STEEL-IT® Polyurethane System – Comprised of STEEL-IT 2203 Alkyd Primer and STEEL-IT 1002 Polyurethane Topcoat

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

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Table of Contents

PROPER SURFACE AND COATING PREPARATION

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. That is, the cause of the failure most often has nothing to do with the coating itself.

SURFACE PREPARATION

Proper surface preparation is key to the success of any coating job, whether the coating is STEEL-IT or another brand.

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

- The surface being coated should ideally be grit blasted. STEEL-IT coatings need a rough, "scarified" surface in order to have something to bite into to adhere properly.

- When applying the STEEL-IT Epoxy System, a steel surface should be grit blasted to a 1.5 - 2.0 mils (0.0015" – 0.0020"; 38-50 microns) sharp angular cut profile per SSPC-SP 6 (Commercial Blast).

- Once the surface has been properly prepared, running a fingernail along the grit blasted surface should feel very similar to running a fingernail along the striking area of a matchbox. Similarly, the grit blasted surface should feel like it had been machine sanded using #36 grit sandpaper.

If blasting is not an option, power sanding using #36 grit paper will achieve similar results.

Another surface preparation option for the Epoxy 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 Epoxy 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.

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 with 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 and, in fact, **adding solvents is discouraged since they alter the chemistry of STEEL-IT coatings and may negatively affect the coating's proper drying and curing processes.**

SAFETY PRECAUTIONS AND APPLICATION

SAFETY

When applying STEEL-IT 2203 Alkyd Primer and STEEL-IT 1002 Polyurethane Topcoat it is critical to use:

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

FILM THICKNESS

Finally, it's critical to say a word about the amount of STEEL-IT that should be applied. Typically, it's recommended to apply one coat of primer at 3 mils (0.003"; 75 microns) dry film thickness (DFT), and one coat of topcoat also at 3 mils (0.003"; 75 microns) DFT.

A second coat at 3 mils (0.003"; 75 microns) DFT of topcoat can be applied in situations where conditions are particularly harsh due to chemical-, abrasion-, or impact-exposure, as examples.

In order to achieve 3 mils (0.003"; 75 microns) DFT of the STEEL-IT Epoxy System, the following wet film thicknesses (WFT) should be applied:

POLYURETHANE SYSTEM	NUMBER OF MILS (MICRONS) TO APPLY WET TO GET 3 MILS (75 MICRONS) DRY
• STEEL-IT 2203 Alkyd Primer	8 mils (.008"; 200 microns)
• STEEL-IT 1002 Polyurethane Topcoat	11 mils (.011"; 275 microns)

PROPERLY MEASURING STEEL-IT COATINGS' FILM THICKNESS

There's one more important point about film thickness and STEEL-IT, and that concerns how to measure it. **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.

When using STEEL-IT brand coatings, most electronic gauges used to measure dry film thickness can give seriously inaccurate results. That's because 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. However, because of the abundance of stainless steel in STEEL-IT coatings and the fact that they form a barrier coat of stainless steel near the surface of the coating, most electronic gauges often misinterpret this barrier coat as the substrate and report too little coating has been applied.

Electronic Gauges That Correctly Measure STEEL-IT's DFT

After working with STEEL-IT brand coatings, two leading electronic dry film thickness gauge companies – Defelsko Instruments and Imaginant/PELT – have determined that the following models accurately measure STEEL-IT coatings' DFT:

Defelsko Instruments

1. PosiTector 6000 F1
2. PosiTest FM mechanical (magnetic principle) coating thickness gauge,
3. PosiTest DFT ferrous (magnetic principle) electronic instrument

Imaginant/PELT

1. µPts3H Pelt ultrasonic film thickness gauge, coupled with a PELT-XER-M100 transducer and FC-U1STU40 wearcap

Both manufacturers recommend that if customers have difficulty reading STEEL-IT brand coatings thicknesses, that the customer contact them directly for guidance.

DRYING TIME AND RECOAT WINDOWS

STEEL-IT Polyurethane System

STEEL-IT 2203 Alkyd Primer

- 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 1002 Polyurethane Topcoat

- 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	STEEL-IT 2203 Alkyd Primer	160 sq ft/gal (15 sq m/gal)
	STEEL-IT 1002 Polyurethane Topcoat	120 sq ft/gal (11 sq m/gal)

* Assumes 20% loss due to overspray and waste

THINNING AND CLEANUP

Thinning

As explained above in the section *Sufficient Agitation*, it is unnecessary to use thinners when working with STEEL-IT brand coatings. Unlike the case with other paints and coatings, power agitation of STEEL-IT while it's still in the can – that is, adding sufficient energy to break short-term chemical bonds that have formed and thickened the coating – is the way to thin STEEL-IT and prepare it for spraying or other form of application.

