



1. The structure and principle of Shenzhen Yuguang PDLC smart glass(Film)

2.Yuguang Glass Technical indicators and parameters

3.Application

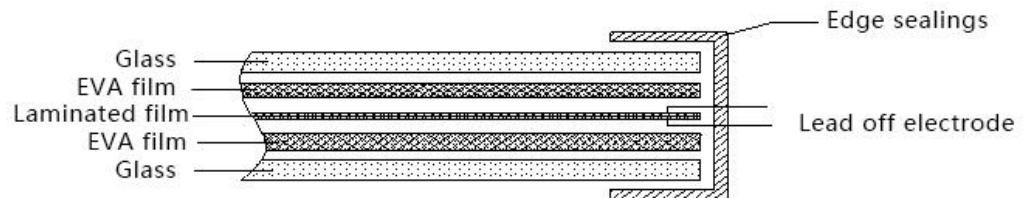
4. Yuguang Self-adhesive PDLC film performance and feature

5.Yuguang self-adhesive Technical indicators and parameters

1.The structure ad principle of Shenzhen Yuguang PDLC smart glass(Film)

1.1Structure

(1) Structure diagram :



Yuguang Switchable Transparent Glass , refered to as STG, this product is made by the dry process of gluing glass, and the switchable transparent film(STF) is glued between two pieces of glass. The glass meets the national standard for laminated standard.

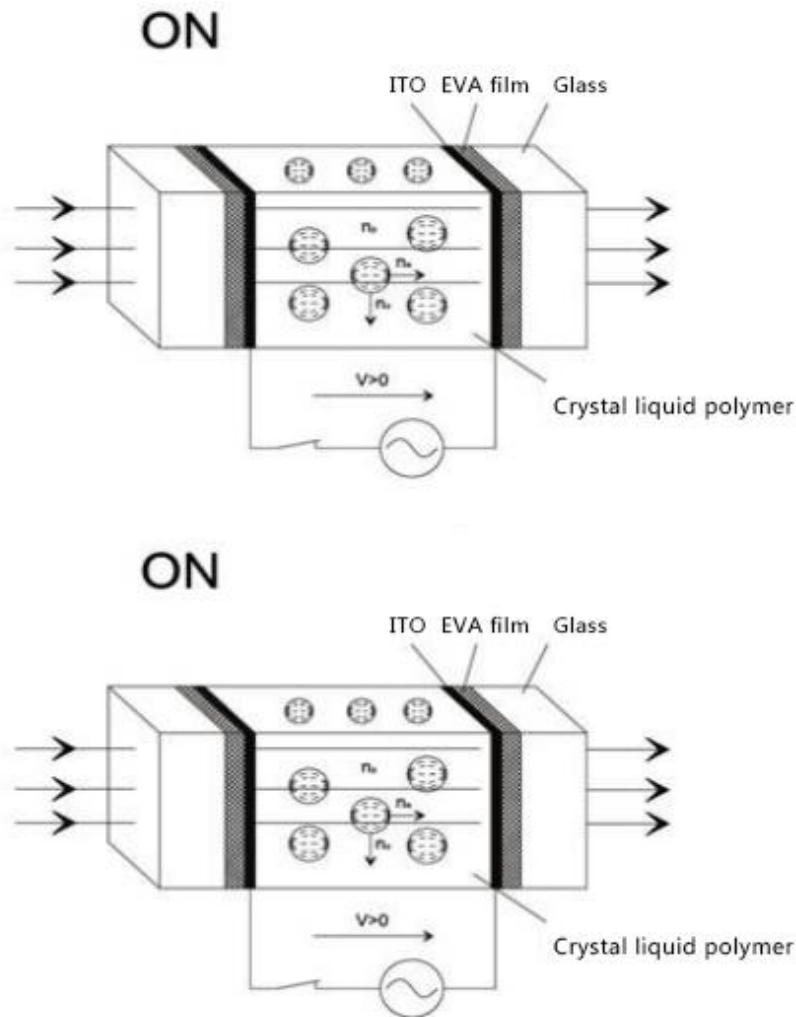
(2) Exterior structurel dimensions :

Glass thickness +0.76mm (EVA) +0.44mm PDLC film+0.76mm (EVA) + Glass thickness(Glass thickness:3mm-20mm)

Note: Tpye of glass: super wihte, white, fireproof, Low-E coated glass etc.

