PRIVASEE®
Smart Glass Division

INSTALLATION MANUAL

Smart Film Installation Manual

Adhesive (Retrofit) · FM-T91-16-A · FM-T91-12-A · FM-T85SL-12-A · Colour grades

On-site installation procedure for PRIVASEE PDLC self-adhesive smart film applied to existing glass. For qualified glazing installers and PRIVASEE Authorised Partners.

PVS-SGS-INS-TEC-06

Revision 1.0 · Issued 2026-05-06

CONFIDENTIAL

Authorised Recipients Only

Document control

DOCUMENT CODE	PVS-SGS-INS-TEC-06
REVISION	Rev 1.0
ISSUE DATE	2026-05-06
CLASSIFICATION	CONFIDENTIAL — Authorised Recipients Only
OWNER	PRIVASEE® Group · Smart Glass Division
AUDIENCE	Glazing contractors · field-application installers · PRIVASEE Authorised Partners
COVERAGE	All adhesive (FM-*-A) Smart Film grades · retrofit application onto existing in-situ glass
COMPANION DOCS	TEC-01a (Adhesive datasheet) · TEC-11a (Maintenance) · QUA-01a (Warranty) · OPS-03 RAMS · Power Drive Catalogue
APPROVED SILICONE	TOSSEAL 381 (LP-003) — no other silicone is approved
APPROVED CLEANER	Isopropyl Alcohol 70% (IPA 70%) — no ammonia, abrasive, acidic, alkaline, or solvent cleaner permitted

SCOPE

This manual covers retrofit application of PRIVASEE PDLC self-adhesive Smart Film onto existing architectural glass. For laminated smart-glass install (SG-01 / LG-01 / LG-AC), see TEC-07. For factory lamination of non-adhesive film (FM-*-N), see Partner Pack OPS-02.

Installation workflow — 10 stages

Every PRIVASEE Smart Film retrofit runs through these ten stages, top to bottom. Stages 6–7 are the highest-skill steps and account for most workmanship-driven defects when rushed.

01	**Site survey**	*Verify glass spec, frame, electrical route, panel sizes*
02	**Tool inventory**	*PRIVASEE-approved consumables, tools, PPE, drive on hand*
03	**Surface preparation**	*Clean and dry glass · cool to touch · no residue*
04	**Film application**	*Wet-method application with squeegee · centre-out*
05	**Trimming**	*Sharp blade · 1–2 mm gap to frame · keep busbar accessible*
06	**Busbar preparation**	*Score liner · silver paint · copper mesh · solder leads*
07	**Edge sealing**	*TOSSEAL 381 only · encapsulate busbar termination*
08	**Wiring + commissioning**	*Drive sized at 5 W/m² · qualified electrician · cycle test*
09	**Immediate care**	*First 72 hours of restricted operation*
10	**Handover**	*Customer brief · maintenance guide · warranty certificate*

Stage 1 — Site survey

STAGE 01

Site survey

Pre-install verification before any film is cut. Skip this and the project doubles in correction time.

1. Verify existing glass: thickness, type (annealed / toughened / laminated), low-iron preferred for clarity. Reject panels with chips, cracks, or surface scratches deeper than 50 µm.
2. Inspect frame: glazing rebate clean, sealant intact, no rust on metal frames, no rot on timber. Check that frame depth allows for film thickness without binding the rebate.
3. Measure each panel: width × height in three places (top, middle, bottom for width; left, middle, right for height). Use the smallest figure as the cutting size, plus 5–10 mm overhang.
4. Identify electrical route: distance from drive location to busbar termination, frame channels available for cable run, mains supply position, switch location, BMS interface if specified.
5. Confirm Power Drive sizing: total panel area in m^2 × 5 W = required drive class. Confirm drive is on site before cutting any film.
6. Document survey results in project file. Photograph any pre-existing glass defects and obtain client sign-off before install begins.

