

Technical Data Sheet (TDS)
Chemically Toughened Glass Sheet

Material Description

Chemically toughened glass is a high-strength aluminosilicate or soda-lime glass strengthened by ion-exchange (typically sodium to potassium). This creates a deep surface compressive layer, delivering exceptional scratch resistance, optical clarity, and improved impact strength while maintaining precise thickness control.

Widely used in medical, industrial, transportation, defence, and consumer electronics where optical performance, chemical durability, and surface hardness are critical.

Physical Properties

Property	Test Method	Units	Typical Value
Density	ISO 1183	g/cm ³	2.48–2.50
Water Absorption	ISO 62	%	0
Surface Roughness (polished)	ISO 4287	Ra μm	<0.01
Thickness Range	–	mm	0.55–6.0

Mechanical Properties

Property	Test Method	Conditions	Units	Typical Value
Surface Compressive Stress	ASTM C158	–	MPa	400–900
Depth of Layer (DOL)	ASTM C158	–	μm	30–100
Bending Strength (4-point)	EN 1288	–	MPa	600–800
Young's Modulus	ISO 527	–	GPa	70
Poisson's Ratio	–	–	–	0.22
Vickers Hardness	ISO 6507	–	HV	600–700
Impact Resistance	IEC 62262	IK rating	–	IK07–IK09*

*Depends on thickness and edge finish.

Thermal Properties

Property	Test Method	Units	Typical Value
Service Temperature Range	–	°C	–40 to +250
Thermal Shock Resistance	EN 12150	ΔT °C	~120
Coefficient of Thermal Expansion	ISO 7991	×10 ⁻⁶ /K	8.5–9.0
Thermal Conductivity	ISO 8302	W/m·K	1.0
Specific Heat Capacity	–	kJ/kg·K	0.75

Optical Properties

Property	Test Method	Conditions	Units	Typical Value
Light Transmission (clear)	ASTM D1003	3 mm	%	>90
Refractive Index	ISO 489/A	—	—	1.52
Haze	ASTM D1003	—	%	<0.5
Yellowness Index	ASTM D1925	—	—	<1

Chemical Resistance

Chemical Type	Resistance
Alcohols	Excellent
Detergents & disinfectants	Excellent
Dilute acids	Excellent
Alkaline cleaners	Moderate
Strong acids / HF	Not resistant

Chemically toughened glass is highly resistant to repeated cleaning and aggressive disinfectants, making it ideal for medical and industrial environments.

Electrical Properties

Property	Test Method	Units	Typical Value
Dielectric Strength	IEC 60243	kV/mm	20–30
Surface Resistivity	IEC 60093	Ω	$>10^{12}$

Fire Performance and Flammability

Standard	Classification	Notes
EN 13501-1	A1	Non-combustible
BS 476 Part 4	Non-combustible	
UL 94	Not applicable	Inorganic
Smoke generation	None	
Flaming droplets	None	

Comparison: Chemically Toughened Glass vs Polymers

Property	Toughened Glass	Polycarbonate	Acrylic
Scratch resistance	Excellent	Moderate	Moderate
Impact resistance	High	Very high	Low
Optical clarity	Excellent	Very good	Excellent
Fire rating	A1	V-0 (FR)	HB
Chemical resistance	Excellent	Moderate	Limited
Weight	High	Low	Low

Processing and Fabrication

- CNC cutting and edge finishing: Before toughening
- Chemical toughening: Ion-exchange bath
- Screen printing (ceramic inks): Excellent
- Coatings (AR, AG, AF): Excellent
- Drilling / machining after toughening: Not possible
- Bonding and lamination: Excellent

Typical Applications

- Medical device displays and HMIs
- Industrial and ruggedised control panels
- Transportation and rail interiors
- Defence and security equipment
- Consumer electronics and instrumentation

Design Considerations

- All machining must be completed before chemical toughening
- Edge quality directly affects mechanical strength
- Thinner glass achieves higher compressive stress
- Ideal substrate for optical coatings and ceramic printing
- Bond-line design must account for CTE mismatch vs polymers