



# Turbo-Coat™ HV Acrylic Conformal Coating

2109

2110 (Turbo-Coat Thinner)

## Introduction

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Techspray's new Turbo-Coat™ HV Acrylic Conformal Coating is a high viscosity version of our popular Turbo-Coat. This coating is tested and approved in Asymtek and PVA selective spray systems, both atomized and airless models.

Turbo-Coat is designed to speed up board production throughput without additional investment of expensive UV systems or other capital equipment. Conformal coating cure time is often considered a production bottleneck for PCB assembly operations. Turbo-Coat HV dries tack-free in under 10 minutes, allowing manufactures to handle boards in 1/2 the time of the leading acrylic coating!

Turbo-Coat Thinner is available to reduce the viscosity to fit ideal process parameters. Turbo-Coat, Turbo-Coat HV, and Turbo-Coat Thinner are all HAPs (Hazardous Air Pollutants) free, so do not contain common coating solvents like Toluene, Xylene, and MEK. This makes these coating more user friendly and safe.

Turbo-Coat HV uses the same acrylic resin as the original Turbo-Coat, so coatings can be mixed-and-matched through the process, e.g. using the faster curing Turbo-Coat in the rework area, Turbo-Coat HV in the assembly area, and Turbo-Coat pen for QC touch-up.

## Features / Benefits

- Fastest Cure – Dry to Touch in Under 10 Minutes!
- Faster Throughput without Capital Investment
- Thick Coating – One-Pass Application
- Fast & Easy Rework & Repair
- IPC-CC-830B& MIL-I-46058C Certified
- UL94 V-0 Rated
- Crystal Clear & Glossy Finish
- UV Indicator for Black Light QC Inspection
- MEK, Toluene & Xylene Free

## Applications

Electronic Assemblies for...

- Automotive
- Aviation
- Consumer Electronics
- Appliances
- Industrial Meters & Control

## Thinning / Removal

Techspray coatings can be thinned to meet production requirements using Turbo-Coat Thinner (2110). Conformal Coating Remover (2510) is also available for rework and repair, although coating is often just burnt through in the soldering process for spot repairs.

Techspray coatings contain Opti/Scan to allow quality control inspection of coverage and evenness of the coating on a PCB. A coated board can be passed under a standard, low-cost long-wave UV (black) light, and the coated areas glow. The brighter the glow, the thicker the coating.

## Chemical Components

### TURBO-COAT HV (2109)

| Chemical                                            | CAS #      |
|-----------------------------------------------------|------------|
| Acrylic Polymer (non-hazardous)                     |            |
| tert-Butyl acetate.....                             | 540-88-5   |
| n-butyl acetate .....                               | 123-86-4   |
| 1-Methoxy-2-propanol.....                           | 107-98-2   |
| 1-(2-Methoxy-Methyl-Ethoxy)-2-Propanol Acetate..... | 88917-22-0 |

### TURBO-COAT THINNER (2110)

| Chemical                                | CAS #    |
|-----------------------------------------|----------|
| n-butyl acetate .....                   | 123-86-4 |
| propylene glycol monomethyl ether ..... | 107-98-2 |

## Cure Profile

|                                  |                                        |
|----------------------------------|----------------------------------------|
| <b>Accelerated Cure:</b>         | 55 minutes @ 131°F / 55°C              |
| <b>Ambient Cure:</b>             | 15 hours @ 74°F / 23°C (ambient temp)  |
| <b>Tack-Time (dry to touch):</b> | 9 minutes @ 74°F / 23°C (ambient temp) |

Cure time depends on a number of factors, including the method and thickness of application. Dilution will also change the cure profile. 131°F / 55°C is recommended as the best accelerated temperature to optimize leveling, providing the smoothest possible finish. A faster cure may be achieved, but should be thoroughly tested first.

