Application Instructions
STEEL-IT® Polyurethane System

Consisting of:

- **STEEL-IT 2213 Epoxy Ester Precoat**

and

- **STEEL-IT Polyurethane Topcoat**
  - **1002 Polyurethane Topcoat - Steel Gray**

OR

  - **1012 Polyurethane Topcoat - Black**

Surface Preparation, Application Instructions, and Recommended Spray Gun Equipment Settings

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1. PREPARATION

Proper surface preparation is key to the success of any coating job, whether the coating is STEEL-IT or another brand. It's often said in the coatings industry that roughly 85% of all paint failures are due to improper or insufficient surface preparation and application.

STEEL-IT coatings adhere to metal surfaces through mechanical adhesion, meaning the coating holds onto the surface by interlocking with a rough profile established on the bare metal, which is ideally achieved by grit-blasting or power-sanding.

SURFACE PREPARATION

Metal surfaces should be clean and free of all rust, old paint, greases, waxes, salts, dirt, scale, etc.

It's best if the surface being coated can be grit-blasted (e.g. sandblasted) to a 1.5 - 2.0 mils (0.0015" – 0.0020"; 38-50 microns) sharp angular cut profile per SSPC SP-6 (Commercial Blast). STEEL-IT coatings require this rough, "scarified" surface profile in order to have some tooth to bite into and adhere properly.

If blasting is not an option, power-sanding (e.g. with a dual-action sander) using #36 grit sandpaper will achieve similar results on steel. The surface once properly prepared should feel much like the strike area on a matchbox.

After grit-blasting, blow any remaining grit material off using an air hose and/or solvent clean the surface with acetone, alcohol, or xylene. Avoid using products that leave behind an oily residue (such as mineral spirits).

Another surface preparation option for the Polyurethane System is to use the Monti Bristle Blaster, a power tool that also achieves proper surface conditions. Stainless Steel Coatings, Inc. has no affiliation with Monti; it is merely an available option in the marketplace. For more information, visit: http://www.monti.de/en/products/bristle-blaster

REQUIRED AMBIENT CONDITIONS

When using the STEEL-IT Polyurethane System:

- Apply only when ambient and substrate surface temperatures are between 50° F (10° C) and 100° F (38° C)
- Relative humidity is less than 85%
- Substrate surface temperature and the temperature of the coating are at least 5° F (2.75° C) above the dew point.

SAFETY
Apply STEEL-IT in a well-ventilated area.

When applying STEEL-IT 2213 Epoxy Ester Precoat and STEEL-IT Polyurethane Topcoat (1002 Steel Gray or 1012 Black), it is critical to use:

- A NIOSH approved respirator using an organic vapor cartridge
- Nitrile gloves

SUFFICIENT AGITATION IN PLACE OF ADDING THINNER
Before applying STEEL-IT, **it is critical that the contents be sufficiently agitated for five minutes**. This can be accomplished using a mechanical paint shaker or a mechanically driven paddle, at the end of a drill, for example. Hand stirring using a wooden stick will not provide sufficient agitation to properly prepare STEEL-IT for application.

Unlike other paints and coatings where agitation or stirring is required to assure the homogeneity of the can's contents, in the case of STEEL-IT, agitation plays the critical role of adding enough energy into the coating to break temporary chemical bonds that have formed and thickened the coating as it's sat in the can. Adding energy makes the can's contents less viscous thus eliminating the need for thinners and readying STEEL-IT for application.

If agitated properly, STEEL-IT coatings should not require thinning with solvents before use. **Adding thinner or reducer is highly discouraged** because they increase the chance of trapping solvents and may negatively affect the coating's proper drying and curing processes. While a very limited amount of reducer can be added if absolutely necessary to the STEEL-IT Polyurethane Topcoat (no more than 5%), adding too much solvent will alter the coating's chemistry.

No thinner or reducer should be used with the STEEL-IT 2213 Epoxy Ester Precoat.

2. APPLICATION

FILM THICKNESS
For proper application, we recommend one coat of 2213 Precoat at 3 mils (0.003"; 75 microns) dry film thickness (DFT), and one coat of Polyurethane Topcoat also at 3 mils (0.003"; 75 microns) DFT.

A second coat of Topcoat at 3 mils (0.003"; 75 microns) DFT can be applied for enhanced durability and longevity in harsher conditions. In that

application, apply one coat 2213 Epoxy Ester Precoat and two coats STEEL-IT Polyurethane Topcoat.