REJECT CRITERIA

No glass with edge chips, cracks, or visible surface contamination should be filmed. Reject pre-install — film cannot mask a defective substrate.

Stage 2 — Tool inventory

STAGE 02

Tool inventory

PRIVASEE-approved consumables and tooling. Substituting non-approved equivalents is the single largest cause of field rework.

1. Cleaning: Isopropyl Alcohol 70% (IPA 70%) only · lint-free microfibre cloths · industrial-grade dust paper (PRIVASEE ACC-DUST-PAPER).
2. Application: 3M-grade plastic squeegee with felt edge (PRIVASEE ACC-SQGE-3M) · fitter's solution (water + small surfactant amount) · spray bottles (two — one for glass, one for film).
3. Cutting: sharp utility blade with fresh blades · steel rule · cutting mat · busbar exposure knife (PRIVASEE ACC-BUS-KNF).
4. Busbar prep: silver conductive paint (ACC-SLV-PASTE) · copper mesh tape (ACC-COP-MESH) · 22 AWG silicone-jacketed lead wires red/black (ACC-WIRE-22).
5. QA tooling: ITO resistance test meter (ACC-RES-MTR) for panel continuity verification before sealing.
6. Sealing: TOSSEAL 381 silicone (LP-003) — the only approved silicone · cartridge gun · damp wooden spatula for tooling (no metal).
7. PPE: lint-free cotton or nitrile gloves · safety glasses · cut-resistant gloves for blade work · suitable footwear and harness for working at height.
8. Power Drive: PRIVASEE family per project (PJ-C / PJ-D / DZ6L / DZD-NO / LD-A / CZ) sized to panel area at 5 W/m².

WARRANTY CONDITION

Substituting silicones, cleaners, or busbar consumables voids the PRIVASEE warranty. Stick to the PRIVASEE-approved kit.

Stage 3 — Surface preparation

STAGE 03

Surface preparation

Glass must be clean, dry, and cool. Contamination at this stage produces visible defects in the cured panel.

1. Tape off frame edges with painter's tape to protect the frame finish from fitter's solution overspray.
2. Spray IPA 70% onto a lint-free microfibre cloth — never directly on the glass. Wipe in a single direction, top to bottom.
3. Allow IPA to flash-evaporate (~90 s at 20–25 °C). Do not work the surface while wet.
4. Inspect glass under raking light for fingerprints, lint, dust, or residue. Re-clean any contamination spotted.
5. Confirm glass is cool to touch. Hot glass (sun-exposed) accelerates solution evaporation and produces dry-lay defects — defer install or shade glass for 30 min.
6. Once glass passes inspection, proceed to film application without delay. Clean glass left for >30 minutes re-contaminates.

ENVIRONMENTAL NOTE

Direct sunlight on glass during application is the single most common cause of bubbles and dry edges. Work in shade or schedule for cloudy / cooler conditions.

Stage 4 — Film application

STAGE 04

Film application — wet method

The application stage. Slow, methodical, no shortcuts.

1. Cut film to size with 5–10 mm overhang each side. Identify the busbar edge (PDLC films are typically marked) — this edge orients toward your termination route.
2. Lay film on a clean flat surface. Peel the release liner 50–80 mm to expose the adhesive face.
3. Spray adhesive face liberally with fitter's solution. Spray glass face also.
4. Position film at top of glass (gravity assists vertical application). Continue peeling backing while pressing film progressively to glass.
5. Squeegee from centre outward, top to bottom — three passes: light (position) → medium (seat) → firm (expel solution).
6. Work air pockets and excess solution toward the edges, never trap them in the field. Use heat gun on low-medium for edge persistence if needed (PRIVASEE ACC-HEAT-GUN).
7. Inspect under raking light. If air pockets visible, lift the corner and re-apply with more solution.

TECHNIQUE

Squeegee always centre-out, never edge-in. Edge-in creates trapped pockets that cannot be expelled later.

