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Why Ionoplast Interlayer Laminated Glass Can Still Bubble After Vacuum-Bag Pre-treatment

A familiar shop-floor puzzle

Processors who move into large ionoplast laminates often do the responsible thing first: they place the pack in a vacuum bag before the autoclave, on the reasonable assumption that thorough pre-evacuation will prevent bubbles. It is therefore frustrating when the finished lite still shows widespread bubbling, local haze, and a lack of clarity. The instinct is to blame a leaking bag or a poor seal. Those faults do occur, but they are not the only, or even the most hidden, cause.

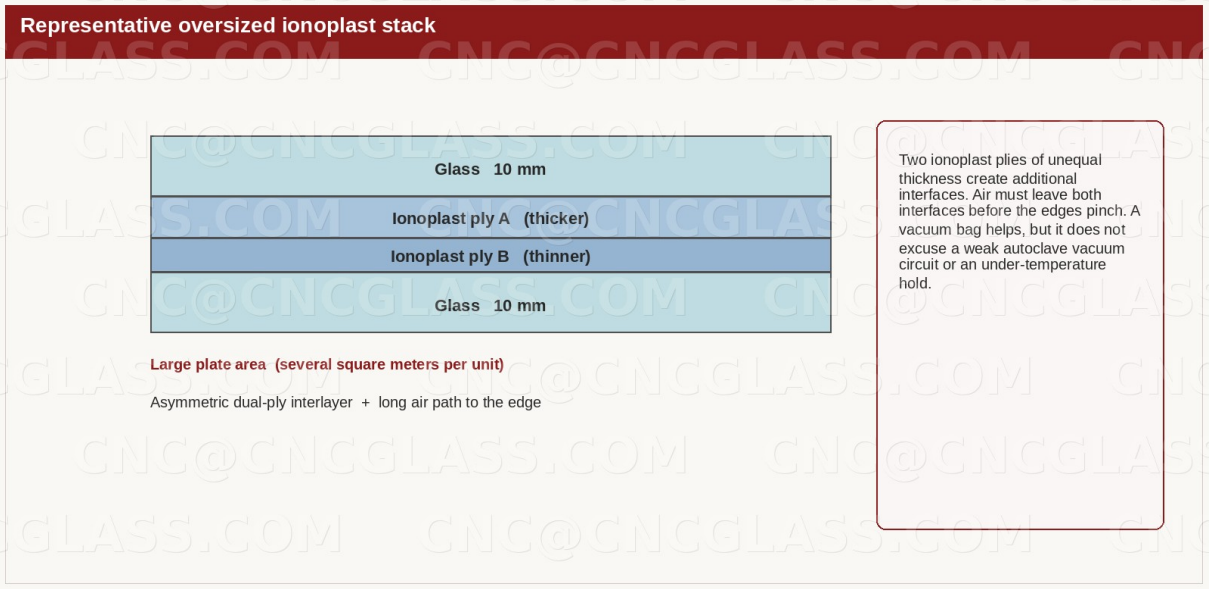


Figure 1. A representative oversized stack: two glass plies with two ionoplast films of unequal thickness. Extra interfaces and a long path to the edge make de-airing harder.

Consider a representative construction that is now common on demanding facades: two substantial glass plies, on the order of 10 mm, with two ionoplast films of unequal thickness between them, and a plate area of several square meters. The long path to the edge and the extra interface between the two films already make de-airing difficult. A bag helps remove bulk air. It does not, by itself, guarantee a clear autoclave result.

Two vacuum systems, and the one that is easy to overlook

The bag is a pre-treatment. It depends on film integrity, tape or seal quality, and a pump that can pull the pack down and hold it. The autoclave has its own vacuum circuit: pumps, valves, hoses, and ports that must keep a vacuum on the pack through heat and pressure. In daily production, that circuit is easy to take for granted. Power loss in a vacuum assembly, a tired valve, or a leaking hose inside the chamber can leave residual air between stacked interlayers and along the edges, even when the bag cycle looked excellent.

These hardware faults are concealed. The line may have run for weeks with a slowly degrading circuit before a large, dual-ply ionoplast job finally makes the weakness visible. When bubbles appear at that moment, the film and the bag are blamed, and the autoclave vacuum set is not even checked. A systematic inspection of both systems should be the first response, not the last.

