



PDLC SMART FILM

Polymer Dispersed Liquid Crystal (PDLC) Smart Film is an advanced switchable glazing technology designed for both new installations and retrofit projects. It enables glass surfaces to switch instantly between opaque and transparent states, providing dynamic light control, privacy on demand, and high-definition rear-projection capability. PDLC Smart Film is widely used in architectural and interior design, commercial environments, transportation, and innovative industrial applications.



**REIMAGINE GLASS
WHERE INNOVATION
TRANSFORMS PERSPECTIVES**

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PDLC Smart Film Overview

Technical Principles

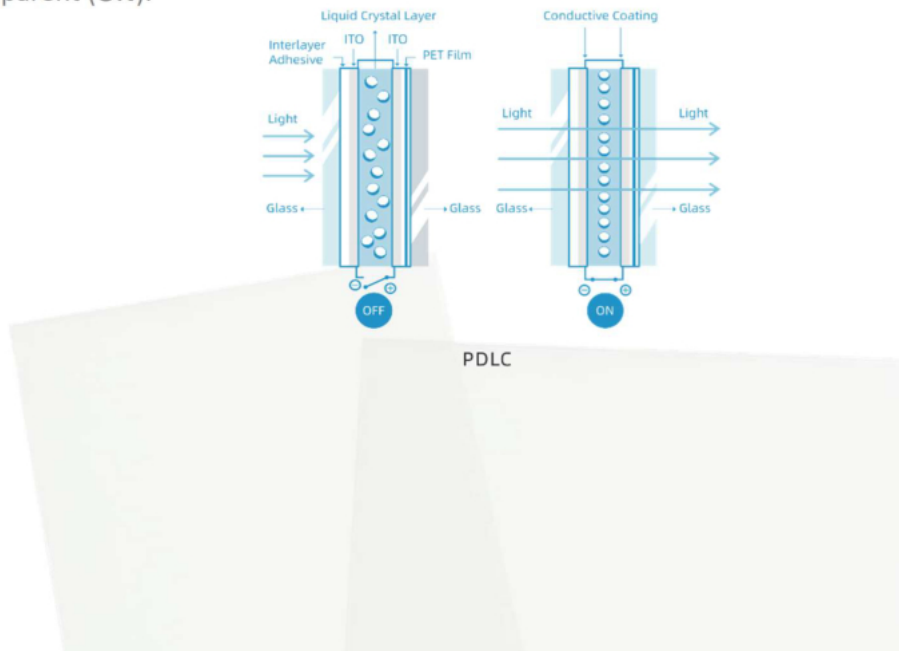
PDLC Smart Film Technology

PDLC (**Polymer Dispersed Liquid Crystal**) Smart Film is an advanced electronic light-control material that allows users to switch glass surfaces between transparent and opaque states with minimal energy consumption.

The film consists of a liquid crystal–polymer composite layer laminated between two transparent conductive films. When applied to glass, this structure enables precise control over both privacy and light transmission at the touch of a switch.

In the absence of an electrical current, the liquid crystal molecules are randomly oriented, diffusing light and causing the glass to appear opaque (**OFF**).

When an alternating current is applied, the liquid crystal molecules align in an orderly manner, allowing light to pass through the film. In this state, the glass becomes transparent (**ON**).



