Duralan II™ P Windows

Polycarbonate & Acrylic Display Enhancement & Protection Windows

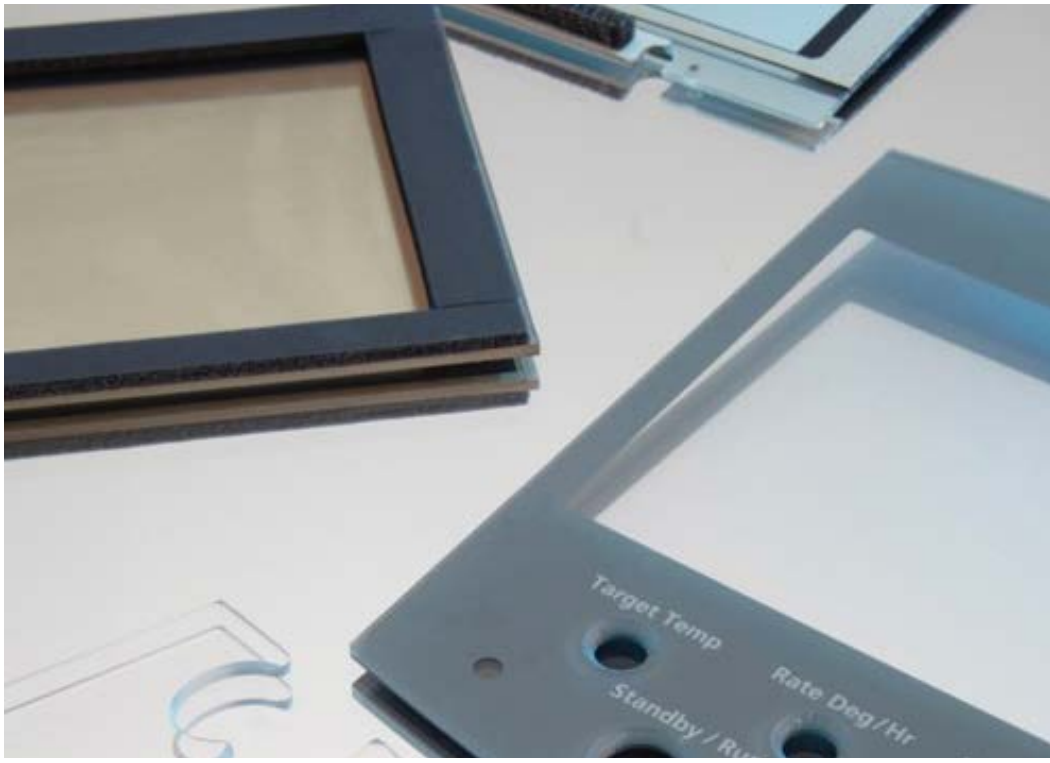
Duralan II P custom plastic window designs protect displays and enhance viewable light transmission. Duralan II plastic windows are available in optical grades of polycarbonate and acrylic substrates.

Our plastic windows protect your displays from scratching, breakage, solvents, liquids and exposure to harsh environments. Duralan II P windows will improve your display's performance by using specially engineered optical materials that increase light transmission and reduce ambient reflections enabling your display to be viewed under the most challenging conditions. Light transmission can exceed 90%, depending on product design.

Advanced lamination processes combine the plastic substrate with application driven specialty films to provide hard coated surfaces, anti-glare and/or anti-reflective surfaces and other product enhancements. Our lamination process protects embedded graphics (like protective borders, logos) from scratching and wear. The embedded graphics are close to the front surface allowing for a sharp aesthetically pleasing appearance.

Duralan II P Windows can be provided with pressure sensitive adhesives (PSA) for assembly into bezels and housings. Gaskets and sealants can be applied to windows to provide superior environmental protection. Windows can be kitted or integrated with frames or housings. Parker Chomerics supply chain management reduces customer complexity for turnkey integrated solutions.

Duralan II P windows are available in custom thicknesses and sizes. Depending on materials specified, thickness can range from 0.007" to 0.500" (0.177mm to 12.7mm) and overall size up to 48" x 96" (121.92cm to 243.84cm).



Product Features

- Custom thickness 0.007" to 0.500"
- Custom sizes up to 48" x 96"
- Plastic substrates: Polycarbonate or Acrylic
- Embedded screen printed graphics
- UL-94-, V0, V1, V2, HB substrates available
- Part designs maximize clarity and durability
- Excellent scratch/abrasion resistance
- Sunlight readability
- Anti-glare coating
- Anti-reflective coating

Typical Applications

- Patient monitoring devices
- Hand-held data mobile communications
- Outdoor equipment
- Point of sale/retail systems
- Emergency/first responder equipment
- Display permanent screen covers
- Ruggedized equipment
- Instrument panels
- Digital Signage/Kiosks
- Industrial equipment

Contact Information

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Parker Chomerics

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Duralan II™ P Windows Product Information