Stage 5 — Trimming · Stage 6 — Busbar preparation

STAGE 05+06

Trimming and busbar preparation

After application, allow 5–10 minutes for solution to expel under squeegee work. Trim, then prepare the electrical busbar.

1. Stage 5 — Trim film with sharp utility blade against a steel rule. Maintain 1–2 mm gap from glass edge to allow for sealant penetration.
2. Stage 5 — Identify busbar (positive and negative) sides. Do not over-trim near busbar — keep the conductive zone fully accessible.
3. Stage 6 — Use the busbar exposure knife (ACC-BUS-KNF) to gently score and lift the protective layer over the busbar, exposing 8–10 mm of contact zone. Avoid damaging the underlying ITO.
4. Stage 6 — Clean exposed busbar with dry lint-free cloth. Apply silver conductive paint (ACC-SLV-PASTE) along the busbar in a thin, continuous bead.
5. Stage 6 — While silver paint is still tacky, press copper mesh tape (ACC-COP-MESH) onto it. Allow silver paint to cure (typically 30 min at 20 °C).
6. Stage 6 — Solder or crimp 22 AWG lead wires (ACC-WIRE-22) — red to + busbar, black to − busbar — onto the copper mesh.
7. Stage 6 — Test panel continuity with resistance meter (ACC-RES-MTR) before sealing. If resistance fails, re-prepare busbar zone before proceeding.

QA GATE

Test resistance BEFORE sealing the edge with TOSSEAL 381. Once sealed, busbar rework requires destructive de-sealing.

Stage 7 — Edge sealing

STAGE 07

Edge sealing

Sealing protects the busbar termination from water ingress — the single largest failure mode in field installations.

1. Apply TOSSEAL 381 (LP-003) along the entire glass-to-frame edge in a continuous bead. Bead size per panel and frame system — typical 5×5 mm minimum.
2. Tool the sealant smooth with a damp wooden spatula. Never use metal — it scratches the glass.
3. Pay particular attention to the busbar termination zone — the sealant must fully encapsulate the cable strain-relief and the copper mesh edge.
4. Allow the sealant to skin-cure for 30–60 minutes before any further panel work.
5. Full cure time: 24 hours under typical site conditions. Do not switch the panel during this period.
6. Remove painter's tape from frame face while sealant is still wet — this gives a clean line.

WARRANTY CONDITION

TOSSEAL 381 is the only approved silicone. Other silicones — including manufacturer-supplied alternatives that look identical — void the PRIVASEE warranty.

Stage 8 — Wiring and commissioning

STAGE 08

Wiring and commissioning

Drive installation is electrical work — qualified electrician only.

1. Run the panel lead wires to the Power Drive location through frame channels supplied. Maintain 50 mm minimum bend radius. Strain-relieve at every frame exit.
2. Drive must be installed by a qualified electrician per local regulations: BS 7671 in the UK, GCC equivalent in MENA, host-country code elsewhere.
3. Confirm drive sized at 5 W per m² of panel area. Round up to next available class. For multi-panel installs, sum all areas.
4. Connect lead wires per drive wiring diagram — red to +, black to −. Torque drive terminals to manufacturer spec (typically 0.5–0.8 Nm).
5. Earth/ground per drive specification. Verify mains voltage at the drive terminals is within ±5% of nominal.
6. Power up sequence: mains first, drive second, then panel. Verify panel switches: opaque (drive off) → clear (drive on) within < 0.5 s.
7. Cycle 5 times consecutive. Confirm uniform clearing — no edge haze, no dark patches. Verify default state on power loss is opaque.
8. Test all customer-facing controls (wall switch, BMS interface, app — per project). Document results in project handover file.

BRAND DISCIPLINE

Power Drive operating voltage is INTERNAL specification. Field installers wire per the supplied drive diagram only — do not measure or document drive output for inclusion in client documentation.

Stage 9 — Immediate care · Stage 10 — Handover

STAGE 09+10

Immediate care and handover

First 72 hours and the customer brief.