Cleanup

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

Solvents to use to cleanup application equipment

COATING	SOLVENTS FOR CLEANUP
• STEEL-IT 2203 Alkyd Primer	Mineral spirits; Xylene
• STEEL-IT 1002 Polyurethane Topcoat	Mineral spirits; Xylene

RECOMMENDED* SPRAY GUN EQUIPMENT SETTINGS OVERVIEW

This section provides settings recommendations for eight (8) types of spray gun equipment for use with the STEEL-IT Polyurethane System (i.e., primer and topcoat).

Spray Gun Equipment Types Evaluated

1. Conventional Gravity Feed Air Spray Guns
2. Conventional Pressure Feed Air Spray Guns
3. HVLP Guns
4. Heated HVLP Guns
5. Airmix (“AAA”, or “Air Assisted Airless”) Guns
6. Heated Airmix (“Heated AAA”, or “Heated Air Assisted Airless”) Guns
7. Airless Guns
8. Conventional Siphon Feed Air Spray Guns**

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

** Conventional Siphon Feed Air Spray Guns are not recommended for use with any of the three STEEL-IT Coating Systems considered.

STEEL-IT Polyurethane System

- **<u>STEEL-IT 2203 Alkyd Primer</u>**

  Conventional Gravity Feed Air Spray Guns
  - Transfer Efficiency (est.) 20%
    - Fluid nozzle: 2.2 mm
      - Flow rate:
        - Without atomizing air: 2 oz./min.
        - With atomizing air: 4 oz./min.
    - Air pressure: 70 psi (high, but not uncommon for viscous coatings)

  Conventional Pressure Feed Air Spray Guns
  - Transfer efficiency (est.) 20%
    - Fluid nozzle: 1.8 mm (with ¼" fluid hose)
      - Flow rate: 4 oz./min.
    - Fluid nozzle: 2.2 mm (with 3/8" fluid hose)
      - Flow rate: 6 oz./min.
    - Air pressure: 70 psi (high, but not uncommon for viscous coatings)
    - Fluid pressure on pot 70 psi

  Heated HVLP Guns
  - Transfer Efficiency (est.) 60%
    - Fluid nozzle: 1.8 mm
      - Flow rate 4 oz./min.
    - Fluid pressure on pot: 40psi
    - Inline heater temp: 110^0 F

  Airmix ("AAA", or "Air Assisted Airless") Guns
  - Transfer efficiency (est.) 75%
    - Tip: .015
      - Flow rate: 10 oz./min.
    - Fluid pressure: 1000 psi.
    - Air pressure when triggered: 10 psi.

- **STEEL-IT 2203 Alkyd Primer (cont.)**

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

- Transfer Efficiency (est.) 85%
  - Tip: .015"
    - Flow rate: 10 oz./min.
  - Fluid pressure: 800 psi
  - Air pressure when triggered: 10 psi
  - Inline heater temperature: 110^0 F

Airless Guns

- Transfer Efficiency (est.) 45%
  - Tip: .016 airless
    - Flow rate: 20 oz./min.
  - Fluid pressure when triggered: 2000 psi

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 Polyurethane Topcoat**

Conventional Gravity Feed Air Spray Guns

- Transfer efficiency (est.) 25%
  - Fluid nozzle: 2.2-2.7 mm
    - Flow rate:
      - Without atomizing air: 3 oz./min.
      - With atomizing air: 6 oz./min.
  - Air pressure: 60 psi (high, but not uncommon for viscous coatings)

Conventional Pressure Feed Air Spray Guns

- Transfer efficiency (est.) 30%
  - Fluid nozzle: 1.8 mm with ¼" fluid hose
    - Flow rate 6 oz./min.
  - Air pressure 40 psi
  - Fluid pressure on pot: 50 psi

Heated HVLP Guns

- Transfer efficiency (est.) 60%
  - Fluid nozzle: 1.8 mm
    - Flow rate: 8 oz./min.
  - Fluid pressure on pot: 40 psi
  - Inline heater temp: 110^0F

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

- Transfer efficiency (est.) 80%
  - Tip: .015
    - Flow rate: 14 oz./min.
  - Fluid pressure: 1000 psi.
  - Air pressure when triggered: 10 psi.

- **STEEL-IT 1002 Polyurethane Topcoat (cont.)**

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

- Transfer efficiency (est.) 80%
  - Tip: .015
    - Flow rate: 16 oz./min.
  - Fluid pressure: 1000 psi.
  - Air pressure when triggered: 10 psi
  - Inline heater temperature: 110^0 F

Airless Guns

- Transfer efficiency (est.) 50%
  - Tip: .016 airless
    - Flow rate: 18 oz./min.
  - Fluid pressure when triggered: 1000 psi

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

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