## Test Data

### Application

|                                       | Test Method* | 2109 Test Results                                    |
|---------------------------------------|--------------|------------------------------------------------------|
| Application Method                    |              | Spray system, dip, or brush                          |
| Cure time                             | TS-053       | <15 hrs                                              |
| Accelerated cure time                 | TS-054       | 55 Min. @ 55°C                                       |
| Dry time to touch                     | TS-055       | 9 Min.                                               |
| Quality inspection method of coverage |              | UV (long-wave black) light                           |
| Removal method                        |              | Alkane, Acetone or Acetate, Solder iron burn through |

### Characteristics

| As Supplied:                          | Test Method                        | 2109 Test Results   |
|---------------------------------------|------------------------------------|---------------------|
| Visual appearance                     | TS-050                             | Clear               |
| Density (25 C)                        | TS-019-1                           | 0.91                |
| Viscosity (25 C)                      | Instrument (Brookefield RVT) guide | 53 to 60 Centipoise |
| Solids %                              | TS-015                             | 24-26               |
| Flash point                           | ASTM D-56 (TAG CC)                 | 5°C (41°F)          |
| Vapor pressure (20 C) (VOC composite) | calculated                         | 1.12 mmHg           |
| Initial boiling point                 | TS-051                             | Not Determined      |
| Stability (30-day test @ 37 C/100 F)  | TS-052                             | Stable              |
| Stability (30-day test @ 6.1 C/21 F)  | TS-052-1                           | Stable              |
| Resin T <sub>g</sub>                  | provided by supplier               | 50 – 55 C           |
| Resin mol wt                          | provided by supplier               | 60,000              |

**Certified Testing** – pending, stated results based on 2108, which contains the same resin

| As Cured - Physical               | Test Method                            | 2109 Test Results |
|-----------------------------------|----------------------------------------|-------------------|
| Dielectric strength               | ASTM D-149, IPC-TM-650 2.5.6.1, Rev. A | 1000 volts        |
| Adhesion                          | ASTM D-3359                            | 5B                |
| Film hardness                     | ASTM D-3363                            | 2B                |
| Film thickness (1 dip)            | ASTM D-1005                            | 1 mil (0.001")    |
| UL Qualification                  | Test Method                            | 2109 Test Results |
| Coating flammability              | UL94/746E                              | V-0               |
| IPC-CC-830B Qualification         | Test Method                            | 2109 Test Results |
| Appearance                        | IPC-CC-830B 3.5.2                      | pass              |
| Fluorescence                      | IPC-CC-830B 3.5.3                      | pass              |
| Flammability                      | IPC-CC-830B 3.5.6                      | pass              |
| Fungus resistance*                | IPC-TM-650 2.6.1.1                     | pass              |
| Flexibility                       | IPC-TM-650 2.4.5.1                     | pass              |
| Dielectric withstand voltage      | IPC-TM-650 2.5.7.1                     | pass              |
| Moisture & insulation resistance* | IPC-TM-650 2.6.3.4                     | pass              |
| Thermal shock*                    | IPC-TM-650 2.6.7.1                     | pass              |
| Temperature humidity ageing*      | IPC-TM-650 2.6.11.1                    | pass              |

\* Final results for 2109 pending. Results based on 2108, which uses the same resin. All other specification testing is complete.

#### Chemical Compatibility – Industrial Chemicals

| INDUSTRIAL CHEMICALS | EFFECT      | CAS #      |
|----------------------|-------------|------------|
| Methanol             | Soften      | 67-56-1    |
| Ethanol              | Dissolution | 64-17-5    |
| IPA                  | Dissolution | 67-63-0    |
| 70% IPA              | Dissolution | 67-63-0    |
| 50% Ethanol          | No effect   | 64-17-5    |
| DPM                  | Dissolution | 34590-94-8 |
| Glycol ether EB      | Dissolution | 111-76-2   |
| THF                  | Dissolution | 109-99-9   |
| Acetone              | Dissolution | 67-64-1    |
| n-propyl acetate     | Dissolution | 109-60-4   |
| t-butyl acetate      | Dissolution | 540-88-5   |
| Hexane               | Dissolution | 110-54-3   |
| Heptane              | Soften      | 142-82-5   |
| Cyclopentane         | Dissolution | 287-92-3   |
| Cyclohexane          | Dissolution | 110-82-7   |
| Toluene              | Dissolution | 108-88-3   |
| Trans-dce            | Dissolution | 156-60-5   |