To achieve 3 mils (0.003”; 75 microns) DFT for the STEEL-IT Polyurethane System, the following wet film thicknesses (WFT) should be applied per coat:

POLYURETHANE SYSTEM	NUMBER OF MILS (MICRONS) TO APPLY WET TO GET 3 MILS (75 MICRONS) DRY PER COAT
• STEEL-IT 2213 Epoxy Ester Precoat	8 mils (0.008”; 205 microns)
• STEEL-IT 1002 Polyurethane Topcoat - Steel Gray *OR* STEEL-IT 1012 Polyurethane Topcoat - Black	10 mils (.010”; 255 microns) *OR* 9 mils (.009”; 230 microns)

PROPERLY MEASURING STEEL-IT COATINGS’ FILM THICKNESS

The amount applied should be measured when the coating is wet using a wet film thickness gauge, which is a very simple tool. A useful demonstration of how to use such a gauge can be found on YouTube at: http://www.youtube.com/watch?v=DtmEBBzlWQc.

Most electronic gauges used to measure dry film thickness can give seriously inaccurate results. Such gauges try to locate the substrate, and then measure the distance from the tool to the substrate and conclude that that is the thickness of the coating. Due to the abundance of stainless steel in STEEL-IT coatings, most electronic gauges often misinterpret this barrier coat as the substrate and report too little coating has been applied. For more information on which electronic gauges can be used with STEEL-IT, please contact: info@steel-it.com.

DRYING TIME AND RECOAT WINDOWS

STEEL-IT Polyurethane System

STEEL-IT 2213 Epoxy Ester Precoat

- Dry to touch: 1 hours
- Tack free to handle: 4 hours
- Dry to recoat window: 4-24 hours

- If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating.

STEEL-IT Polyurethane Topcoat (1002 Steel Gray or 1012 Black)

- Dry to touch: 2 hours
- Tack free to handle: 2 hours
- Dry to recoat window: 6-24 hours
- Light duty use: 36 hours; Ideally, wait 5-7 days before putting newly coated equipment into full service
- In cases when a second topcoat will be applied, subsequent coats will be dry to handle in 24 hours. If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating.
- The coating's hardness and chemical resistance increase at an accelerated pace initially, then more slowly, attaining near maximum values after two weeks.

EXPECTED COVERAGE

STEEL-IT SYSTEM	COMPRISED OF		PRACTICAL COVERAGE AT 3 MILS (75 MICRONS) DFT*
• Polyurethane System	STEEL-IT 2213 Epoxy Ester Precoat		168 sq ft/gallon (15.6 sq m/gal)
•	STEEL-IT Polyurethane Topcoat	*1002 Steel Gray*	152 sq ft/gallon (14.1 sq m/gal)
		1012 Black	180 sq ft/gallon (16.7 sq m/gal)

* Assumes 20% loss due to overspray and waste

3. THINNING AND CLEANUP

THINNING

Adding thinner or reducer is highly discouraged.

If absolutely necessary to add thinner to STEEL-IT Polyurethane Topcoat, use mineral spirits and do not dilute the coating more than 5%.

No thinner or reducer should be used with the STEEL-IT 2213 Epoxy Ester Precoat.

CLEANUP

To clean spray guns and other application equipment after applying the STEEL-IT Polyurethane System, the following solvents should be used:

Solvents to use to cleanup application equipment

COATING	SOLVENTS FOR CLEANUP
STEEL-IT Polyurethane System	Mineral spirits

4. RECOMMENDED* SPRAY GUN EQUIPMENT SETTINGS FOR USE WITH THE STEEL-IT POLYURETHANE SYSTEM

This section provides settings recommendations for commonly used types of spray gun equipment for use with STEEL-IT 2213 Epoxy Ester Precoat and STEEL-IT 1002 Steel Gray Polyurethane Topcoat or STEEL-IT 1012 Black Polyurethane Topcoat.

In some cases, it may be necessary to use a slightly narrower fluid nozzle or tip. Please adjust as necessary to achieve the proper wet film build and even coats when spraying.

* Actual settings may differ due to equipment manufacturer, altitude, or weather conditions. However, the recommendations found on the pages that follow should provide a solid starting point.

