



APPLICATION MANUAL

TABLE OF CONTENTS

About ST-1	1
Laboratory Testing Protocols	2
Manual Scrub Application - rinse	2
Manual Scrub Application - no rinse	3
High Pressure Spray Application – no rinse	3
Low Pressure Spray Application – no rinse	3
Low Pressure Spray Application – rinse	4
Immersion Application	4
ST-1 Wipes	4
Testing for Proper Application	5
Troubleshooting	6

This manual contains several application methods for ST-1. Due to the variability of ST-1 application methods, always contact Pantheon Enterprises to discuss the best way to incorporate ST-1 into your existing surface pre-treatment process.

About ST-1

ST-1 chemically increases the surface energy and wets the substrate activating these surfaces for better coating performance. The monomolecular layer left behind provides a more intimate contact between the coating and the substrate compared to traditional surface preparation technologies. Additionally, ST-1 cleans the surface of oils, fuels, dirt, and other contaminants.

Environmental Health and Safety

- Chrome-free
- Non-toxic
- Non-hazardous
- Non-flammable
- Non-corrosive
- CFC free
- ODS free
- Odor free
- Readily biodegradable upon disposal

ST-1 does not require HAZMAT shipping and storage. See Safety Data Sheet for a full description on health, physical, and environmental hazards.

Safe and Effective on:

- Aluminum
- Anodized
- Composite
- Fiberglass
- Galvanized
- Magnesium
- Plastics
- Steel
- Titanium
- Wood
- Already coated surfaces
- Scuff sand

Coating Compatibility

- Paints
- Primers
- Urethanes
- Water-based
- Oil-based
- Sealants
- Stains
- Powder coatings
- E-coats



ST-1 can easily be implemented into your regular surface preparation process. This manual highlights common application methods used and provides you with an overview of how to incorporate ST-1 into your current application procedures.

LABORATORY TESTING PROTOCOLS

For coatings to perform well, they must adhere to the substrate on which they are applied. The protocols below will support testing of ST-1.

- Manual scrub application with rinse should be used as a baseline for any testing.
- ST-1 is not a standalone product. Ensure tests are done with a coating over ST-1. Some typical pretreatment tests may not apply.
- When testing coupons, ensure bare metal is present before proceeding with application. Coupons often have a layer of silica which must be removed prior to testing.
- After any test, it is important to record whether the bond failure was adhesive (failure at the coating / substrate interface) or cohesive (failure within the coating film or the substrate).
- Always assure proper controls are in place in any testing procedure.

If loss of adhesion occurs in any testing procedure, contact Pantheon Enterprises to confirm proper application and processes were followed.

Pantheon Enterprises

888.608.7888
engineering@pantheonchemical.com

APPLICATION METHODS:

Workflow Recommendations and Considerations:

- Rinse to remove all dust and debris
- High soil areas may require extra cleaning
- Assure all working area surfaces are wet with ST-1
- Pay particular attention to high erosion areas or contaminated surfaces
- After ST-1 application and rinse is complete, keep surface free of dust and debris prior to coating application.

[**DO NOT** let ST-1 dry on the surface at any time prior to the final rinse phase. Keep surface wet with water or ST-1.]

Tools & Materials Needed For Most Application Methods:

- ST-1
- Aluminum Oxide Pads—3M 7447 (burgundy)
- Spray Gun
- Municipal Water
- Optional: Pole Scrubber or Pneumatic Sander

Manual Scrub Application—rinse

This process can be used without an additional cleaning and etching step.

1. Apply a flood coat of ST-1 to the designated area.
See Workflow Recommendations and Considerations above.
2. Agitate surface area with an aluminum oxide pad using OVERLAPPING HORIZONTAL motions until you see a rich lather.
Never let ST-1 dry on the surface. If work area does dry, reapply ST-1.
3. In same area just treated, apply a second application of ST-1.
Do not rinse between applications.
4. Re-agitate surface with an aluminum oxide pad, this time using OVERLAPPING VERTICAL motions until a rich lather is formed.
Do not allow ST-1 to dry on the surface.
5. Immediately following the second application of ST-1, rinse the completed area thoroughly from top down.

After rinse is complete, wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

Manual Scrub Application—no rinse

STOP! CONTACT PANTHEON ENTERPRISES BEFORE MOVING FORWARD WITH THIS APPLICATION

This process can be used without an additional cleaning and etching step.