Types of PDLC Smart Film

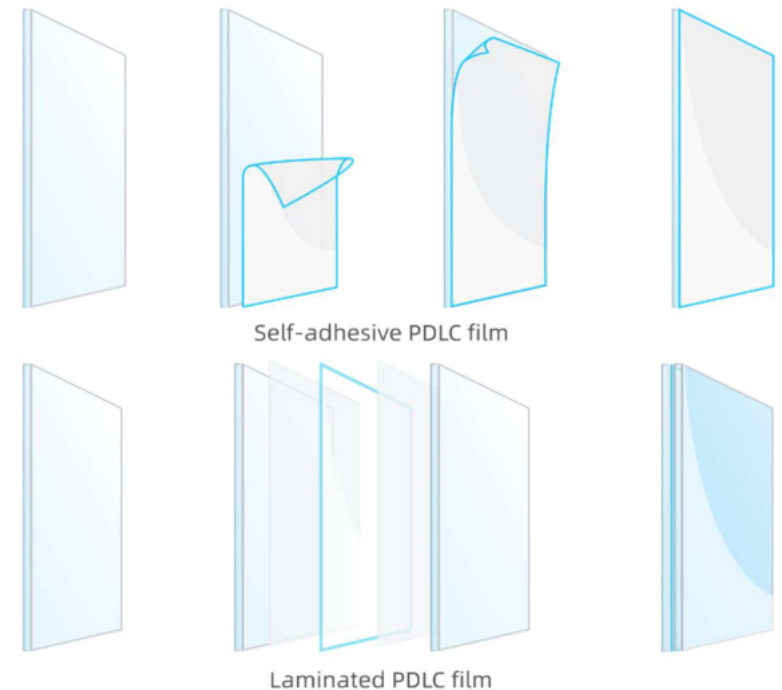
PDLC Smart Film is available in two main types, making it suitable for both new installations and retrofit projects:

Self-adhesive PDLC Smart Film

Designed for post-installation and retrofit applications. This version can be applied directly to existing glass surfaces, making it ideal for upgrades where replacing the glass is not desired.

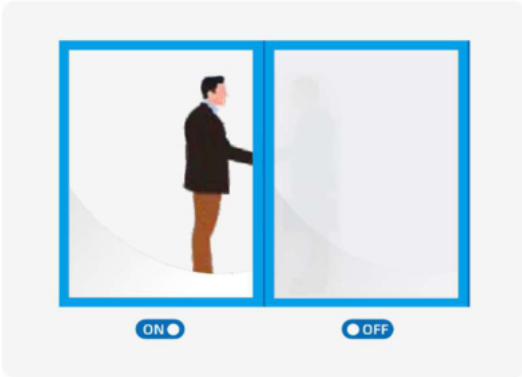
Non-adhesive PDLC Smart Film (Lamination Type)

Intended for integration into laminated glass during the manufacturing process. This option is typically used in new projects and front-end design stages, where PDLC Smart Film is specified as part of the glass assembly.



Characteristics

PDLC Smart Film



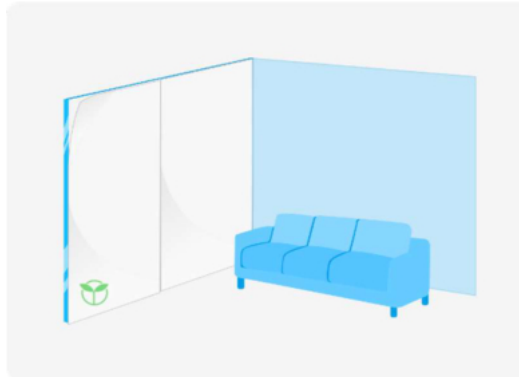
Privacy Control

Instantly switch between transparent and opaque states to ensure privacy and security whenever required, allowing spaces to adapt between open and private use.



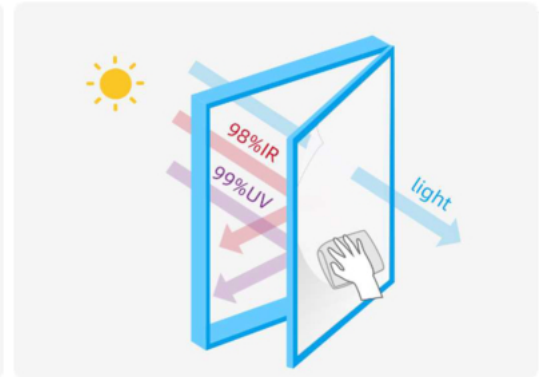
Safety Enhancement

In the event of glass breakage, the PDLC film helps retain fragments, reducing the risk of injury and improving overall safety.



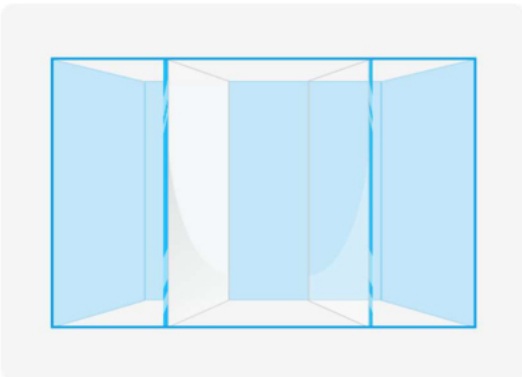
Sustainable Retrofit

PDLC Smart Film enables upgrades to existing glass without replacement, reducing material waste and supporting more sustainable renovation practices.



