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CNCGLASS TECHNICAL NOTE

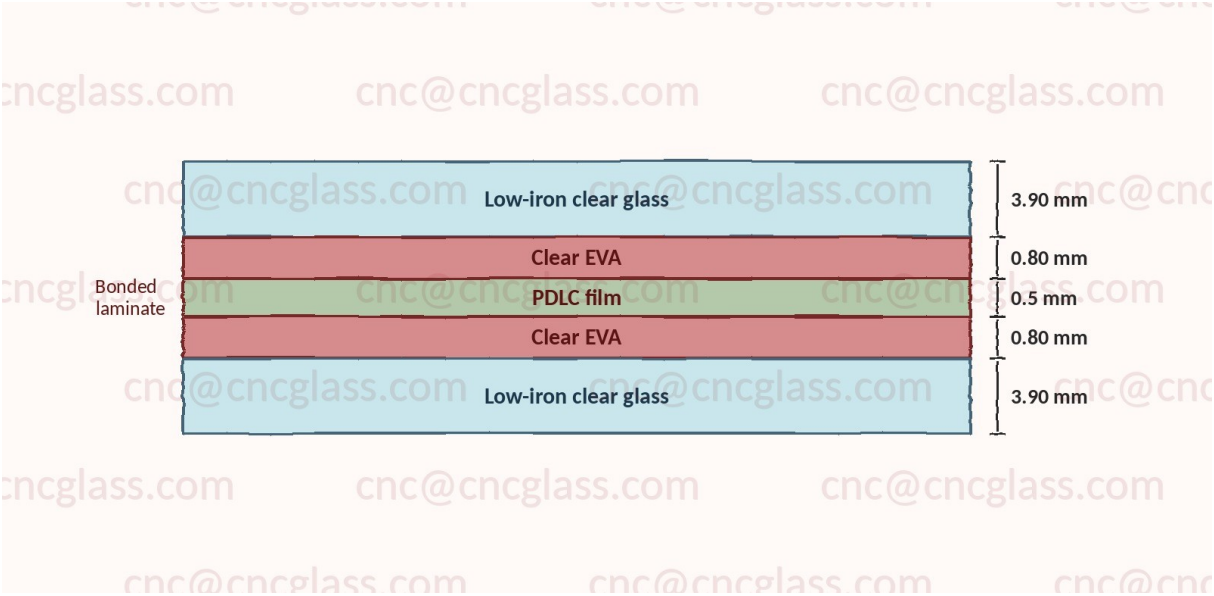
CNCGLASS PDLC EVA Switchable Laminated Glass — Durability and EN 410

A switchable PDLC laminate bonded with clear EVA — 3.90 mm low-iron clear glass / 0.80 mm clear EVA / 0.5 mm PDLC / 0.80 mm clear EVA / 3.90 mm low-iron clear glass — was evaluated for high-temperature and humidity resistance to EN ISO 12543-4:2011 and for luminous and solar characteristics to EN 410:2011 in the OFF and ON states. No bubbles, delamination or cloudiness were observed after either durability exposure. Switching raised luminous transmittance from 54.4 % to 81.5 % and the solar factor from 59.7 % to 75.2 %.

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Construction

The construction is a laminated safety glass in the EVA family, typed against EN ISO 12543-2:2011. A 0.5 mm polymer-dispersed liquid-crystal (PDLC) film is sandwiched between two 0.80 mm plies of clear EVA and two 3.90 mm plies of low-iron clear glass. The nominal thickness is 9.90 mm (also recorded as 9.9 mm on the optical evaluation). Durability specimens measured 300 mm × 200 mm, with a polished edge, no edge protection, and one edge supported by the test frame.



Switchable laminate construction: 3.90 mm low-iron glass / 0.80 mm clear EVA / 0.5 mm PDLC / 0.80 mm clear EVA / 3.90 mm low-iron glass.

High temperature and humidity

High-temperature exposure followed EN ISO 12543-4:2011 point 5, Procedure A, for 16 h. Humidity exposure followed point 6.3.1. Pre-test visual inspection found no faults. After each exposure, thickness was recorded and the specimens were inspected for bubbles, delamination and cloudiness. None were found, and both items conformed.

Exposure	Thickness (mm)	Bubbles / delamination / cloudiness	Conformity
High temperature — specimen 1	9.26	None / None / None	Yes
High temperature — specimen 2	9.24	None / None / None	Yes
High temperature — specimen 3	9.28	None / None / None	Yes
Humidity — specimen 1	9.27	None / None / None	Yes
Humidity — specimen 2	9.31	None / None / None	Yes
Humidity — specimen 3	9.29	None / None / None	Yes

Luminous and solar characteristics (EN 410:2011)

Luminous and solar characteristics were measured to EN 410:2011 in the OFF and ON modes, as the mean of three determinations. The spectral range was 300–2500 nm, at near-normal incidence, using an integrating-sphere spectrophotometer.

Property	OFF (%)	ON (%)
UV transmittance	0.05	0.05
Light transmittance	54.4	81.5
Light reflectance	14.8	13.3
Solar direct transmittance	50.7	70.7
Solar reflectance	11.1	10.2
Solar factor	59.7	75.2

Commentary for laminated-glass use

A PDLC interlayer is a privacy and daylighting device as much as it is a safety-glass interlayer. In the OFF state the liquid-crystal droplets scatter light and the pane reads as a translucent screen (54.4 % luminous transmittance, 14.8 % luminous reflectance). In the ON state the droplets align, the scatter collapses, and the pane opens to 81.5 % luminous transmittance with a slightly lower reflectance of 13.3 %. Ultraviolet transmittance remains 0.05 % in both states, which is the behaviour expected of a clear EVA package around the PDLC film. The solar factor moves from 59.7 % (OFF) to 75.2 % (ON), so solar gain should be considered together with the switching schedule when the pane is used on a sun-exposed façade.

From a fabrication standpoint the durability result is the more important reassurance. A five-layer stack with a 0.5 mm PDLC film and two 0.80 mm EVA plies is thicker and more interfaces than a simple two-ply EVA laminate; Procedure A and condensed humidity are therefore a meaningful screen for edge bubbles, delamination at the PDLC interface, or cloudiness in the EVA. All six specimen results remained clear of those defects on unprotected, polished 300 mm × 200 mm pieces. The construction can be specified as CNCGLASS PDLC EVA switchable laminated glass in this low-iron makeup. Bus-bar design, edge sealing and the electrical supply are project details and lie outside the scope of this note.

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