1. Apply a flood coat of ST-1 to the designated area.
See Workflow Recommendations and Considerations above.
2. Agitate surface area with an aluminum oxide pad using OVERLAPPING HORIZONTAL motions until you see a rich lather.
Never let ST-1 dry on the surface. If work area does dry, reapply ST-1.
3. In same area just treated, apply a second application of ST-1.
Do not rinse between applications.
4. Re-agitate surface with an aluminum oxide pad, this time using OVERLAPPING VERTICAL motions until a rich lather is formed.
Do not allow ST-1 to dry on the surface.
5. Squeegee off excess ST-1 from the surface.
6. Using a damp microfiber towel, wipe the treated surface in one direction using uniform, and sufficient pressure.
Dampen towel with water of adequate quality. City water is generally acceptable.

Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

High Pressure Spray Application —no rinse

STOP! CONTACT PANTHEON ENTERPRISES BEFORE IMPLEMENTING THIS APPLICATION METHOD

Use this method when etching is not possible or over already coated surfaces. If possible, etch the surface before ST-1 application for best results. Remove large debris before application. Extra cleaning steps prior to ST-1 high pressure spray application are generally not necessary. A Pantheon Enterprises Engineer can advise on the best surface preparation technique.

1. Prepare a 2-5% solution of ST-1 with water of adequate quality. City water is generally acceptable. Hot water can be used and will assist in contamination removal.
2. Using a high pressure sprayer at 2000-3000 psi, apply ST-1 solution.
Keep tip of wand within 1' of substrate

Due to the dilution of ST-1 in this application method, no rinse is required. Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

Low Pressure Spray Application—no rinse

STOP! CONTACT PANTHEON ENTERPRISES BEFORE MOVING FORWARD WITH THIS APPLICATION

Cleaning and etching is required prior to Low Pressure Spray Application.

1. Prepare a 2-5% solution of ST-1 with water of adequate quality. City water is generally acceptable. Hot water can be used and will assist in contamination removal.
2. Using a low pressure sprayer (less than 100 psi is acceptable), apply ST-1 solution.
Keep wand within 1' of substrate.

Due to the dilution of ST-1 in this application method, no rinse is required. Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

ST-1 run-off may not be used due to difficulty keeping contaminants out and maintaining proper concentration levels.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

Low Pressure Spray Application—rinse

STOP! CONTACT PANTHEON ENTERPRISES BEFORE MOVING FORWARD WITH THIS APPLICATION

Cleaning and etching is required prior to low pressure spray application.

1. Use 100% concentration of ST-1.
2. Using a low pressure sprayer (less than 100 psi), apply ST-1. *Keep wand within 1' of substrate. Do not let ST-1 dry on the surface at any time prior to the final rinse phase.*
3. Rinse with water or dip in water.

ST-1 may be reused in this application method. Avoiding contamination of ST-1 run-off is imperative. Contact a Pantheon Enterprises Engineer to learn the required steps to reuse the solution.

Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**


Immersion Application

STOP! CONTACT PANTHEON ENTERPRISES BEFORE MOVING FORWARD WITH THIS APPLICATION

ST-1 can be used in an immersion application method for small parts and components in addition to an immersion line process. ST-1 immersion processes are customized to meet specific customer needs. Contact a Pantheon Enterprises Engineer to discuss your current process.

Below is an example of a common ST-1 immersion process.

1. Alkaline cleaner bath
2. Water rinse
3. Acid etch
4. Water rinse
5. ST-1 (100% concentrate)
6. Rinse with water or dip in water.
7. Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application. Commonly used in powder coating applications.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

ST-1 WIPES

Use ST-1 Wipes to pretreat any and all paintable surfaces, including all metal and composite surfaces. ST-1 will also reactivate primers and can be used for paint on paint adhesion.

Materials Needed:

- ST-1 Wipes
- Aluminum oxide pads—3M 7447 (burgundy) or pneumatic sander (for oxidized metal substrates and composites only)


Important Application Information: read first

ST-1 Wipes should be only damp to the touch. Unlike most cleaners and adhesion promoters, less is more when it comes to ST-1. Never add liquid ST-1 to the Wipes.

- Before using ST-1 Wipes, ensure surface is free of heavy contamination and loose debris.
- **IMPORTANT!** Only wipe in one direction in order to maximize removal of contaminants and ensure a clean surface. Wiping back and forth or in circles may lessen soil removal and/or further imbed contaminants.
- Use minimal and uniform pressure on the Wipe during the application process.
- Each Wipe covers 4 sq. ft. of surface.
- Wipe may be folded and used multiple times as long as a clean side of the Wipe is used on each pass.

ST-1 Wipes Continued

- Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

For Painted, Prepped & Non-Oxidized Substrates

1. Wipe surface in one direction using the ST-1 Wipe. If necessary, fold wipe to expose clean side and re-wipe.
2. Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

For Oxidized Substrates or Composites

NOTE: ST-1 Wipes will provide adhesion promotion without a wet abrade step; however, for best results, scarification and oxide removal (wet abrasion) is recommended.