## Chemical Compatibility – Household Chemicals

| HOUSEHOLD CHEMICALS      | EFFECT      | EXAMPLE OF US BRAND NAME       |
|--------------------------|-------------|--------------------------------|
| 5% Acetic acid           | No effect   | Heinz Vinegar                  |
| 0.1N Hydrochloric acid   | No effect   | Lime-A-Way Toilet Bowl Cleaner |
| 50% Nitric acid          | No effect   |                                |
| Parson's solution        | No effect   | Windex                         |
| 0.1N Potassium hydroxide | No effect   | 10% Liquid Plumber             |
| 45% Potassium hydroxide  | No effect   | Liquid Plumber                 |
| d-limonene               | Dissolution | Orange Glo                     |
| Chlorox neat             | No effect   | Chlorox                        |
| Chlorox 1:1              | No effect   | 50% Chlorox                    |
| Chlorox 1:4              | No effect   | 20% Chlorox                    |
| Pine-Sol Lemon           | No effect   | Pine-Sol Lemon                 |
| Pro 409                  | No effect   | 409 Professional               |

*In most cases, Techspray corporate test methods (TS designation) correspond to standard ASTM Copies of Techspray corporate test methods are available upon request.*

## Environmental Policy

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Techspray® is committed to developing products to ensure a safer and cleaner environment. We will continue to meet and sustain the regulations of all federal, state and local government agencies.

## Packaging and Availability

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### Turbo-Coat HV:

|          |                                 |
|----------|---------------------------------|
| 2109-P   | 1 pint (0.47L) in glass bottle  |
| 2109-G   | 1 gallon (3.8L) in metal bottle |
| 2109-5G  | 5 gallons (18.9L) in metal pail |
| 2109-54G | 54 gallons (204L) in metal drum |

### Turbo-Coat Thinner:

|         |                                 |
|---------|---------------------------------|
| 2110-G  | 1 gallon (3.8L) in metal bottle |
| 2110-5G | 5 gallons (18.9L) in metal pail |

### Original Turbo-Coat:

|          |                                 |
|----------|---------------------------------|
| 2108-12S | 12oz aerosol                    |
| 2108-N   | 10ml rework & retouch pen       |
| 2108-P   | 1 pint (0.47L) in glass bottle  |
| 2108-G   | 1 gallon (3.8L) in metal bottle |
| 2108-5G  | 5 gallons (18.9L) in metal pail |

## Resources

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Techspray® products are supported by a global sales, technical and customer services resources.

For additional technical information on this product or other Techspray® products in the United States, call the technical sales department at 800-858-4043, email [tsales@techspray.com](mailto:tsales@techspray.com) or visit our web site at: [www.techspray.com](http://www.techspray.com).

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email: [info@itw-cc.com](mailto:info@itw-cc.com)

### Countries Outside US

Call to locate a distributor  
in your country.

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# Asymtek Applications Demo Report

## Tech Spray 2108-HV and 2108 Evaluations

Author: Mike Szuch

July 2010

Note: Final part number for 2108-HV, referenced in this document, is 2109.

### Goal:

Evaluate a new material & develop some baseline parameters.

### Parts:

None supplied.

### Material:

Tech Spray 2108-HV is a higher viscosity (17.3s @ 74F) and higher solids content (~25%) than regular 2108 (13.3s/15%). 2108 is also known as "Turbo Coat".

### Results:

Great results with 2108-HV in all three applicator technologies (atomized spray coat, non-atomized film coat and non-atomized jet coat). No thinning was required for any of the applicators. No cob-webbing was detected while atomizing. Nominal thicknesses of 1-3 mils can readily be dialed in by using standard machine parameters.

Although the regular 2108 can also be dispensed, it is less controllable than the -HV version. 2108 tends to break apart (splash) more easily and it seems to run easily. Clearly 2108-HV is the preferred version.

Although no unusual nozzle clogging occurred, this material dries very quickly when exposed to air. So prudent and frequent use of idle cups is recommended.