1. Stage 9 — Do not clean the panel for 24 hours after sealing.
2. Stage 9 — Do not switch the panel for 4 hours after sealant skin-cure.
3. Stage 9 — Avoid water contact at edges for 72 hours (full sealant cure window).
4. Stage 9 — Avoid temperature shock — no direct sun blast on freshly installed panel for first day if avoidable.
5. Stage 10 — Provide customer with TEC-11a Maintenance Guide, QUA-01a Warranty Policy, and Power Drive operating instructions.
6. Stage 10 — Brief customer on operation: cleaning method (IPA 70% on lint-free cloth, no spray-on-panel), switching frequency (unlimited), what voids warranty (other silicones, abrasive cleaning, water at busbar).
7. Stage 10 — Obtain customer signed handover certificate. Lodge in project file. Email PRIVASEE technical sales the handover record.

POST-INSTALL SUPPORT

If anything looks wrong post-handover — slow switching, edge haze, dark spots, intermittent operation — contact PRIVASEE technical sales. Field repair beyond the procedures in this manual voids warranty.

Common defects and corrective actions

Field-encountered issues during install or commissioning. Apply corrective action below; if defect persists, contact PRIVASEE technical sales — do not attempt field repair beyond the procedures listed.

DEFECT	PROBABLE CAUSE	CORRECTIVE ACTION
Air bubbles after install	Insufficient solution, premature trim, ambient too hot	Small (<5 mm): self-resolve in 24–48 h. Large: lift corner, re-apply with more solution, re-squeegee.
Dark spots in clear state	Contamination at install (lint, dust, fingerprint)	Field repair not possible. Remove film and re-apply with new film panel. Document for warranty review.
Edge haze after install	Insufficient solution at edge during squeegee	Caught early: lift edge, re-apply with solution, re-squeegee. Cured in: replace panel.
Partial switching	Busbar prep issue, lead wire continuity, drive sizing	Test resistance at busbar, then at lead-wire pigtail, then at drive output. Re-prep busbar if discontinuity.
No switching	Drive fault, fuse, miswiring, mains fault	Qualified electrician check: mains presence, drive output, lead-wire continuity, busbar resistance.
Slow clearing in cold ambient	PDLC slows below 0 °C — not a defect	No action. Customer briefing: switching speed is ambient-dependent within design envelope.

Safety, qualifications and sign-off

Safety requirements

- IPA 70% is flammable — keep away from heat sources, ventilate work area, no smoking within 5 m of work zone.
- Working at height: scaffold, ladder, or MEWP per local regulations and project risk assessment (OPS-03 RAMS).
- Cuts from utility blade and busbar knife — use cut-resistant gloves where appropriate, dispose of blades into sharps container.
- Heavy lifting — large rolls require two-person handling. Manual handling assessment per project size.
- Sealant — read TOSSEAL 381 SDS before use. Eye protection mandatory during application.

Qualifications required

Glazing installer with experience in retrofit film application — minimum 12 months supervised experience or PRIVASEE Authorised Partner certification.

Drive electrical termination by a qualified electrician — local certification (NICEIC, ELECSA, GCC equivalent) mandatory.

Project supervisor signs the handover record only after all 10 stages have passed sign-off.

PROJECT SIGN-OFF

Installer signs the project handover record once all stages above are complete and panel passes commissioning. Customer countersign confirms receipt of TEC-11 maintenance guide and warranty certificate.

Revisions

Revision history

REV	DATE	AUTHOR	SUMMARY OF CHANGES
1.0	2026-05-06	PRIVASEE	Initial issue. 10-stage retrofit installation procedure for adhesive PDLC Smart Film. Built from PDLC industry-standard practice + PRIVASEE locked rules: TOSSEAL 381 only · IPA 70% only · 5 W/m² Power Drive sizing · qualified electrician for drive · PRIVASEE-approved consumables only · no supplier names · operating voltage INTERNAL · neutral SKU codes. No [VERIFY] markers — full procedural depth.