CNCGLASS
CNC Ucolin Interlayer Technology Co., Ltd.
SHENZHEN, GD, CHINA
Peter Lin · cnc@cncglass.com · WhatsApp / Mobile +86 15013829504
WeChat wecan365 · www.cncglass.com

Solving Edge Bubbles in Wired Laminated Glass

A thin fabric laminate with a foaming edge

A shop laminating light silk or wire-cloth inside glass saw bubbles at the perimeter, and the edge squeeze-out itself looked foamed. Three successive trials were used to separate a furnace problem from a material problem. The notes below are offered as practical guidance for the same class of work, not as a claim about a named laboratory brand.



Figure 1. A three-trial path: repeat the plant cycle, slow the ramp, then pre-dry the fabric and move to a lower-flow EVA grade.

What the three trials showed

The first trial repeated the plant cycle, a hold at 60 degrees Celsius for 20 minutes and a hold at 125 degrees Celsius for 60 minutes, in a controlled laboratory furnace. The same edge bubbles appeared. The equipment in the plant was therefore not the only cause; the cycle itself deserved a change.

The second trial lowered the temperature and slowed the ramp: 60 degrees Celsius for 20 minutes, 80 degrees Celsius for 20 minutes, then 105 degrees Celsius for 60 minutes, at about 4 degrees Celsius per minute. The laboratory plates came out with a clear edge, which showed that a gentler profile can solve the bubble. When the plant adopted the same written cycle, the edge improved but did not clear completely. Furnaces differ in ramp, in how they read temperature, in control, and in internal layout; a cycle that is clean in one chamber will not automatically be clean in another.

The third trial looked at the fabric. Shrinkage was measured at about 3 to 4 percent, and the moisture content was high; after heat, a movement on the order of 4 mm was seen. The cloth was dried before lay-up so that shrinkage and moisture were taken out first. A lower-flow EVA grade was used so the melting film would not drag the fabric as strongly. On the plant furnace, the edge bubbles then disappeared.

A short prevention list for fine or loose fabrics

Store silk, light wire-cloth, loose weaves, and natural-fiber fabrics in a stable temperature and humidity so they do not arrive wet. Pre-dry and pre-shrink them before lay-up. Control the furnace ramp so the chamber does not overshoot and so every plate is heated evenly. Choose a lower-flow EVA so the melt does not rearrange the cloth. Those four habits prevent most of the edge bubbles this construction produces.

Edge bubbles in a thin fabric laminate are often a combination of an aggressive heat ramp, a wet or high-shrink cloth, and a film that flows too freely. Change the cycle, prepare the fabric, and match the EVA flow, and remember that two furnaces will not interpret the same written profile in the same way.

Contact Us

Brand: CNCGLASS

Company: CNC Ucolin Interlayer Technology Co., Ltd.
Address: SHENZHEN, GD, CHINA
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Email: cnc@cncglass.com
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Website: www.cncglass.com

We can advise on lower-flow EVA grades and on drying and cycle practice for fabric or wired laminated glass.