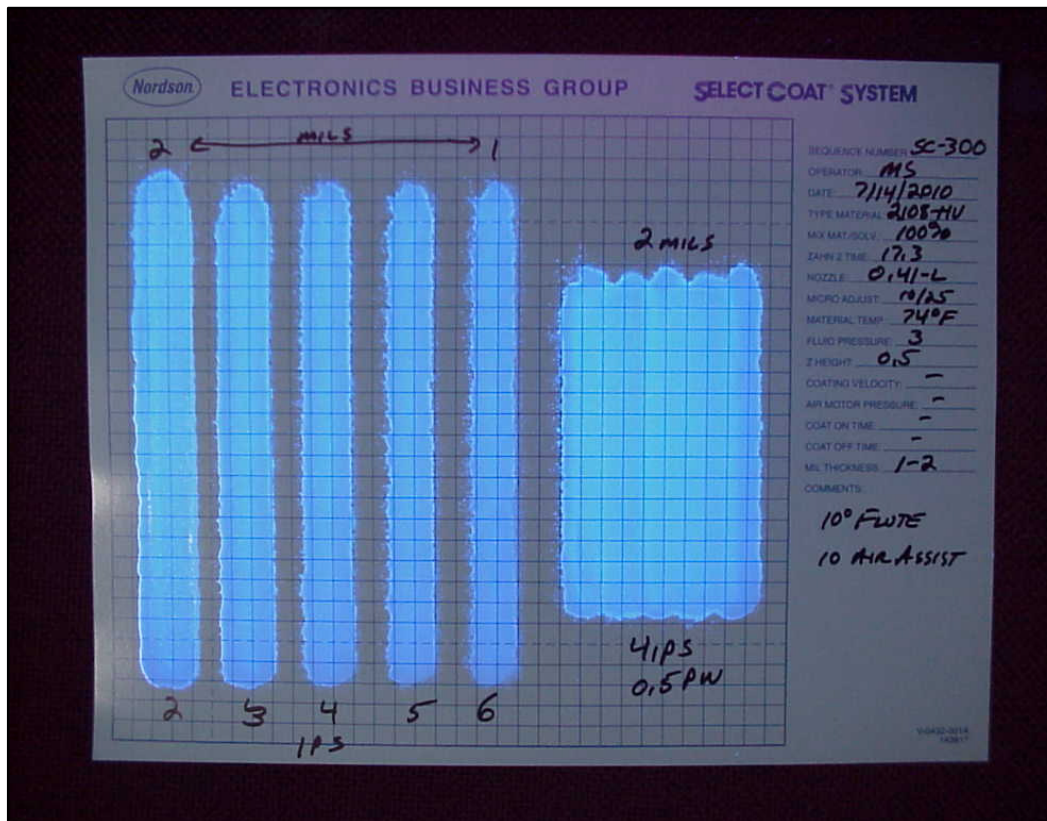
Note: The values listed below are for reference only. Actual results may vary. Consult Asymtek applications engineering for specific recommendations.

### Details:

|                                |                                                                                                                                                                                                                                                   |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Non-Atomized Jet Coater</b> | <ul style="list-style-type: none"><li>• Model: SC400</li><li>• Needle: 21 gage x 6.5mm, Iwashita</li><li>• Micro Adjust: 5/10 increments</li></ul>                                                                                                |
| <b>Parameters(nominal)</b>     | <ul style="list-style-type: none"><li>• Fluid Pressure: 3 PSI</li><li>• Valve Pressure: 65 PSI</li><li>• Duration: 7ms</li><li>• Period: 14ms</li><li>• Dispense Height: 0.1"</li><li>• Line Speed: 1-4 IPS</li><li>• Pass Width : 1/8"</li></ul> |
| <b>Thickness (nominal)</b>     | <ul style="list-style-type: none"><li>• 1-2 mils</li></ul>                                                                                                                                                                                        |