** **Siphon Feed Air Spray Guns are not recommended for use with any STEEL-IT Coating Systems.**

STEEL-IT 2213 Epoxy Ester Precoat

Conventional Gravity Feed Air Spray Guns

- Fluid nozzle: 1/4 mm (cup strainer removed)
- Air pressure: 40 psi (dynamic) of atomization air

NOTE: Applicator used was the Fpro G with a conventional air cap and a 1.4mm fluid nozzle with the cup strainer removed. The fluid nozzle and lack of strainer restriction resulted in enough fluid flow at the current viscosity to achieve a 3.5-4 inch-wide pattern using 40 psi (dynamic) of atomization air. The Fpro G would be a good applicator choice for a low-cost option for touch-ups or small hobbyist projects.

Conventional Pressure Feed Air Spray Guns

- Fluid nozzle: 1.5 mm
    - Flow rate: 400 cc/min.
- Fluid pressure: 50 psi (dynamic)
- Air Pressure: 45 psi (dynamic)

NOTE: Applicator used was the Fpro P with a conventional air cap and a smaller 1.5mm fluid nozzle. 50 psi (dynamic) of fluid pressure from the Prima 1:1 diaphragm pump allowed for 400 cc/m and room to increase fluid pressure to 30 psi (dynamic) if needed. With 45 psi (dynamic) of atomization air a 6-7.5 inch-wide pattern was achieved. As with other coatings with higher flowrates and longer continuous use, the Fpro P in the conventional configuration would be a step up in cost but also performance and efficiency to the Fpro G.

Airmix ("AAA", or "Air Assisted Airless") Guns

- Tip: .013"
- Fluid pressure: 650 psi (dynamic)
- Air pressure: 12 psi (dynamic) of atomization air

NOTE: The applicator used was the Xcite+ with a smaller 09-094 (0.013") tip and a 24VX HVLP air cap and a 100 mesh in gun filter. 650 psi (dynamic) of fluid pressure from a 30c25 3:1 piston pump providing 450 cc/m of fluid flow. With 12 psi (dynamic) of atomization air a 5.5-6.5 inchwide pattern was achieved while staying within HLVP compliance at the air cap. The Xcite+ provides a wider range of usable spray patterns utilizing similar tip orifice size with different available tip spray angles. The tip size and pressure parameters tested worked well in the middle ground of Airmix fluid pressures allowing flexibility with the application.

Heated Airmix ("Heated AAA", or "Heated Air Assisted Airless") Guns

- Transfer Efficiency (est.) 85%
    - Tip: .013" and 24VX HVLP air cap
    - Fluid pressure: 650 psi (dynamic)
    - Air pressure when triggered: 10 psi (dynamic)

NOTE: The applicator used was the Xcite+ with a 09-094 (0.013") tip and a 24VX HVLP air cap and a 100 mesh in gun filter. 650 psi (dynamic) of fluid pressure from a 30c25 3:1 piston pump providing 1800cc/m of fluid flow. With 10 psi (dynamic) of atomization air a 10-11 inch-wide pattern was achieved while staying within HLVP compliance at the air cap. The Xcite+ with the lower viscosity of the heated material achieves even more flexibility with the application. Closing the needle to lower fluid flow and adjusting the atomization air down would be recommended at this viscosity for a more controllable pattern.

Airless Guns

- Tip: 06-11 Tip Top reversible tip
- Fluid pressure when triggered: 2400 psi

NOTE: The applicator used was the Sflow with a much smaller 06-11 Tip Top reversible tip (compared to the polyurethane coatings and a 100mesh in gun filter. 2400 psi (dynamic) of fluid pressure from a 40c100 40:1 piston pump providing 500 cc/m of fluid flow. With the 06-11 (0.011") tip the pattern was 9-10 inches wide. The pattern size could easily be changed with larger smaller tip orifice sizes and tip spray angles.The Sflow would be a good applicator choice for its ease of use, possible fluid flowrates, and the easy to clean reversible tip at a loss of transfer efficiency over the Airmix technology.

NOT RECOMMENDED

Conventional Siphon Feed Air Spray Guns

- With either a 1.8 mm or 2.2 mm fluid nozzle, the product is too viscous to siphon smoothly, unless excessive pressures (90+ lbs) are used.

HVLP Guns

- At the EPA recommended limit of 10 psi at the air cap, atomization is unacceptable, even at rates as low as 4 oz./min.