1.2.Principle:

STF is the core technology of light-proof glass developed and products of our company. Magic glass, Switchable Light Glass, Smart Window, Intelligent Smart Glass, Chromotropic glass, Electric fog glass is the same products. The atomization function of the Yuguang Glass is realized by the PDLC smart film of the interlayer.



(1) Opaque statue of STG

STG is composed of two transparent ITO film sandwiched between a layer of plastic and liquid crystal. The plastic and liquid crystal include a liquid crystal ball and a polymer, and the liquid molecule director is approximately parallel to the glass substrate, the polymer is surrounded by the liquid crystal micro droplet, the refractive index of the polymer is n_p , which is similar to the refractive index of the glass. Approximately 1.5, an isotropic substance, the unusual refractive index and the ordinary refractive index of liquid crystals are n_e and n_o , respectively. When the vertically incident visible light passes through the glass and transparent ITO film, it enters the liquid crystal sphere and the

polymer interface, due to n_e is not equal to n_o , So scattering occurs and the STG is atomized.

(2) Transparent STG

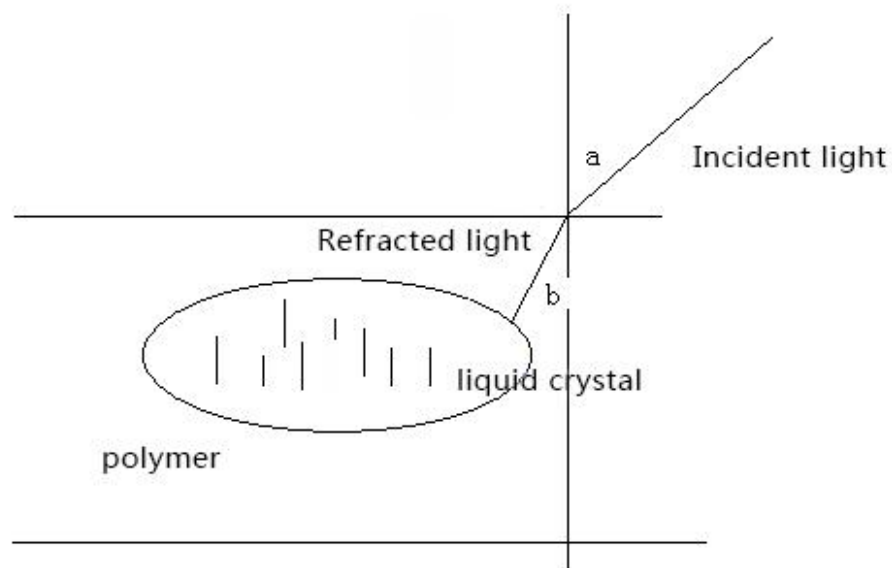
When the external electric field is applied, the electric field is formed between the two transparent ITO films, and the liquid crystal molecules are arranged in the direction of the electric field. When the vertically incident visible light passes through the glass and the transparent ITO film, it is incident to the interface between the liquid crystal sphere and the polymer. Because the n_o direction is perpendicular to the direction of light propagation and n_o is equal to n_p , the glass is transparent.

(3) STG haze

The main indicator of the advantages and disadvantages of STG glass optical performance is transparency. In fact, it is the haze. The smaller the haze when energized, the better the haze when the power is cut off. When the external electric field is applied, the light is perpendicular to the direction of the transparent conductive film. When incident, although n_{LC} is approximately equal to n_o , However, due to the difference between the n_p and n_o values, scattering still occurs at the interface between liquid crystal droplets and polymers. This is the main reason for the haze.

(4) View angle

When the ITO film is power on, Angle between incident light and the vertical direction of the electric control film is not zero (Called the view angle "a") The direction of light propagation in the STF is not parallel to the liquid crystal molecule pointing vector, as shown in the figure:





At the interface between liquid crystal droplets and polymers, the component of light vibrating along the NE direction is scattered, and the larger a is, the more scattered, so the mist increases with the increase of the angle of view, which is the characteristic of the photoelectric effect of liquid crystal.