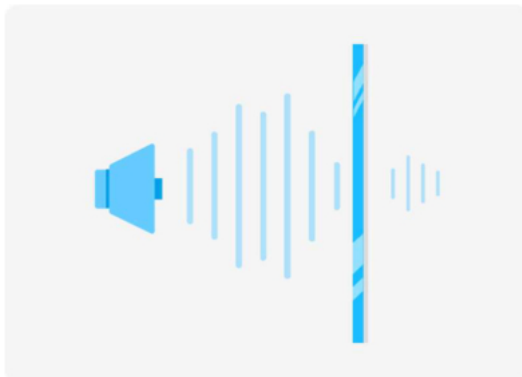
Heat-Resistant & Durable

Designed for elevated operating temperatures, with a protective surface layer that resists everyday scratches without compromising optical clarity.



Flexible Space Division

Enables glass partitions to transition between open and private zones, increasing spatial flexibility without altering the physical layout.



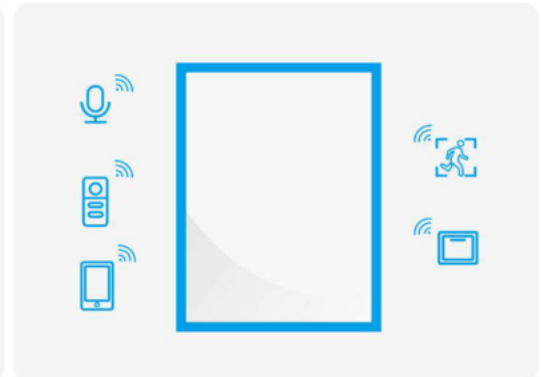
Sound Attenuation

When applied to glass, PDLC Smart Film can contribute to improved sound insulation compared to standard glass partitions.



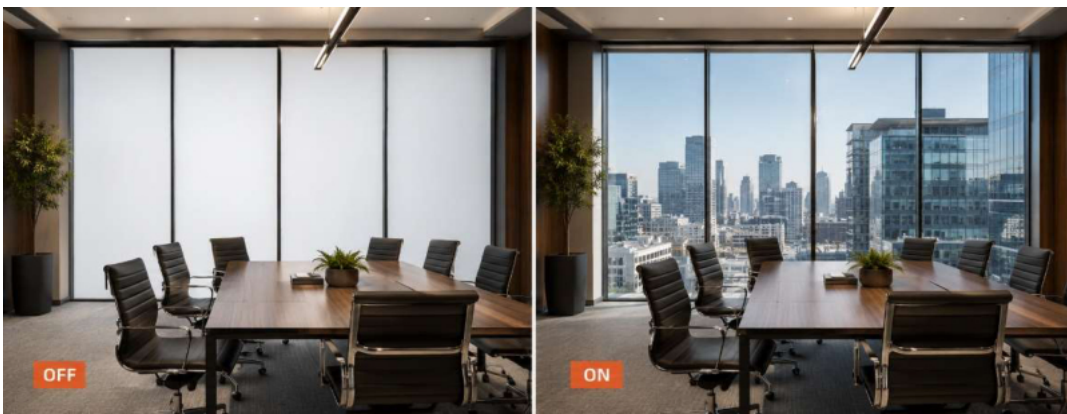
Projection & Interactive Use

Suitable for rear projection and interactive display applications, delivering wide viewing angles and high-definition visual performance.



Multiple Control Options

Compatible with various control methods, including wall switches, remote control, sensors, automation systems, and mobile applications.