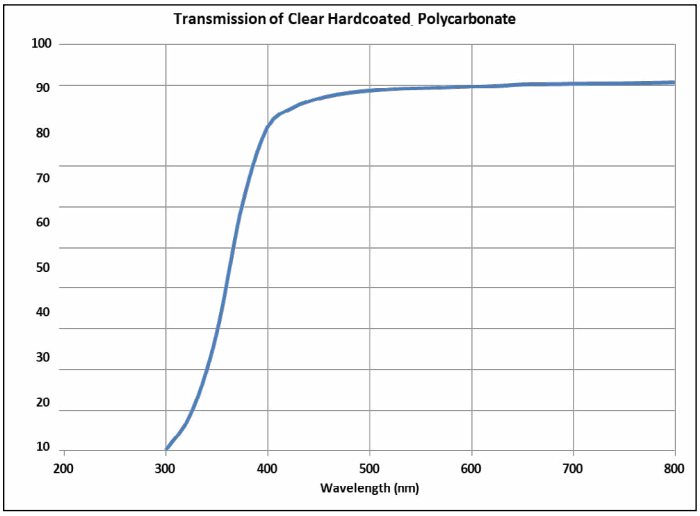
Optical Properties

Hardcoats Role

Hardcoats increase the life and durability of the polycarbonate and acrylic based windows from scratching, abrasion and solvent attack. Hardcoats provide excellent resistance to Taber abrasion (see Table 2). They also perform well against various solvent attacks (see Table 3).

Clear Hardcoats

Clear hardcoats cost effectively provide a clear scratch resistant window, while preserving the resolution of a display. They are typically on the inside of a window facing the LCD. They can also be on the front (user side) surface in low ambient light applications where reflections are not an issue.



Anti-Glare Hardcoats

Anti-glare (AG) hardcoats resist scratches and improve viewability by reducing glare with a textured surface that blurs hard reflections. AG hardcoats are resistant to fingerprinting, smudges and smears. They have high solvent resistance and can be easily cleaned with isopropol alcohol.

Table 1- Anti-glare Coating (Polycarbonate Laminate)

Surface	Gloss Reading[1]	Light Transmission[2]	Haze Reading[2]
Clear Hardcoat	87-93	90-93%	0.3-0.7%
Anti-glare	55-63	88-93%	9-14%

[1] Based on black background
[2] Testing per ASTM D1003-61

Table 2 - Taber Abrasion: ASTM D1 044-85 (% haze change) (Polycarbonate Laminate)

Cycles	Clear Hardcoat	Anti-Glare Hardcoat
25	1.60%	0.60%
50	2.50%	3.2%
100	5.80%	8.70%
200	13.00%	18.00%

Anti-Reflective Coatings

Anti-reflective coatings (AR) are used in high performance applications where high light transmission and low reflection is desired. AR coatings increase the contrast of a display by reducing ambient light reflections. Transmission of the overall window will increase 3-4% per surface when AR coating is used.

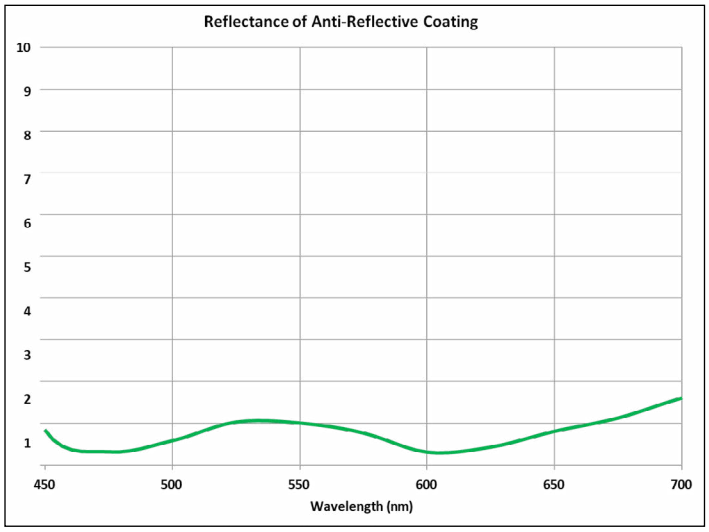
Coating Design:

Optimized for visible light (400-700 nm) Average

Reflection < 0.7%

Surface Properties:

AR coated surfaces have a hydrophobic/oleophobic coating that reduces fingerprinting, oils, marks, and cleans easily.



Duralan II™ P Windows Product Information Cont'd.

