

CNCGLASS

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TECHNICAL NOTE / CASE STUDY

Too High Temperature Causing Bubbles in EVA Interlayer Film Safety Laminated Glass — Practical Case Study

By Peter Lin

When large bubbles appear in the body of EVA laminated tempered glass after a full heat–vacuum cycle, oven setpoint temperature is one of the first variables to audit. This practical case study records how a safety-glazing laminator solved body and then edge micro-bubbles by stepping the high-temperature hold from 140 °C down to 130 °C and finally to 122 °C for their oven and non-CNC EVA film stack.

CNCGLASS · Summary

Bubbles in EVA interlayer film safety laminated glass were caused by **too high temperature** for the laminator's oven and film. The stack was **10 mm tempered + 0.76 EVA (2 × 0.38 EVA) + 10 mm tempered**, about 5 m². An initial high hold at **140 °C** produced big body bubbles; **130 °C** cleared the body but left edge micro-bubbles about **3–4 mm** from the edge; **122 °C** produced a perfect laminate.

CNCGLASS · Customer Situation

CNCGLASS helped a safety-glazing laminator solve a bubbles problem in EVA interlayer film laminated glass. The case is shared here so other laminators can compare process numbers against their own ovens.

Interlayer: China-made EVA film, **not** CNCGLASS / CNC Ucolin EVA interlayer products.

Glass stack: 10 mm tempered glass + 0.76 EVA film (combination of two layers of 0.38 EVA) + 10 mm tempered glass.

Pane size: pre-laminated glass about 5 square meters.

CNCGLASS · Initial Heating Cycle (as reported)

The laminator's first reported cycle was:

- Heat to 70 °C within 30 minutes
- Hold at 70 °C for 5 minutes
- Heat to 140 °C during 40 minutes
- Hold at 140 °C for 55 minutes

Result: big bubbles in the body of the laminated glass.

Public EVA vacuum-lamination guidance commonly places high-stage crosslinking near about 120–145 °C at the glass/film, while oven setpoint and glass-surface temperature can differ by a substantial margin depending on oven airflow, load mass, and bag type. Do not treat a single published setpoint as universal; qualify on your own gauge and glass.

CNCGLASS · Evidence Photos — Failed / Edge Bubbles

Photos shared by the laminator (archive images; each watermarked cnc@cncglass.com):



Figure 1. Failed EVA laminated tempered glass after the initial high-temperature cycle (body bubbles; overlay contact spam softened before watermark).