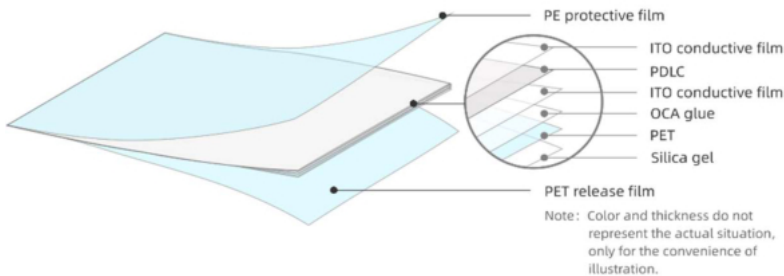
PDLC 84-85%

The 84-85% light transmittance PDLC Smart Film is the most cost-effective option in the range, offering a clear appearance combined with a subtle 4-5% haze level. This specification is particularly well suited for projects that do not require ultra-high transparency or extremely low haze, while still delivering excellent visual clarity and reliable privacy performance.

It is commonly used in:

- Modern office workspace partitions, conference rooms, and meeting halls
- Museums and exhibition centers
- Hotels, bars, and retail environments
- Hospitals, clinics, and medical facilities

This film provides an effective balance between transparency, privacy, space division, and projection capability, making it a versatile solution for a wide range of architectural and interior design applications.



Size

Items			
Adhesive PDLC Film	Total Thickness		0.47mm
	Cut to Sheet	Width	100-1800(mm)
		Length	100-50000(mm)
	Roll	Width	1000,1200,1500,1800(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	≤ 5W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	ON	≥ 160°	Visual inspection
UV block rate	OFF	≥ 99%	Optical transmittance tester
IR block rate	OFF	≥ 60%	
Response time	OFF→ON	≤ 30ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 200ms	
Operating temperature	--	-30℃ ~ 50℃	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

Product Transparency / Haze

Items	Full light tester			Parallel light tester		
	ON/OFF	Haze	Full light	b value	45° light	Parallel light
Adhesive PDLC Film	OFF	94.5	78.0	6.62	/	/
	ON	4.53	84.0	4.56	58.0	82.0



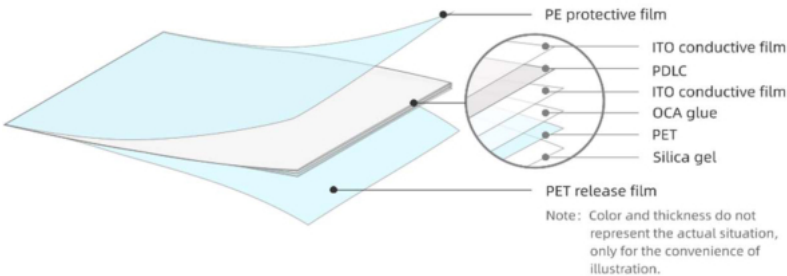
PDLC 87-88%

The 87-88% light transmittance PDLC Smart Film is one of the most popular choices for projects where enhanced visual clarity is required. With a reduced 3-4% haze, it delivers a noticeably cleaner and more refined transparent appearance while maintaining effective privacy when switched off. This option is often specified in applications where higher transparency and improved aesthetics are priorities, without moving into ultra-high-clarity or specialist-grade requirements.

Typical applications include:

- High-quality office and meeting room partitions
- Conference halls, presentation spaces and exhibition environments
- Hotels, hospitality venues, premium retail spaces, and healthcare facilities

This film is well suited for projects that require a harmonious combination of clarity, privacy control, spatial flexibility, and projection functionality, making it a versatile choice for modern architectural and interior design concepts.



Size

Items			
Adhesive PDLC Film	Total Thickness		0.47mm
	Cut to Sheet	Width	100-1800(mm)
		Length	100-50000(mm)
	Roll	Width	1000,1200,1500,1800(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	≤ 5W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	ON	≥ 160°	Visual inspection
UV block rate	OFF	≥ 99%	Optical transmittance tester
IR block rate	OFF	≥ 60%	
Response time	OFF→ON	≤ 30ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 200ms	
Operating temperature	--	-30℃ ~ 50℃	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

Product Transparency / Haze

Items	Full light tester			Parallel light tester		
	ON/OFF	Haze	Full light	b value	45° light	Parallel light
Adhesive PDLC Film	OFF	94.5	78.0	6.95	/	/
	ON	4.53	88.0	4.71	58.0	86.0