Physical Properties

Table 3 - Chemical Resistance: 24-Hour Watch Glass (Polycarbonate Laminate) Soak*

Chemical	Clear Hardcoated	Anti-Glare Hardcoated
Acetic Acid	Excellent	Excellent
Acetone, Acetic Acid	Excellent	Good
Dimethylformamide, Acetone	Excellent	Good
Ethyl Acetate, Dimethylformamide	Excellent	Excellent
10% Hydrochloric Acid, Ethyl Acetate	Excellent	Excellent
Isopropyl Alcohol, 10% Hydrochloric Acid	Excellent	Excellent
MEK, Isopropyl Alcohol	Excellent	Good
Pine Oil, MEK	Excellent	Excellent
Ammonia, Pine Oil	Excellent	Excellent
Toluol, Ammonia	Excellent	Excellent
Water, Toluol	Excellent	Excellent
Windex® Water	Excellent	Excellent
Unleaded Gas, Windex®	Excellent	Excellent
Oil 30w, Unleaded Gas	Excellent	Excellent
Brine 33% Salt, Oil 30w	Excellent	Excellent
THF, Brine 33% Salt	Excellent	Good
$MeCl_2$, THF	Good	Good
10% NaOH, $MeCl_2$	Good	Good
10% NaOH	Good	Good

*24-Hour Watch Glass Soak Test Rating

- Excellent = 24 hour exposure OK
- Good = Minor cosmetic defects such as craze, haze, and gloss change between one and 24 hours
- Fair = Major chemical attack such as wrinkle, blister, and destroy between five minutes and one hour

24-Hour Watch Glass Soak Test is one of the industry's most stringent tests for chemical resistance.

Thermal:

Typical Operating Temperature Range: -40 to +70°C (-40 to +160°F)

Storage:

25°C (80°F), 50% relative humidity with no masking present

Standard Tolerance:

- ± 0.010" Machined
- ± 0.015" Die cut
- ±10% Thickness
- ± 0.020" Bus Bars/Graphics

Custom tolerances available upon request

Maximum Sizes:

48" x 96" (121.92cm x 243.84 cm)

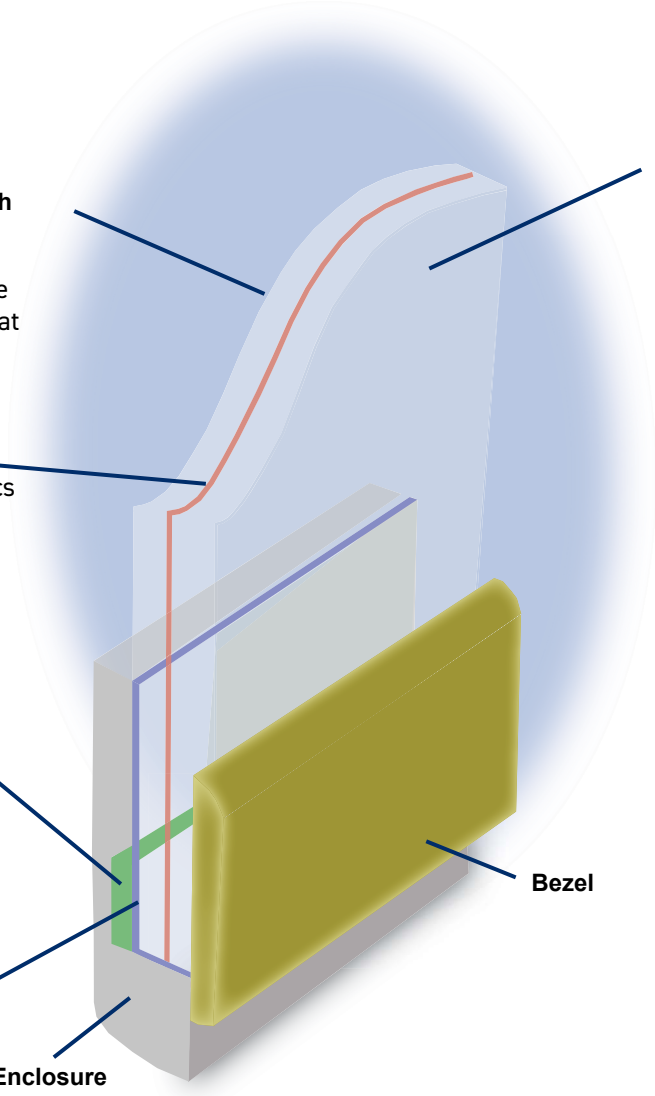
Thickness 0.007" to 0.500" (0.177mm to 12.7mm)

Larger sizes available upon request

Design Guide (Please choose from the following options):

1. Front Surface Options:
   - Anti-glare
   - Anti-reflective
   - Anti-glare/Anti-reflective
   - Clear Hardcoat
2. Embedded Options:
   - Screen Printed Graphics (Borders. Logos)
   - None
3. Rear Surface Options:
   - Anti-glare
   - Anti-reflective
   - Clear Hardcoat
4. Gasketing:
   - PSA (for bonding to bezel)
   - Environmental gasket (for sealing to bezel)

Duralan II™ P Windows Design Options



Rear Surface Finish Options:
- Anti-glare
- Anti-reflective
- Clear Hardcoat

Front Surface Options:
- Anti-glare
- Anti-reflective
- Anti-glare/Anti-reflective
- Clear Hardcoat

Embedded Options:
- Screen Printed Graphics (Borders, Logos)
- None

Gasketing:
- PSA (for bonding to bezel)
- Environmental gasket (for sealing to bezel)

Bezel

Edge Feature

Enclosure

Typical Edge Features:

Square Edge

Stepped Edge

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