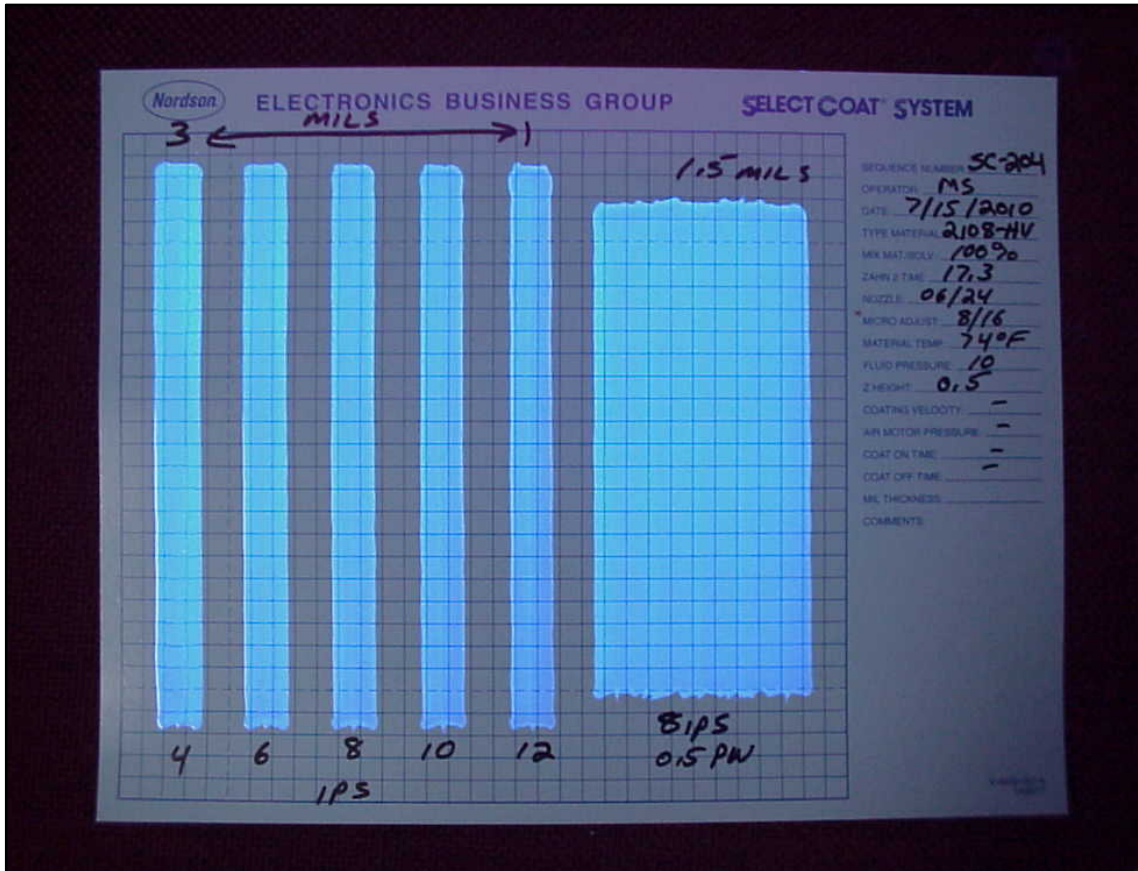
(No Photo)

|                              |                                                                                                                                                                                                     |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Atomized Spray Coater</b> | <ul style="list-style-type: none"> <li>Model: SC300</li> <li>Nozzle: 0.41-0</li> <li>Fluid Extension: 10 Degree</li> <li>Micro Adjust: 10/25 increments</li> </ul>                                  |
| <b>Parameters (nominal)</b>  | <ul style="list-style-type: none"> <li>Fluid Pressure: 3 PSI</li> <li>Air Assist Pressure: 10 PSI</li> <li>Dispense Height: 0.5"</li> <li>Line Speed: 2-6 IPS</li> <li>Pass Width : 0.6"</li> </ul> |
| <b>Thickness (nominal)</b>   | <ul style="list-style-type: none"> <li>1-2 mils dry</li> </ul>                                                                                                                                      |



**Atomized Spray using SC300**

|                                 |                                                                                                                                                                  |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Non-Atomized Film Coater</b> | <ul style="list-style-type: none"> <li>Model: SC204</li> <li>Nozzle: 06/24</li> <li>Micro Adjust: 8/16 increments</li> </ul>                                     |
| <b>Parameters (nominal)</b>     | <ul style="list-style-type: none"> <li>Fluid Pressure: 10 PSI</li> <li>Dispense Height: 0.5"</li> <li>Line Speed: 4-12 IPS</li> <li>Pass Width : 0.5"</li> </ul> |
| <b>Thickness (nominal)</b>      | <ul style="list-style-type: none"> <li>1-3 mils dry</li> </ul>                                                                                                   |



**Non-Atomized Film using SC204**



## Project Description

Test the spray quality of modified version of 2108 coating (2109 Turbo-Coat HV) using airless and atomized methods.

## Equipment and Materials

- PVA650 coating machine
- FC100-CF airless spray valve
- FCS300-ES atomized spray valve
- Techspray 2108-HV (final part # 2109) Form #2
- Techspray 2108-HV Diluent (final part #2110)
- BYK Gardner white test cards

## Application

A few sample patterns were sprayed onto the BYK cards to see how the coating reacts to being applied with the 2 application methods. The airless test used the coating as-is, and the atomized test was used 5, 10, and 20% dilutions. All samples were cured at room temperature.