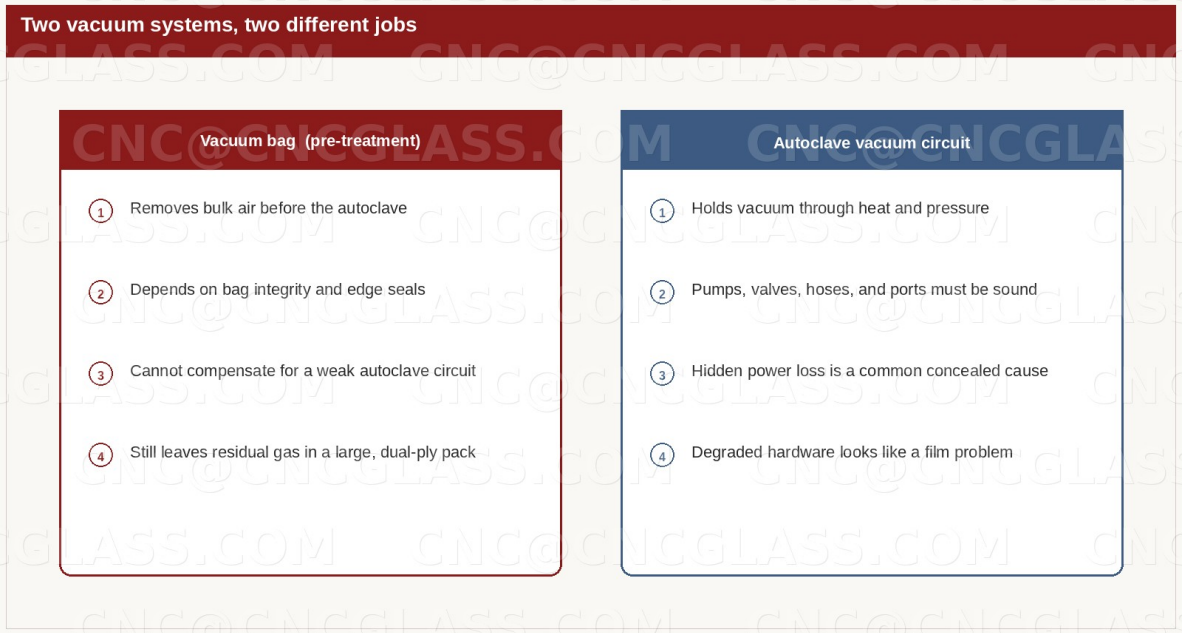


Figure 2. A vacuum bag and the autoclave vacuum circuit do different jobs. Bag integrity cannot compensate for a weak pump, valve, hose, or port inside the autoclave.

Stage-2 temperature is the other usual miss

Even with sound vacuum, the thermal cycle may be wrong for this polymer family. A two-stage autoclave program is typical. Stage 1 is a pre-heat and an initial press; many plants already have a moderate temperature and hold that are acceptable if vacuum is sound. Stage 2 is supposed to take the ionoplast to a temperature at which it flows, wets the glass, and completes the bond under full pressure.

A frequent error is to run Stage 2 at a hold that would be familiar from some PVB work, but that is simply too cool for ionoplast. The pack leaves the autoclave with residual voids and a hazy look because the film never fully flowed. Raising the Stage-2 hold into the proper ionoplast window, while leaving a sound Stage-1 program in place, is often the decisive process change. The exact numbers belong to the grade and the equipment; the direction of the correction is consistent.



Figure 3. In a two-stage autoclave cycle, Stage 2 is the usual miss: a hold that is adequate for some PVB work is often too cool for ionoplast flow and wetting.

Repair the hardware, correct the hold, then rework with care

The practical sequence is straightforward. Restore the autoclave vacuum circuit to its rated capacity. Confirm bag practice so that pre-evacuation is still doing its job. Move Stage 2 into the ionoplast temperature window. Then, if

the first batch is optically defective but otherwise intact, a controlled re-autoclave on the repaired and correctly set equipment can often clear the bubbles and the haze and bring the plates to an inspectable standard. That path saves glass that would otherwise be scrapped.

The lesson travels beyond one stack. A written process is not a finished process. Hidden degradation in vacuum hardware and a hold temperature copied from another interlayer family are two of the most expensive quiet faults in advanced lamination. They deserve a place on the maintenance calendar and on the parameter card for every ionoplast job.

A vacuum bag is necessary insurance on a large, multi-ply ionoplast laminate; it is not a complete explanation of bubbles after the autoclave. Inspect the autoclave vacuum circuit with the same seriousness as the bag, and do not run Stage 2 at a temperature that only suits a different polymer. Repair, retune, and, where the glass is still salvageable, rework with the corrected cycle. Clarity is the product of hardware and heat, not of the bag alone.

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We welcome enquiries on ionoplast autoclave windows, vacuum-circuit checks, and controlled rework of bubbled or hazy large plates.