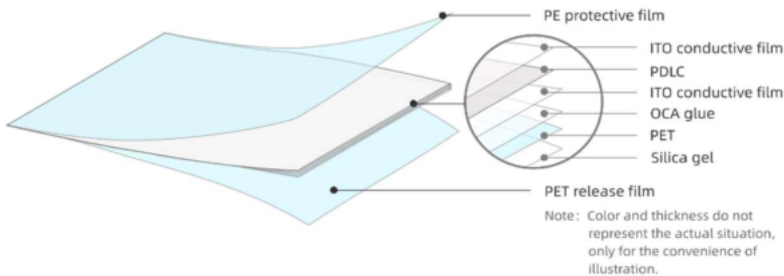


PDLC 91-92%

The 91-92% light transmittance PDLC Smart Film represents the premium segment of PDLC technology currently available. With a haze level of below 3%, it preserves the natural clarity of the original glass to the greatest extent while delivering precise and reliable privacy control when required. This specification is designed for projects where maximum transparency, visual purity, and uncompromising performance are essential. Typical applications include:

- Research and development facilities
- Executive offices, boardrooms, and high-security or confidential environments
- Luxury residential properties and private villas
- Five-star hotels and premium hospitality venues

This film is ideal for environments that demand ultra-high transparency combined with strict privacy requirements, without visual compromise.



Size

Items			
Adhesive PDLC Film	Total Thickness		0.47mm
	Cut to Sheet	Width	100-1800(mm)
		Length	100-50000(mm)
	Roll	Width	1200,1500,1800(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	≤ 5W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	ON	≥ 160°	Visual inspection
UV block rate	OFF	≥ 99%	Optical transmittance tester
IR block rate	OFF	≥ 60%	
Response time	OFF→ON	≤ 30ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 200ms	
Operating temperature	--	-30℃ ~ 50℃	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

Product Transparency / Haze

Items	Full light tester			Parallel light tester		
	ON/OFF	Haze	Full light	b value	45° light	Parallel light
Adhesive PDLC Film	OFF	94.5	85.0	7.57	/	/
	ON	4.53	91.0	5.29	60.0	88.0

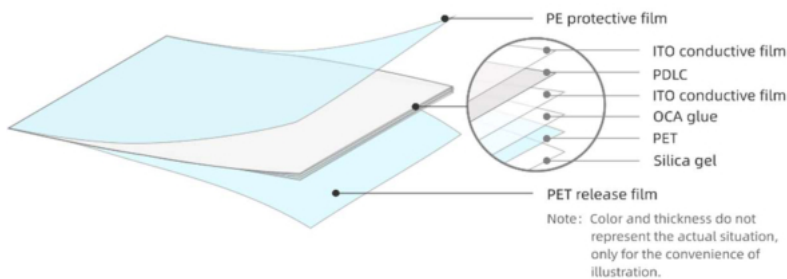


PDLC HIGH-TEMPERATURE

The High-Temperature PDLC Smart Film is specifically engineered for applications exposed to elevated ambient temperatures and increased solar load. It is designed to maintain stable performance and optical consistency in environments where standard PDLC films may be subject to thermal stress. This series is particularly suitable for large-scale architectural applications and semi-outdoor installations, including:

- Curtain wall glazing systems
- External glass partitions, glass balconies and balustrades
- Outdoor or semi-outdoor swimming pool enclosures
- Other applications exposed to direct sunlight or higher operating temperatures

This film provides an effective balance between transparency, privacy, space division, and projection capability, making it a versatile solution for a wide range of architectural and interior design applications.



Size

Items			
Adhesive PDLC Film	Total Thickness		0.47mm
	Cut to Sheet	Width	100-1500(mm)
		Length	100-50000(mm)
	Roll	Width	1200,1500(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	≤ 5W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	ON	≥ 160°	Visual inspection
UV block rate	OFF	≥ 99%	Optical transmittance tester
IR block rate	OFF	≥ 60%	
Response time	OFF→ON	≤ 30ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 200ms	
Operating temperature	--	-30℃ ~ 90℃	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

Product Transparency / Haze

Items	Full light tester			Parallel light tester		
	ON/OFF	Haze	Full light	b value	45° light	Parallel light
Adhesive PDLC Film	OFF	94.5	78.0	5.93	/	/
	ON	4.53	83.5	3.77	58.0	81.0