1. Clean surface with ST-1 Wipe.
2. Wet abrade surface with an aluminum oxide pad or pneumatic sander
3. With a damp microfiber towel, wipe up oxides. If only a small amount of oxides are present, this step may be skipped and oxides may be wiped up with an ST-1 Wipe. This will, however, cause the wipes to soil faster.
4. Wipe substrate in one direction with an ST-1 Wipe. If necessary, wipe may be folded and used again as long as a clean side of the wipe is used on each pass.
5. Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of ST-1 application.

 **Assure ST-1 is applied correctly prior to paint—review testing procedures on page 5.**

TESTING FOR PROPER APPLICATION

To assure proper application, use the following testing procedures:

Method #1: Water Break-Free Surface

During the final rinse, look for a water break-free surface as an indicator of proper application (typically 2-10 seconds). If water beads or breaks immediately, repeat ST-1 process.

Method #2: pH Strip

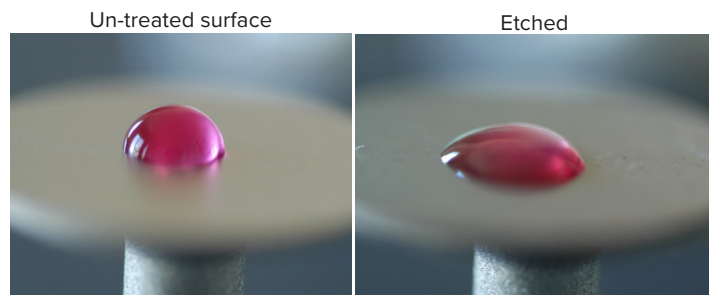
pH strips can be used as an indicator of adequate rinsing. Touch one pH strip to substrate and one to rinse water. Rinsing was adequate if pH on the substrate is equal to the pH of rinse water.

Method #3: Visual

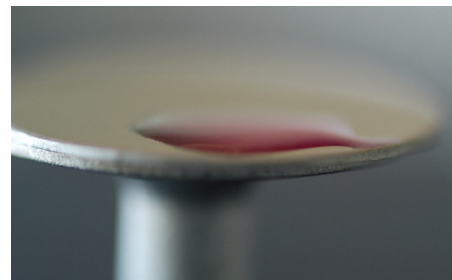
If a film or haze is visually present, adequate rinsing was not done. Rinse again until haze disappears.

Method #4: Water Droplet

Place a drop of water on the treated surface. If ST-1 application is done correctly, the droplet should lay flat. If water beads, rinse with water or solvent wipe to ensure surface is clean. Reapply ST-1. If beading continues, an oxide layer may be present. In this case, it is important to wet abrade the surface prior to ST-1 application. See *images below*.



Etched & treated with ST-1





APPLICATION TROUBLESHOOTING

The below features troubleshooting suggestions to ensure proper surface treatment and adhesion promotion.

CHALLENGE	POSSIBLE ISSUE / SOLUTIONS
<p>Water break free surface (2-10 seconds) not achieved</p>	<p>Contamination removal was not sufficient. Redo ST-1 application. In some cases, a pneumatic sander may be necessary for heavy contamination removal. OR too much ST-1 on substrate</p> <p>Possible causes (Wipes):</p> <ul style="list-style-type: none"> • Missed treatment of area • Area heavily contaminated and requires ST-1 liquid treatment • An oxide layer may be present which requires removal <p>Possible causes (liquid):</p> <ul style="list-style-type: none"> • Missed treatment of area • Area heavily contaminated and requires extra cleaning
<p>Paint pulling away from itself; Paint falling off of substrate; Haze or film appearance on substrate after ST-1 application.</p>	<p>Too much ST-1 is on the substrate. Rinse with water or use a damp microfiber cloth to wipe up excess.</p> <p>Possible causes (Wipes):</p> <ul style="list-style-type: none"> • Too much pressure applied when using the wipe • Non-uniform pressure applied with wipe • Wiped more than one time over the same area <p>Possible causes (liquid):</p> <ul style="list-style-type: none"> • Rinse was not adequate • Excess was not wiped up with microfiber cloth.
<p>Paint adhesion failure</p>	<p>Too much ST-1 on substrate</p> <p>Area solvent wiped or tack rag used after ST-1 treatment</p> <p>Contamination removal not sufficient</p> <p>Waited longer than 24 hours from ST-1 treatment to paint</p> <p>Expired product – verify expiration date prior to use</p> <p>ST-1 (liquid) was allowed to dry on surface during application process prior to rinsing</p> <p>Substrate was not given sufficient time to dry before coating</p> <p>Substrate was contaminated post ST-1 treatment.</p>