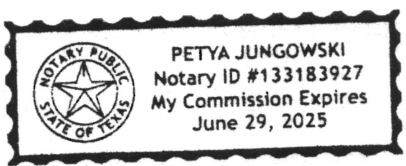
TITLE
Assembly of Electrochromic Device

DISCLOSURE
Produce an electrochromic double glazing unit (DGU) in plant A, ship it to plant B where it will be transformed into a triple glazing unit (TGU) by addition of a third pane of glass. The latter can be a single glass (coated or not), a laminate or a functionalized pane (armored, fire resistant, ...).

TECHNICAL CHALLENGES
During the production of the first DGU, contamination of surface (4) of the second glass pane is difficult to avoid. This is the surface on which the seals of the second cavity will adhere. Any contamination of this surface usually leads to loss of adhesion, gas retention issues and/or failing of the seal.
A good example is when silicone is used as a secondary seal in plant A. Silicone is shown to creep over time onto surface (4). This pollution can be detected with contact angle measurements (The more hydrophobic the surface, the more polluted). Seal adhesion and Ar retention tests usually fail if no step is taken to prevent surface (4) contamination.

TECHNICAL SOLUTION
Apply a polymer film or tape in plant A to protect glass surface (4) from contamination. The film is removed in plant B before applying the primary/secondary seal of the second cavity.
Special polymer films or tapes are known to be excellent barriers to silicone and other material contaminations.
It is applied to surface (4) of the DGU in plant A before the secondary seal. While applying a film to glass is an industry-standard method of protection, applying it to a completed IGU may be less common because the IGU limits the amount of force that can be used vs. monolithic glass. Two tapes have been tested and only one of the two had sufficient adhesion.
The tape needs to withstand further processing steps including packing in plant A, and shipping to plant B. The tape needs to be easily removed once the DGU arrives in plant B.
Ideally it should not leave any residue on the surface of the glass after it is removed. When shipped by sea containers, it is common that temperature & humidity reach high levels. The tape needs to withstand such climatic changes.
The positioning of the tape on surface (4) needs to be precise. An offset from the edge of the glass of 1 to 2mm was found to be very advantageous. It helps prevent edge damages to the tape during the various post-application steps.
In addition to its protection function, it is important that the tape does not disturb any quality inspections done in plant A or B (Optical controls, functionality of the electrochromic device, ...)
This leads to the requirement that the technical solution does not cover the whole surface like a full area film would. The use of a tape with a specific width (1.5") leaves the viewing area exposed for our smallest silicone inset and still enables access for all quality checks.
Before applying the tape, the perimeter of glass is wiped with isopropyl alcohol. Then the protection tape is applied by using a custom-designed tape applicator which aligns & off-sets the tape with the glass edge. The applicator meets all tolerance requirements.



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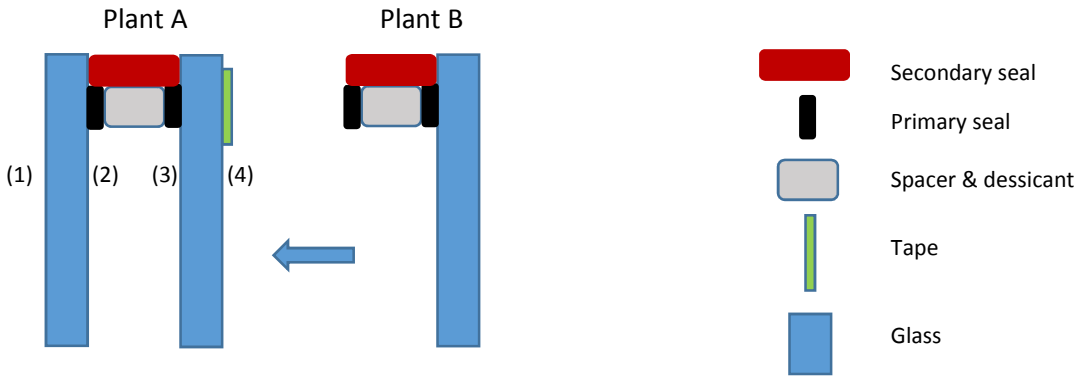
A re-work process has also been developed in plant B, in case the tape is locally damaged or removed during transport from plant A to plant B/un-loading in plant B. This allows to regain adhesion/gas retention properties in the areas where the tape could not play its protective role any longer.