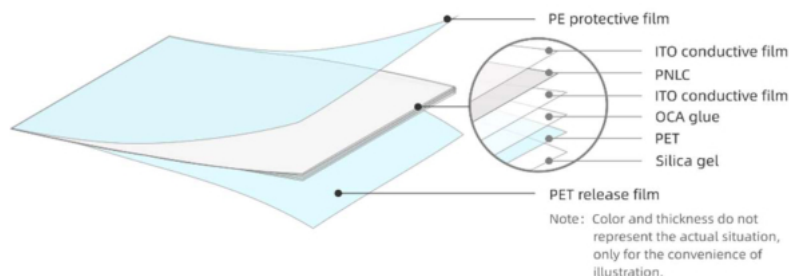
PDLC REVERSE (PNLC)

Reverse PDLC Smart Film (PNLC) is a special variant of PDLC technology in which the optical behaviour is inverted compared to standard PDLC film. In its default state (OFF), the film remains transparent. When an electrical current is applied (ON), the liquid crystal molecules change orientation, causing the film to become opaque. This makes reverse PDLC particularly suitable for applications where transparency is required as the default condition, with privacy activated only when needed.

Typical applications include:

- Office and workspace partitions, meeting rooms and consultation areas
- Selected specialty and design-driven applications

Reverse PDLC Smart Film provides an alternative approach to privacy control and spatial flexibility, allowing designers and end users to choose the default visual state that best suits the functional and aesthetic requirements of the space.



Size

Items			
Adhesive PDLC Film	Total Thickness		0.37mm
	Cut to Sheet	Width	100-1400(mm)
		Length	100-50000(mm)
	Roll	Width	1200,1400(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	avg 4-6W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	OFF	≥ 160°+1	Visual inspection
UV block rate	ON	≥ 85%	Optical transmittance tester
IR block rate	ON	≥ 60%	
Response time	OFF→ON	≤ 200ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 220ms	
Operating temperature	--	-30°C ~ 50°C	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

Product Transparency / Haze

Items	Full light tester			Parallel light tester		
	ON/OFF	Haze	Full light	b value	45° light	Parallel light
Adhesive PDLC Film	OFF	7	90.0	3.85	80.0	85.0
	ON	92	88.0	4.42	/	19.0



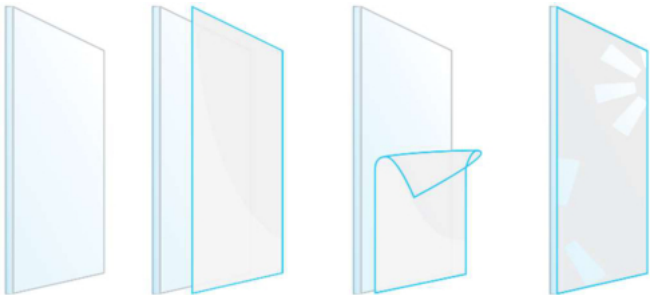
PDLC SMART FILM (ETCHED)

PDLC Etched Smart Film is a premium, customisable variant of PDLC technology that allows bespoke designs to be integrated directly into the smart film itself. This includes elements such as company logos, branding, text, graphic patterns, artwork, or decorative imagery. The etched content becomes an integral part of the film and remains fully switchable, transitioning together with the surrounding PDLC surface between transparent and opaque states. This enables unique visual effects while preserving full privacy control.

Typical applications include:

- Branded office partitions, meeting rooms, and reception areas
- Showrooms and flagship retail spaces, Hospitality and lifestyle environments
- Decorative privacy solutions in commercial interiors

PDLC Etched Smart Film combines privacy, functionality, and visual identity, allowing smart glass to become both a technical feature and a design statement.



