display covers for sunlit or high-glare environments
- Optical panels and lenses for outdoor instruments
- Automotive clusters, HUD combiner lenses, and avionics
- Scientific and laboratory equipment requiring reduced reflection

Design Considerations

- AR coatings are directional – correct orientation is essential
- Coated surface may be more sensitive to abrasion – handle with care
- Avoid aggressive cleaning agents; use compatible cloths and fluids
- Allow for thermal expansion of PMMA in bonded assemblies

Disclaimer

Material properties are typical values and not guaranteed. Optical performance depends on coating quality, application environment, and surface cleanliness. Suitability should be confirmed through real-world validation.