



Technical Bulletin

SCARGARD® MIRROR Quality Assurance Program

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Trulite Glass & Aluminum Solutions (formally known as Binswanger Mirror) is the recipient of the Mississippi Quality “Excellence” Award, a recognition earned for demonstrating continuous performance excellence. It is a structured, externally validated, self-assessment process, utilizing the prestigious Malcolm Baldrige Award criteria.



The mirror manufacturing process has various quality assurance systems in place.

Metal Plating Sections: Stannous chloride, critical to proper silver adhesion, is electronically controlled. Silver and copper deposition is checked by plating glass samples, chemically removing the metal films, titrating the metals and recording the results on a statistical process control chart. All process variables, to include line speed, temperatures, DI water quality, traverse cycles, pump rates, etc., are closely monitored and recorded every hour.

- **Daily Silvering Report:** The Daily Silvering Report consists of a list of process parameters and target values. In general the process parameters are to be checked hourly during production, the times are listed on the report. Any significant variations from the target values are adjusted immediately.
- **Silver and Copper Titrations:** The two exceptions to the hourly checks on the Daily Silvering Report are the silver and copper titrations. Silver and Copper titrations are conducted five times over the course of two shifts. The target values are listed on the Daily Silvering Report.
- **Silver Adhesion:** The silver adhesion test is conducted once per shift using the standard tape pull method in accordance with ASTM D3359-97.

Paint Application and Curing: Paint viscosity is maintained electronically, which ensures consistent paint film thickness. Sample glass is run through the curtain coater and weighed. The weight of the paint is recorded on a statistical process control chart. All process variables, to include oven temperatures, line speeds, paint batch information, etc., are closely monitored and recorded as well.

- **Daily Paint Report:** The Daily Paint Report consists of a list of process parameters that are checked, compared and recorded on an hourly basis.
- **Dry Film Paint Weight:** The dry film paint weight is checked on the operators’ side upon start-up, on an hourly basis and after breaks and recorded on the daily paint report. The dry film paint weight is checked at four locations across the line to assure a uniform coating of properly mixed mirror-backing paint sufficient for optimum metal protection.
- **Solvent Rub Test:** During each shift, a random piece of mirror is selected and returned to the paint machine. After a minimum of 45 minutes air-cure time, the paint operator conducts a solvent rub test on the sample assuring an adequate paint cure sufficient for optimum resistance to corrosion and chemical attack.
- **Paint Thickness Test:** Once each shift, the paint operator uses a scratch gauge to check the paint thickness assuring it is within established process parameters with a target thickness of 1.5 mils.

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End of the Line Inspection: All mirrors are barrel rolled and inspected on line under high intensity lighting to Q² Mirror Quality standards in accordance with ASTM C1503-08 and ASTM 1036-06. Mirrors are inspected for glass and silvering defects on a Pass/Fail basis. Samples for salt spray and ammonia testing are chosen at random. Additionally, samples are viewed in a black box under a 150-Watt floodlight for scrub brush marks ensuring proper brush pressure at the glass scrubbing section.

- **Concentration of ScarGard® Solution:** The HSE concentration is checked each shift with a refractometer and each time a new mixture is added to the tank. The temperature of the solution is checked and recorded as well.
- **Inspection for Cup Brush Marks:** Each shift a random piece of mirror is selected and viewed in the “Black Box” for light hairline scratches between the glass and the silver. If scratches are detected the Supervisor is notified and corrective action is taken. The test is repeated until the scratches are eliminated.

Pre and Post Production Tests

Mirror backing materials are inspected upon receipt and before they are placed in storage. Mirror backing paint drums are weighed, measured, recorded and color coded. The supplier has been ISO 9000 certified and provides product batch certification on demand. Trulite has a similar program for silver solutions.

Trulite has a reputation for thoroughness when approving new raw materials. Typically, it takes over one year to certify a new paint or silver solution for use in the process. Samples of mirror with the test material must pass 1000 hours of salt spray--over three times the industry standard. Trulite's current backing system of silver, copper and paint successfully withstood 1800 hours in salt spray and the edge creep (black edge) only penetrated 1 ½ mm. For comparison, this is six times the hours required by Federal Standards, but only one-third of the allowable edge creep.

- **Salt Spray Test:** Trulite uses the salt spray test as the primary measurement of quality. Production samples are placed in a salt spray chamber, in accordance with ASTM B117-97, and exposed to 300 hours of continuous salt spray using a 20% solution of sodium chloride. At the end of the test, the samples are removed, washed and inspected for clouding, undercutting and spotting and are graded in accordance with ASTM C1503-08. Salt spray testing is performed in-plant and by an outside laboratory. Results are compared ensuring consistent results.
- **Ammonia Test:** When the mirror samples collected for the salt spray test are prepared, one sample is set aside to be placed into an Ammonia test chamber on a daily basis. Chemical resistance is tested by means of a 24-hour ammonia vapor test.