2.Yuguang Glass Technical indicators and parameters

2.1 Raw material:

2.1.1 Glass: Car float glass(white or pure white)

Thickness: 3mm-20mm

Brand : CSG Jinjing Xinyi

2.1.2 Yuguang Film : Producing area : Shenzhen , independent produce PDLC film

2.1.3 EVA laminated film: switchable glass appropriate film

2.1.4 Appropriate glass glue: Producing area: Japan Toshiba

2.1.5 Yuguang Glass appropriate electrical source

2.1.6 Yuguang Glass processing mode: Independent producing adhesive furnace

2.1 Optical performance:

1) Parallel optical transmittance(Power on): $> 75\%$

Parallel optical transmittance(Power off): $\leq 2\%$

2) Visible Light Transmittance(Power on): $\geq 85\%$

Visible Light Transmittance(Power off): $> 60\%$

3) View angle(Power on): $\geq 145^\circ$

4) Haze(Power on): $< 4\%$

Haze(Power off): $\geq 96\%$

5) Response time: Off-On $< 10\text{ms}$

6) UV resistance: $\geq 99\%$

7) Infrared rejection (Power off) $> 20\%$

2.2 Physical property

1) Working environmental temperature : $-20^\circ\text{C} \sim +60^\circ\text{C}$



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- 2) Storage environmental temperature : $-30^{\circ}\text{C} \sim +70^{\circ}\text{C}$
 - 3) Impact – resistant : Meet the GB9656-2003 national standard of laminated glass
 - 4) Radio resistance : Meet the GB9656-2003 national standard of laminated glass
 - 5) Moisture resistance : Meet the GB9656-2003 national standard of laminated glass
 - 6) Moisture and heat resistance : Meet the GB9656-2003 national standard of laminated glass
 - 7) Moisture and hot resistance : Meet the GB9656-2003 national standard of laminated glass
 - 8) Shock-proof : Meet the GB9656-2003 national standard of laminated glass
 - 9) Sound proof : Meet the GB9656-2003 national standard of laminated glass , up to 40 db
 - 10) Max size:Width:1850mm* length is unlimited

2.3 Electrical property

1)Drive voltage:

Input voltage: AC220V、 AC110V、 DC24V、 DC12V

Working voltage: AC48V ~ 65V/50Hz

2) Threshold voltage: $\leq 25\text{V}$ (Smallest power of voltage)

3)Power consumption: $\leq 5\text{W}/\text{m}^2$

4)Reponse time:

Turn on time: $< 10\text{ms}$



Turn off time: < 10ms

5)Working life(Power on): > 80000h

6)Switch time: (Power on-off) : > 2000000 times

7) Insulation resistance : > 20MΩ

8) Frequency : 30Hz ~ 400Hz (The besst working frequency is 50-100 Hz)

2.4 Exterior quality:

1)Thickness: Glass thickness*2+ 2mm

2)Scoring: < 3mm/m²

3)Air bubble: < 1.5mm/m²

4)Impurity: NO

5)Chip,unglued,side opening: NO

2.5 Special power supply performance and technical parameters:

1) Input voltage:AC220V(AC110V) ±20% 50Hz±5%

2) Output voltage: AC48V ~ 65V±5%

3) Output power:5W-1000W

4) Output current: 0.01A ~ 20A

5)Environment temperature:: -20 ~ + 60℃(No ice or dew)

6) Environment humidity: Less then 90%RH (No Dew)

7)Insulation power: AC1800V 1M1N

8)Insulation resistance:20M

9) Protection function: Over current, over voltage protection, overload protection, overheat protection, moisture protection and fire protection

10) Standby mode: low voltage control, high voltage, long term standby

11) Remote model:

① Switches: manual control, remote control, manual remote control linkage control, infrared control, light control, voice control, WIFI, Bluetooth, computer, tablet, mobile phone APP control, etc

② Control: independent research and development of manual control, remote control.