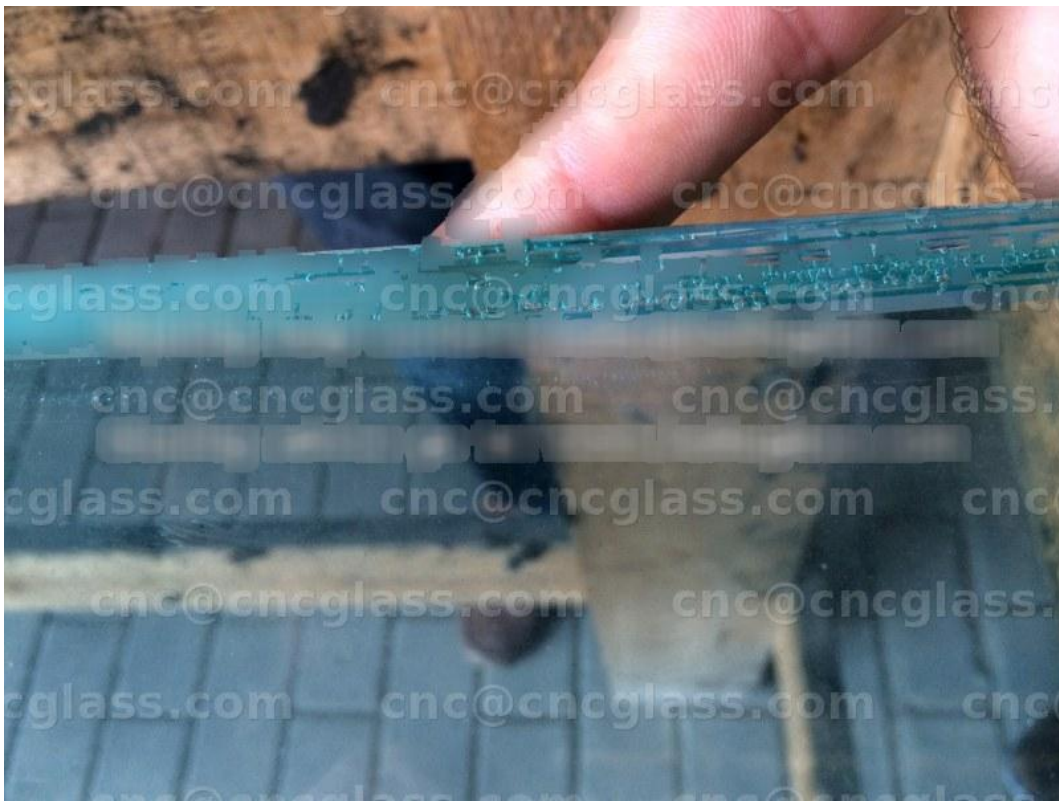


Figure 2. Edge view after the 130 °C trial — micro-bubbles concentrated near the edge (about 3–4 mm inward from the glass edge).

CNCGLASS · Diagnosis — First Suggestion (Peter Lin)

After reviewing the background, Peter concluded that **140 °C was too high** for this oven and film. Excessively high temperature can break down the compound and cause bubbles in the laminate body.

Recommendation: reduce the high-stage temperature from **140 °C to 130 °C**.

CNCGLASS · Test Result at 130 °C

The laminator ran a trial at **130 °C** and reported that body bubbles were solved: *“the laminated glass is very good now, there is no bubbles in the body of the laminated glass”*.

Remaining issue: very small bubbles near the edge — not deep inside the pane — about **3–4 mm** inward from the very edge of the laminated glass (also visible on overflowed EVA outside the glass).

Customer follow-up process (as emailed):

- Heat to 70 °C within 30 minutes
- Hold at 70 °C for 15 minutes
- Heat up to 130 °C within 40 minutes
- Hold at 130 °C for 50 minutes

The laminator asked whether overheating, low vacuuming, or bad cooling could explain the residual edge bubbles:

1. Overheat?

Process above; question whether 130 °C was still too high for their oven.

2. Vacuum?

Customer stated vacuum was at the maximum stage on their scale — reported as **0.01** (as written by the laminator; no further unit was given in the source).

3. Cooling?

After the alarm, the rack was taken fully out and cooled with additional fans blowing air.

CNCGLASS · Diagnosis — Second Suggestion (Peter Lin)

Because body bubbles had already been tied to **too high temperature**, and edges of a pre-laminate typically absorb **higher temperature than the center**, Peter recommended reducing the second-stage temperature further from **130 °C to 125 °C**.

Edge-only micro-bubbles a few millimeters inward after the body clears often mean the perimeter still runs hotter than the field. Stepping the high hold down in small increments—while keeping vacuum active through cool-down—is a practical way to find the oven’s workable window for a given film and load.

CNCGLASS · Outcome — 122 °C Perfect

The next day the laminator confirmed that all bubble problems were solved and the laminated glass was perfect. Their closing note:

“I would like to let you know that we finally today solved the problem. It was exactly the problem that you guessed. The temperature 135 and 130 was too high for our oven. I reduced it till 122 C degrees which is the best temperature for our machine and the EVA film. And it is perfect now.”

Final working high-stage temperature (this oven / this film): 122 °C.

CNCGLASS · Practical Tips — Bubble Factors

When bubbles appear in EVA film safety laminated glass, many factors may be involved, including:

- Leak / weak vacuuming
- Too high temperature
- Too thin EVA film
- Tempered glass (bow / roller-wave effects on contact)
- Too much humidity
- Too many layers of pre-laminated glass at one time
- Poor EVA film quality

If the cause is not obvious, run small-quantity trials and exclude possibilities one by one—temperature steps, vacuum path, film thickness, and load count—before changing several variables at once.

CNCGLASS · Closing

This case shows that body bubbles at **140 °C** and residual edge micro-bubbles at **130 °C** on a **10 + 0.76 (2 × 0.38) + 10 mm** tempered EVA stack of about **5 m²** can be resolved by finding the oven's workable high hold—here **122 °C** for the customer's machine and non-CNC EVA film. For further questions on EVA laminated glass process and safety glazing, please contact us.

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