STEEL-IT 1002 Steel Gray Polyurethane Topcoat

Conventional Gravity Feed Air Spray Guns

- Transfer efficiency (est.) 25%
  - Fluid nozzle: 2.2-2.7 mm
  - Air pressure: 60 psi (high, but not uncommon for viscous coatings)

NOTE: The applicator used was the Fpro G with a conventional air cap and a 2.2mm fluid nozzle with the cup strainer removed. The fluid nozzle and lack of strainer restriction resulted in enough fluid flow at the current viscosity to achieve a 3-3.5 inch-wide pattern using 60 psi (dynamic) of atomization air. Not the most efficient spray gun by any means; it gives a good appearance but will need many passes to reach proper film build.

Conventional Pressure Feed Air Spray Guns

- Transfer efficiency (est.) 30%
  - Fluid nozzle: 1.8 mm
  - Air pressure 60 psi

NOTE: The applicator used was the Fpro P with a conventional air cap and a 1.8mm fluid nozzle. 60 psi (dynamic) of fluid pressure from the Prima 1:1 diaphragm pump allowed for maximum flow at current viscosity, the flow was around 177cc/m. With 35 psi (dynamic) of atomization air a 4-5 inch-wide pattern was achieved. Using the larger 2.3mm or 2.7mm fluid nozzles and a higher atomization air to the higher side of conventional you will be able to achieve a larger pattern with the same fluid pressure. You will get higher flowrates and longer continuous using the Fpro P in the conventional configuration over the Gravity Airspray gun.

Airmix ("AAA", or "Air Assisted Airless") Guns:

- Transfer efficiency (est.) 80%
  - Tip: 0.015" and 24VX HVLP air cap
  - Fluid pressure: 1000 psi (dynamic)
  - Air pressure when triggered: 12.5 psi (dynamic)

NOTE: The applicator used was the Xcite+ with a 12-094 (0.015") tip and a 24VX HVLP air cap and a 100 mesh in gun filter. 1000 psi (dynamic) of fluid pressure from a 30c25 3:1 piston pump providing 450 cc/m of fluid flow. With 12.5 psi (dynamic) of atomization air a 8-9 inch-wide pattern was achieved while staying within HLVP compliance at the air cap. The Xcite+ provides a wider range of usable spray patterns utilizing similar tip orifice size with different available tip spray angles. The tip size and pressure parameters tested worked well in the middle ground of Airmix fluid pressures allowing flexibility with the application.

Heated Airmix ("Heated AAA", or "Heated Air Assisted Airless") Guns

- Transfer efficiency (est.) 80%
  - Tip: 0.015"
  - Fluid pressure: 1000 psi (dynamic)
  - Air pressure when triggered: 10 psi

NOTE: The applicator used was the Xcite+ with a 12-094 (0.015") tip and a 24VX HVLP air cap and a 100 mesh in gun filter. 1000 psi (dynamic) of fluid pressure from a 30c25 3:1 piston pump providing 510cc/m of fluid flow. With 10 psi (dynamic) of atomization air a 9-9.5 inch-wide pattern was achieved while staying within HLVP compliance at the air cap.The Xcite+ with the lower viscosity (35 seconds EZ Zahn#4) of the heated material achieves even more flexibility with the application.

Airless Guns

- Transfer efficiency (est.) 50%
  - Tip: 0.015” Tip Top reversible tip
  - Fluid pressure when triggered: 2000 psi (dynamic)

NOTE: The applicator used was the Sflow with a 12-13 (0.015”) Tip Top reversible tip and a 100mesh in gun filter. 2000 psi (dynamic) of fluid pressure from a 40c100 40:1 piston pump providing 700 cc/m of fluid flow. With the 12-13 tip the pattern was 10-11.5 inches wide. The pattern size could easily be changed with larger smaller tip orifice sizes and tip spray angles.The Sflow would be a good applicator choice for its ease of use, possible fluid flowrates, and the easy to clean reversible tip at a loss of transfer efficiency over the Airmix technology

NOT RECOMMENDED

Conventional Siphon Feed Air Spray Guns:

- With either a 1.8mm or 2.2 mm fluid nozzle, the product is too viscous to siphon smoothly, unless excessive pressures (90+ lbs) are used.

HVLP Guns and Heated HVLP Guns

- At the EPA recommended limit of 10 psi at the air cap, atomization is unacceptable, even at rates as low as 4 oz./min.

STEEL-IT 1012 Black Polyurethane Topcoat

(The 1012 applies similar to the 1002 with a slightly lower fluid flowrate and spray patter width.)

