



## CORNING LOTUS™ NXT GLASS FOR HIGH-PERFORMANCE DISPLAYS

Corning Lotus™ NXT Glass is specially formulated for high-temperature processing. By working in close collaboration with its customers, Corning developed a new substrate that withstands the demanding processes involved in creating high-performance displays.

Lotus NXT Glass is the newest addition to Corning's specialty glass platform. It is formulated to perform exceptionally well in low temperature poly-silicon (LTPS) and oxide thin-film transistor (TFT) backplane manufacturing processes.

Specifically, Lotus NXT Glass provides industry-leading levels of low total pitch variation resulting in heightened resolutions; more energy-efficient displays; and better yields.

## PRODUCT & MATERIAL INFORMATION

Lotus NXT Glass is produced to the following typical specifications:

PRODUCT SPECIFICATIONS		
<b>Maximum Size</b>	Gen 10 Substrate	
<b>Major Thicknesses</b>	0.3 mm, 0.4 mm, 0.5 mm, 0.6 mm, 0.7 mm	
<b>Thickness Tolerance</b>	± 0.02 mm	
<b>Thickness Ranges (150mm Moving Window)</b>	≤ 9 μm	
<b>Edges</b>	R-Beveled	
<b>Corner Cuts</b>	1.5 ± 1.0 mm	
<b>Orientation Corner(s)</b>	Various	
<b>Squareness</b>	± 0.3 mm	
<b>Sheet Warp</b>	≤ 0.20 mm	
<b>Waviness</b>	Cut off: 0.8-8 mm	≤ 0.06 μm
	Cut off: 0.8-25 mm	≤ 0.33 μm
SUBSTRATE INSPECTION & PACKAGING		
<b>Scratch &amp; Stain</b>	Pattern Surface	None visible using 5K lux or 10K lux

	Back Surface	1.5K or 5K Limit Sample using 1.5K lux
<b>Inclusions</b>	≤ 0.1 mm	
<b>Edge Chips</b>	≤ 1.0 mm	
<b>Edge Cracks</b>	None visible using 1.5K lux	
<b>Packaging</b>	Polypropylene Slotted Cases (=<730 x 920mm)	
	Corning® DensePak® (products larger than 730 x 920 mm)	
<b>Quality Area</b>	Scratch, stain and inclusion fault criteria apply to all except a border area on each substrate which has a width of 10 mm.	

DIMENSIONAL MEASUREMENT									
	Size	Thickness	Chamfer	Corner Cut	Orientation Corner	Squareness	Warp	Waviness	Compaction Variation
Laser Gauge	X	X				X			
Calipers	X								
Micrometer		X							
Scale Loupe			X	X	X				
Squareness Gauge						X			
Warp Gauge							X		
Profilometer								X	
Compaction Gauge									X

VISUAL INSPECTION					
	Pattern Surface	Back Surface	Inclusions	Chips	Cracks
Environment	Darkened Clean Room				
Light Source	Halogen (10K lux), Halogen (5K lux) or Fluorescent (1.5K lux)				
Brightness	5K or 10K lux	1.5K lux	1.5K lux	1.5K lux	1.5K lux
Method	Automated				

<b>MATERIAL INFORMATION</b>			
<b>Glass Type</b>	Alkaline Earth Boro-Aluminosilicate		
<b>Forms Available</b>	Fusion Drawn Sheet		
<b>Principle Uses</b>	Substrates for High Performance Displays with LTPS and oxide-TFT technologies.		
<b>Mechanical Properties</b>	Density (20°C)	2.59 g/cm <sup>3</sup>	
	Young's Modulus	83 GPa	
	Shear Modulus	34 GPa	
	Poisson's Ratio	0.23	
	Vickers Hardness (200g load, 15 sec dwell)	643 kgf/mm <sup>2</sup>	
<b>Thermal Expansion</b>	Coefficient of Thermal Expansion (0 - 300°C)	35 x 10 <sup>-7</sup> /°C	
<b>Viscosity</b>	Softening Point (10 <sup>7.6</sup> poises)	1043°C	
	Annealing Point (10 <sup>13</sup> poises)	806°C	
	Strain Point (10 <sup>14.5</sup> poises)	752°C	
<b>Electrical Properties</b>	Log <sub>10</sub> Volume Resistivity	at 25°C	25.7 ohm-cm
		at 250°C	14.3 ohm-cm
		at 500°C	9.4 ohm-cm
	Dielectric Constant (20°C, 1kHz)	6.17	
	Loss Tangent (20°C, 1kHz)	0.15%	
<b>Optical Properties</b>	Refractive Index (at 589.3nm)	1.526	
	Dispersion Constant	61.7	
	Birefringence Constant	283 (nm/cm)/(kg/mm <sup>2</sup> )	
	Transmittance (from 400 to 800nm)	>90%	

## THERMAL CONDUCTIVITY

Thermal conductivity is a calculated value, and is equal to the product of the Thermal diffusivity multiplied by specific heat multiplied by density of the glass.

Temp (°C)	Specific Heat (J/g-K)	Thermal Diffusivity (cm <sup>2</sup> /sec)	Thermal Conductivity (W/cm-K)
23	0.759	0.0061	0.0116
100	0.820	0.0060	0.0130
200	0.903	0.0057	0.0137
300	0.965	0.0057	0.0150
400	1.010	0.0056	0.0159
500	1.044	0.0056	0.0159

## CHEMICAL DURABILITY

Chemical durability is measured via weight loss per surface area after immersion. Values are highly dependent upon actual testing conditions. Unless otherwise noted, concentrations refer to weight percent.

Reagents	Time	Temp	Weight Loss (mg/cm <sup>2</sup> )
HCl - 5%	24 hrs	95°C	0.04
HNO <sub>3</sub> - 1M	24 hrs	95°C	0.03
HF - 10%	20 min	20°C	5.81
110BHF	5 min	30°C	0.34
1HF:10HNO <sub>3</sub>	3 min	20°C	1.67
1HF:100HNO <sub>3</sub>	3 min	20°C	0.17
DI H <sub>2</sub> O	24 hrs	95°C	0.00
Na <sub>2</sub> CO <sub>3</sub> - 0.02N	6 hrs	95°C	0.10
NaOH - 5%	6 hrs	95°C	1.46