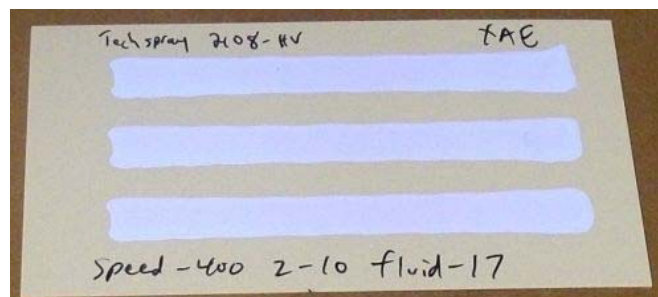
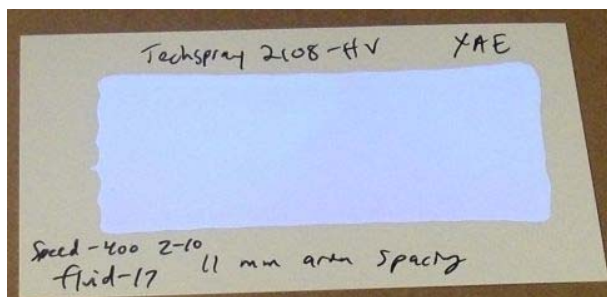
## Settings

|                     |                 |            |
|---------------------|-----------------|------------|
| Valve:              | FC100-CF        | FCS300-ES  |
| Dilution:           | None            | 5, 10, 20% |
| Fluid Pressure:     | 17 PSI          | 5 PSI      |
| Atomizing Air:      | N/A             | 0.5 PSI    |
| Valve Stroke:       | 0.045"          | 0.008"     |
| Speed:              | 400 mm/sec      | 100 mm/sec |
| Z height:           | 10 mm           | 10 mm      |
| Area Spacing:       | 8-11 mm         | 4-8 mm     |
| Dry Film Thickness: | .0015" - .0025" |            |

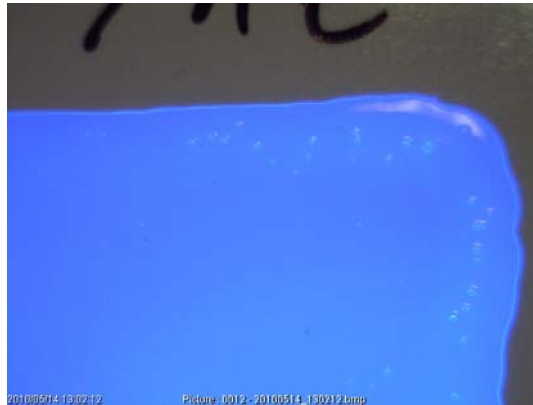
## Summary

The material worked well with atomized and airless spray valves. Pictures and comments:

### Airless Film:

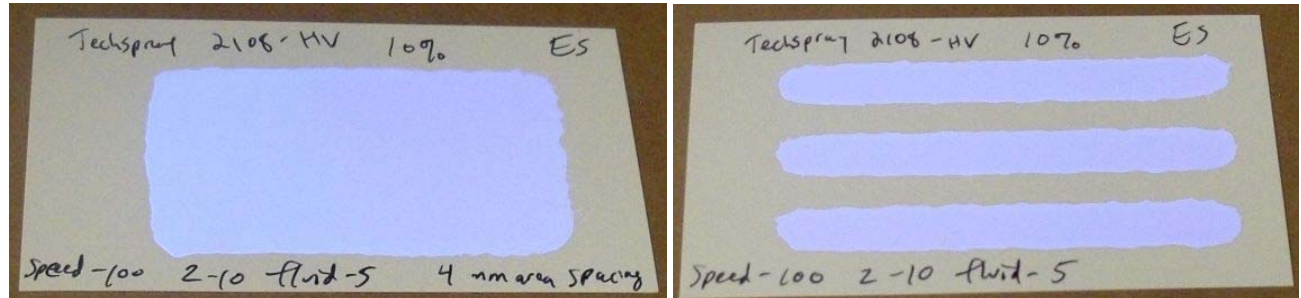


## Summary (cont.)



The airless application produced better results than original testing but did tend to create slight ridges around edges of coated lines/areas and trap some small bubbles during cure.

### Atomizing:



Atomizing at a 10%+ dilution gave decent results with OK edges but had no signs of bubbles and smooth finish.

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