Conventional Gravity Feed Air Spray Guns

- Transfer efficiency (est.) 25%
  - Fluid nozzle: 2.2-2.7 mm
  - Air pressure: 60 psi (high, but not uncommon for viscous coatings)

NOTE: The applicator used was the Fpro G with a conventional air cap and a 2.2mm fluid nozzle with the cup strainer removed. The fluid nozzle and lack of strainer restriction resulted in enough fluid flow at the current viscosity to achieve a 2.5-3 inch-wide pattern using 60 psi (dynamic) of atomization air. Though restricted at this viscosity, the Fpro G with the 1012 would still be a possible applicator choice for a low-cost option for touch-ups or small hobbyist projects.

Conventional Pressure Feed Air Spray Guns

- Transfer efficiency (est.) 30%
  - Fluid nozzle: 1.8 mm
  - Air pressure 60 psi

NOTE: The applicator used was the Fpro P with a conventional air cap and a 1.8mm fluid nozzle. 60psi (dynamic) of fluid pressure from the Prima 1:1 diaphragm pump allowed for maximum flow at current viscosity which was around 140cc/m. With 45 psi (dynamic) of atomization air a 5-6.5 inch-wide pattern was achieved. Using the larger 2.3mm or 2.7mm fluid nozzles and a higher atomization air to the higher side of conventional you will be able to achieve a larger pattern with the same fluid pressure. With higher flowrates and longer continuous use the Fpro P in the conventional configuration would be a step up in cost but also performance and efficiency to the Fpro G.

Airmix ("AAA", or "Air Assisted Airless") Guns:

- Transfer efficiency (est.) 80%
  - Tip: 0.015" and 24VX HVLP air cap
  - Fluid pressure: 1000 psi (dynamic)
  - Air pressure when triggered: 12.5 psi (dynamic)

NOTE: The applicator used was the Xcite+ with a 12-094 (0.015") tip and a 24VX HVLP air cap and a 100 mesh in gun filter. 1000 psi (dynamic) of fluid pressure from a 30c25 3:1 piston pump providing 440cc/m of fluid flow. With 10 psi (dynamic) of atomization air a 5-6 inch-wide pattern was achieved while staying within HLVP compliance at the air cap. The Xcite+ provides a wider range of usable spray patterns utilizing similar tip orifice size with different available tip spray angles.The Tip size and pressure parameters tested worked well in the middle ground of Airmix fluid pressures allowing flexibility with the application.

Heated Airmix ("Heated AAA", or "Heated Air Assisted Airless") Guns

- Transfer efficiency (est.) 80%
  - Tip: 0.015"
  - Fluid pressure: 1000 psi (dynamic)
  - Air pressure when triggered: 10 psi

NOTE: The applicator used was the Xcite+ with a 12-094 (0.015") tip and a 24VX HVLP air cap and a 100 mesh in gun filter. 1000 psi (dynamic) of fluid pressure from a 30c25 3:1 piston pump providing 500cc/m of fluid flow. With 10 psi (dynamic) of atomization air a 5-6.5 inch-wide pattern was achieved while staying within HLVP compliance at the air cap. The Xcite+ with the lower viscosity (30 seconds EZ Zahn#4) of the heated material achieves even more flexibility with the application.

Airless Guns

- Transfer efficiency (est.) 50%
    - Tip: 0.015” Tip Top reversible tip
    - Fluid pressure when triggered: 2000 psi (dynamic)

NOTE: The applicator used was the Sflow with a 12-13 (0.015”) Tip Top reversible tip and a 100mesh in gun filter. 2000 psi (dynamic) of fluid pressure from a 40c100 40:1 piston pump providing 700cc/m of fluid flow. With the 12-13 tip the pattern was 8-9.5 inches wide. The pattern size could easily be changed with larger smaller tip orifice sizes and tip spray angles.The Sflow would be a good applicator choice for its ease of use, possible fluid flowrates, and the easy to clean reversible tip at a loss of transfer efficiency over the Airmix technology.

NOT RECOMMENDED

Conventional Siphon Feed Air Spray Guns:

- With either a 1.8mm or 2.2 mm fluid nozzle, the product is too viscous to siphon smoothly, unless excessive pressures (90+ lbs) are used.

HVLP Guns and Heated HVLP Guns

- At the EPA recommended limit of 10 psi at the air cap, atomization is unacceptable, even at rates as low as 4 oz./min.