Size

Items			
Adhesive PDLC Film	Total Thickness		0.47mm
	Cut to Sheet	Width	100-1800(mm)
		Length	100-50000(mm)
	Roll	Width	1000,1200,1500,1800(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	≤ 5W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	ON	≥ 160°	Visual inspection
UV block rate	OFF	≥ 99%	Optical transmittance tester
IR block rate	OFF	≥ 60%	
Response time	OFF→ON	≤ 30ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 200ms	
Operating temperature	--	-30℃ ~ 50℃	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

Product Transparency / Haze

Items	Full light tester			Parallel light tester		
	ON/OFF	Haze	Full light	b value	45° light	Parallel light
Adhesive PDLC Film	OFF	94.5	78.0	6.62	/	/
	ON	4.53	84.0	4.56	58.0	82.0



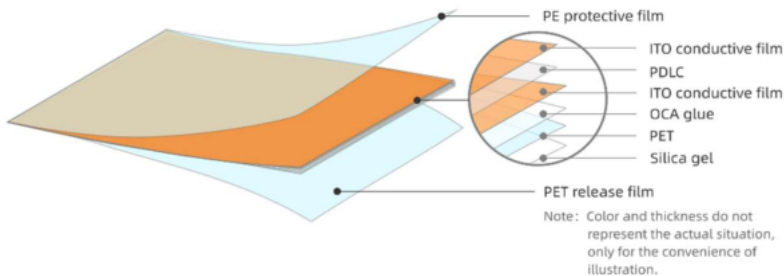
PDLC SMART FILM (COLORED)

Coloured PDLC Smart Film is designed for applications where visual expression and design diversity are key considerations. The film is available in a range of colour options, including grey, black, red, green, blue, orange, and other customised shades upon request. By combining switchable privacy with colour, this variant allows designers to move beyond purely neutral glass and introduce creative accents while maintaining the functional benefits of PDLC technology.

Coloured PDLC Smart Film is particularly popular in:

- Museums, art, and cultural centres
- Educational environments, including kindergartens and learning spaces
- Theme restaurants and entertainment venues
- Interior spaces requiring a playful, expressive, or distinctive design language

This option enables privacy control, colour, and creative design, making it ideal for projects where smart glass should be both functional and visually engaging.



Size			
Items			
Gray adhesive PDLC Film	Total Thickness		0.47mm
	Cut to Sheet	Width	100-1800(mm)
		Length	100-50000(mm)
	Roll	Width	1200,1500,1800(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm
Other colors adhesive PDLC Film (black, blue, green, orange, red)	Total Thickness		0.54mm
	Cut to Sheet	Width	100-1500(mm)
		Length	100-50000(mm)
	Roll	Width	1500(mm)
		Length	30 meters / 50 meters
	Roll Tube	Inner Diameter	15.24cm

Optical Parameters

Items	ON/OFF		Test Methods/Standards
Operating voltage	ON	60V	Multimeter/Voltage Regulator, WGW
Power consumption	ON	≤ 5W/m ²	Multi-parameter electrical measuring instrument
Viewing angle	ON	≥ 160°	Visual inspection
UV block rate	OFF	≥ 99%	Optical transmittance tester
IR block rate	OFF	≥ 60%	
Response time	OFF→ON	≤ 30ms	Liquid crystal parameter integrated tester
	ON→OFF	≤ 200ms	
Operating temperature	--	-30°c ~ 50°c	Constant temp. & humidity testing machine
Life-span	--	100000 Hours	GB18910.5-2008
Switching times	--	≥ 2 Million times	Self-made on/off tester

INNOVATION YOU CAN SEE PERFORMANCE YOU CAN TRUST



Integrating PDLC Smart Film

PDLC Smart Film offers a modern and versatile solution for controlling transparency, privacy, and visual impact in contemporary architectural and interior spaces. From functional office partitions to high-end design applications, PDLC technology enables flexible environments without compromising aesthetics.

At **Bullconcept Smart Solutions Ltd.**, we focus on delivering PDLC Smart Film solutions that are practical, reliable, and thoughtfully integrated into each project. Through technical consultation, careful planning, and professional installation, we support architects, designers, and project partners in turning smart glass concepts into long-lasting, high-quality results.

We believe that successful projects are built on collaboration. Whether you are exploring PDLC Smart Film for an upcoming design, a retrofit project, or a bespoke application, we would be pleased to discuss how this technology can add value to your work.

Contact & Further Information

If you would like to learn more about PDLC Smart Film or discuss a potential project, please feel free to get in touch.

Bullconcept Smart Solutions Ltd.

Advanced Smart Glass & Building Technologies

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We welcome the opportunity for a personal meeting or consultation and look forward to potential collaboration.