③ FM: self developed automatic tracking FM controller for optical glass; (solving the screen flashing problem)

2.6 Feature

a) Environmental protection, saving-energy, safety, heat preservation, anti-condensation

b) High UV resistance function, It can block more than 99 % of ultraviolet light. While it does not lose visible light into the room, it isolates a large amount of ultraviolet light to prevent the fading and aging of interior decorations and furniture. It can also protect people from diseases caused by excessive ultraviolet radiation

c) The suitable visible light penetration rate has a certain degree of concealment for outdoor bright light

d) Low solar coverage effectively prevents solar thermal radiation from entering the room

e) High infrared reflectivity, limiting outdoor secondary thermal radiation into the room

f) The extremely high absorption of more solar radiation heat and ultraviolet rays to reduce the transmission of infrared and ultraviolet light, reduce the energy consumption of indoor air-conditioning, heat insulation and energy saving

g) A high degree of safety, when damaged by external forces, will only cause cracks, but will not break down, there is no danger of splashing glass fragments.

h) The privacy protection is transparent when energized, opaque when the power is cut off, light is still abundant under the protection of privacy, and the reception room in the hidden office area is still bright, not only comfortable, but also saving lighting.



Transparency in power, opacity, opacity: fast response, instant privacy within 1/10 seconds

i) Sound insulation features excellent reflection, heat absorption type hollow glass, the middle electric control film and film have sound damping effect, can effectively block all kinds of noise up to 38 decibels, plus hollow, sound insulation effect is even better

j) Projection characteristics: Under the closed state, visible light scattering reaches more than 43 %, and the penetration rate reaches more than 50 %. It can be used as a projection screen in a street mall, playing a good advertising effect. If the projection is in the open state, there is also a three-dimensional ethereal effect

k) Control diversity: hand control, remote control, optical control, audio control, infrared, remote network control

3. Application

Large command and control dispatch center office, meeting room, negotiation room, special hospital room. Operating room, villa toilet. Shower room, window of entertainment room. Isolation. screen, etc..

Police station, Courts. Prisons. Jewelry shops. Museums. Bank Windows. Curtain walls. Counter. Isolation, etc.. Large special screen projection screen, etc..

4.Yuguang Self-adhesive PDLC film performance and feature

The self-adhesive electrical control film(Called Yuguang Self-adhesive film) is a new type of product based on the PDLC-Film dispersed polymer liquid crystal electric control film(referred to as the PDLC film). In addition to maintaining the characteristics of PDLC-Film's original "power transparent, power outage grinding", the electric control membrane also has the characteristics of "dry direct paste, automatic exhaust"; Compared with the traditional glass made using adhesive technology, it has the advantages of "light weight and simple installation". It provides the best solution for some projects that have been installed with ordinary glass or need to be projected on ordinary glass. The entire glass facility, Can be directly pasted on the smooth surface of the clean glass. It is one of the best options to realize the fast switching and hiding space of glass partition wall; It can also be used as a backseat screen and has a unique effect in window advertisements and exhibition displays. Car glass side window, rear block and skylight glass applications.

5.Yuguang self-adhesive Technical indicators and parameters

1.Structure of Yuguang Self-adhesive: ITO conduction powder+ (macromolecule polymer r+ liquid crystal)mixture+ ITO conduction powder

2.1 Optical property

1) Parallel optical transmittance(Power on): > 75%

Parallel optical transmittance(Power off): $\leq 2\%$

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- 5)Response time: Off-On $< 10\text{ms}$

2.2 Physical property

- 1) Working environmental temperature : $-20^\circ\text{C} \sim + 60^\circ\text{C}$
- 2) Storage environmental temperature : $-30^\circ\text{C} \sim + 70^\circ\text{C}$
- 3)Size: Width:1500mm* length is unlimited

2.3 Electrical property

- 1)Drive voltage:
- Input voltage: AC220V、AC110V、DC24V、DC12V
- Working voltage: AC48V ~ 65V/50Hz
- 2) Threshold voltage: $\leq 25\text{V}$ (Smallest power of voltage)
- 3)Power consumption: $\leq 5\text{W}/\text{m}^2$
- 4) Reponse time:
- Turn on time: $< 10\text{ms}$
- Turn off time: $< 10\text{ms}$
- 5)Working life(Power on): $> 80000\text{h}$
- 6)Switch time: (Power on-off) : > 2000000 times



7) Insulation resistance : > 20MΩ

8) Frequency : 30Hz ~ 400Hz (The besst working frequency is 50-100 Hz)

2.4 Exterior quality:

1)Thickness: 0.4mm

2)Scoring: NO

3)Air bubble: No

4)Impurity: NO

5)Chip,unglued,side opening: NO