

CNCGLASS

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TECHNICAL NOTE

Bubble Solutions for Laminated Glass with EVA Interlayer Film

By Peter Lin

When bubbles appear in EVA-film laminated glass, film quality is often blamed first. In practice, most bubble defects trace to process temperature, oven uniformity, vacuum performance, moisture management, or a change of film formula—not to a defective roll alone. This note summarizes common misconceptions, five general causes, micro-level process checks, and a heating-pipe case study for laminated-glass fabricators.

CNCGLASS · What People Often Assume When They See Bubbles

When customers process laminated glass with EVA interlayer film and bubbles appear, they often reason in one of the following ways:

1. “Last order was fine—so this film must be bad.”

The EVA interlayer film ordered last time had no bubble problem, so this time the bubbles must be caused by film quality.

A sudden appearance of bubbles after a previously good run more often points to a change in oven temperature, vacuum performance, bag seals, or storage moisture than to a sudden drop in film quality on an otherwise identical grade.

2. “Same roll, later use—how can quality differ?”

Some customers do not use EVA film frequently and do not finish one roll quickly. After using about two-thirds of a roll, they return weeks later to the remaining film—and bubbles appear. They are confused: how can the same roll have different quality?

An opened roll left unrepacked can absorb ambient moisture. Even though EVA is less moisture-sensitive than PVB, wet film can still generate vapor bubbles during heat-up. Re-seal unused film promptly and store it dry.

3. “New supplier—so it must be their film.”

Some customers have just changed to a new EVA interlayer film supplier when bubbles appear. Even when the new supplier explains that the issue is processing-related, they may still assume the film quality is at fault—because the previous supplier’s film did not show this problem.

Different suppliers use different EVA formulations. Time and temperature settings that worked for one grade often need retuning for another. Compare cure windows and run trial panels before judging film quality alone.

CNCGLASS · General Reasons for Bubbles

Many laminated-glass producers misattribute bubble problems. The following are the principal process-related causes:

1. Temperature too high

If the process temperature is too high—**maybe more than 160°C**—EVA and other compounds can break down and generate gas. In that case, reducing temperature usually resolves the bubbles.

Treat 160°C as the source caution threshold in this note. Always follow the film supplier’s published maximum cure temperature for the specific grade; do not invent a different plant limit without supplier data.

2. Uneven oven temperature

If oven temperature is not uniform, some areas of the glass run hotter than others. Parts of the EVA film may melt and finish crosslinking while other parts are still unmelted, interrupting vacuuming and trapping bubbles.

For this situation, modify or improve the lamination oven for better heat uniformity (element layout, airflow, and sensor placement). Spot overheating above heating pipes is a common pattern—see the case study below.

3. Vacuum pump oil needs renewing / weak or aging pump

The vacuum-pump oil may need renewing. The pump may be old, or vacuum capacity may be inadequate. Renew the oil; if the machine is worn, repair or replace it. If vacuum capacity is insufficient for the load, upgrade the pump.

Also check for water or contamination in the pump line. Weak vacuum shows up as edge or mid-pane voids even when temperature settings look correct.

4. High ambient moisture / opened unrepacked roll

High ambient moisture can wet EVA film exposed to air. Moisture in the film contributes to bubbles. Although EVA interlayer film is less sensitive to moisture than PVB film, if moisture in the EVA is too high, bubbles will still appear.

Some customers open a packaged roll and do not use it up at once. The remaining film absorbs moisture from the air and later causes bubbles.

Keep opened rolls resealed, minimize open-air exposure, and avoid laminating film that has been stored damp. Dry storage and prompt re-wrapping remain good practice even for EVA.

5. Different supplier formula—retune process

Different EVA interlayer film suppliers use different formulas. If you change supplier, adjust processing parameters—time and temperature—according to the new film's properties.

Run a small qualification set (same glass stack, bag loading, and vacuum schedule) whenever the film grade or lot chemistry changes. Copying the previous supplier's recipe without retuning is a frequent root cause of "new film = bubbles."

CNCGLASS · Micro Reasons for Bubbles

1. Poor tempered-glass flatness

Tempered glass typically has more roller-wave and less flatness than annealed float glass. Prefer tempered glass from a producer with better flatness control.

Because tempered glass is less flat than annealed glass, use thicker EVA interlayer film for tempered laminates. Generally, tempered glass should be laminated with **at least 0.76 mm** thickness EVA interlayer film.

Load fewer pre-laminated stacks in one silicone bag at a time. Overloading the bag impairs vacuum distribution and promotes bubbles.

When laminating small pieces together, place them on PTFE/Teflon mesh to aid airflow. The mesh should cover the vacuum port so the silicone bag cannot seal the hole shut.

2. Silicone bag leaking

Check whether the silicone bag is leaking. On average, a silicone bag can be used for **2** or more years—but inspect the bag whenever laminated glass shows bubbles.

Check that the edge sealing buckle closes fully and that no debris is trapped in the seal. Inspect hoses and fittings as well as the bag skin.

3. Removing the laminate from the oven too early

It is too early to pull the laminated glass from the oven while temperature is still very high and the EVA is still melting and reacting. As the laminate cools, the molten EVA contracts and may not fully fill the gap between the glasses, so bubbles appear at the edges.

Allow adequate cool-down under vacuum before unloading. Early unload while the interlayer is still flowing is a classic cause of edge bubbles.

4. Stopping vacuum too early

Stopping vacuum too early leaves crosslinking unfinished and unstable. The silicone bag can also draw air back in, causing bubbles. Generally, do not stop vacuuming until the laminated-glass temperature is **lower than 45°C** or close to room temperature.

Equipment makers commonly advise holding vacuum until the laminate cools to about 40–50°C (some guides say stop only below 50°C; others cite about 40°C). Keep the source figure of 45°C as the primary guidance in this note, and treat 40–50°C as the overlapping industry band. Also practice cold pre-vacuum before heat-up, and cool the bag/tray before the next load so edge melt does not seal air inside.

Note: Always place PTFE/Teflon mesh over the vacuum hole so vacuuming is not blocked by glass sitting on the port.

CNCGLASS · Case Study: Regular Bubble Lines Above Heating Pipes



Example: bubble defect in EVA laminated glass (illustrative process photo).

We observed a case in which bubbles appeared in laminated glass even after vacuuming checks confirmed that vacuum performance itself was sound. The bubbles were regular and arranged in lines.

We then noticed that the bubble lines sat directly above the heating pipes. After reducing temperature and retesting, bubbles no longer appeared—but some areas of the laminate were less transparent. That pointed to uneven heat: glass above the pipes ran hotter than adjacent zones.

Because the heating pipes sit under the silicone bag, the portion of laminated glass directly above the pipes reaches a higher temperature. Oven temperature is not uniform. When temperature is too high, the copolymer and compounds break down and produce gas, which forms bubbles inside the laminated glass.

Recommendation: work with the EVA glass lamination oven manufacturer to modify the oven for more even heat distribution. Lowering set-point alone can stop gas bubbles but may leave cooler zones under-cured and less transparent—uniformity is the durable fix.

CNCGLASS · Closing

If you need further process guidance on EVA laminated glass bubbles—temperature, vacuum schedule, bag maintenance, or oven uniformity—please contact us.

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