

Surface Preparation Guidelines

At PES we have developed a range of products for coating for steel and concrete which offer flexibility to the user with regards to surface preparation. As a manufacturer we would always recommend that the best possible surface preparation be completed prior to the application of our products. However, through experience we know that on many projects this is not possible. As a guide the more aggressive the chemical, temperature and operating environment the more stringent our preparation guidelines will become.

Steel

Some of the various methods of surface preparation of steel are described below, such as;

- *International Standard ISO 8504:1992(E). Preparation of steel substrates before application of paints and related products - Surface preparation methods.*
- *International Standards ISO 8501-1:1988(E) and ISO 8501-2:1994. Preparation of steel substrate before application of paints and related products – Visual assessment of surface cleanliness.*
USA Standard ISO 8501-1 Society of Protective Coatings (SSPC), National Association Engineers International, Swedish Standard, SIS 05 59 00 (1967) - Pictorial Surface Preparation Standards for Painting
- *Steel Surfaces*



As standard, PES uses the internationally accepted SSPC and NACE standard for Surface preparation guidance for all coatings and repair materials.

The performance of our coatings applied to steel will be significantly affected by the condition of the steel substrate immediately prior to painting. The principal factors affecting performance are;

- *Contamination on the surface of the steel including salts, grease, oils, drilling and cutting fluids.*
- *Rust and mill scale.*
- *Surface profile.*

The main objectives of surface preparation are to ensure that all surface contaminants have been removed and a coarse profile (key) has been created for the PES coating to adhere too.



Concrete

To ensure a clean surface for the recommended PES coating, the concrete surface must be roughened by blasting, scarifying or grinding. The type of method used depends on the conditions of the concrete surface and the working environment of the application.

- *Blasting: the concrete should be blast cleaned using a recovery unit*
- *Scarifying: the machines used include fast rotating hardened flails which remove old coatings and can be set to roughen the concrete surface to various depths*
- *Grinding: the most popular method of grinding concrete is using mechanical diamond grinders which scarify the surface of the concrete ensuring a good key and removing any loose material or existing coating.*

Hand Tool Cleaning

Loosely adhering mill scale, rust and old paint can be removed from the surface using a wire brush, sandpaper or scraper. This type of surface preparation will only remove surface contaminants that are visible to the eye and will not remove any ingrained contamination. For this particular type of surface preparation it is recommended that only the following PES coatings be used;

PES-Chem 501 CRSG, PES-Chem 502 CRXF, PES-Chem 506 Aluprime

PES-Chem 554 RB Membrane, PES-Chem 555 Pesinox

Notes on application; the surface must be dry and then degreased using an appropriate solvent cleaner such as MEK (Methyl Ethyl Ketone).



Power Tool Cleaning

Generally more effective and less time consuming than hand tool cleaning, power tools such as grinders, sanders, needle guns, power wire brushes and MBX bristle blasters will remove rust and mill scale but will not remove tightly adhered contaminants. PES testing has shown the MBX bristle blaster to give the best adhesion results. For this particular type of surface preparation it is recommended that only the following PES coatings be used;

PES-Chem 501 CRSG, PES-Chem 502 CRXF, PES-Chem 506 Aluprime, PES-Chem 507 DWPU, PES-Chem 555 RB Membrane, PES-Chem 555 Pesinox

Notes on application; the surface must be dry and then degreased using an appropriate solvent cleaner such as MEK (Methyl Ethyl Ketone).

Blast Cleaning

The most effective method for removal of mill scale, rust and old coatings, is by blasting with abrasive media. The primary standard quoted by PES for surface preparation is SSPC-SP10, 3 mil profile. The key areas to be considered during any blasting process are;

- The presence of salts, grease and oils on the surface. These may appear to be removed during the blasting process. However they may have been ingrained into the surface of the metal and will require sweating from the metal substrate by repeated blasting or power washing.
- Weld Seam, metal slivers and sharp edges must be ground down after the blasting process as coatings tend to run off sharp edges and will result in thinning of the paint surface.
- Weld spatter is proven to be one of the main reasons for failure and must be removed, as the spatter is likely to be poorly adhered to the steel surface.



We recommend for the best profile that angular grit of 80-12 mesh size grain be used

To achieve a surface profile of the steel ranging from 3-4 mils.

For this particular type of surface preparation it is recommended that the following PES coatings be used;

PES-Chem 501 CRSG, PES-Chem 502 CRXF, PES-Chem 506 Aluprime, PES-Chem 507 DWPU, PES-Chem 511 UCEN, PES-Chem 554 RB Membrane, PES-Chem 555 Pesinox

Notes on application; PES-Chem 501 CRSG, 502 CRXF, 506 Aluprime can be applied to damp surfaces and surfaces that have

Preparation of Steel Surfaces



Wet Abrasive Blasting

Wet abrasive blasting uses slurry of water and abrasive rather than dry abrasive alone. The main advantage of this type of surface preparation is the eradication of dust from the application area. Also while blasting the fluids wash out any contaminants embedded in the pitting and scarring on the surface of the steel. However, a disadvantage of this technique is that the cleaned steel begins to rust rapidly after blasting and therefore it is essential that rust inhibitors are used in the wet abrasive mix. Careful selection is required to ensure that these do not adversely affect adhesion. For this particular type of surface preparation it is recommended that the following PES coatings be used;

PES-Chem 501 CRSG, PES-Chem 502 CRXF, PES-Chem 506 Aluprime, PES-Chem 507 DWPU, PES-Chem 511 UCEN, PES-Chem 554 RB Membrane, PES-Chem 555 Pesinox

Hydroblasting

Hydroblasting is considered to be the most environmentally friendly method of surface preparation as it relies entirely on the energy of water striking the surface. No abrasive is included in the water and therefore eradicates problems caused by dust and the disposal of blasting abrasive.

High pressure hydroblasting, operating at pressures between 680 bar (10,000psi) and 1,700 bar (25,000psi).

For this particular type of surface preparation it is recommended that the following PES coatings be used;

PES-Chem 501 CRSG, PES-Chem CRXF, PES-Chem 506 Aluprime, PES-Chem 507 DWPU, PES-Chem 511 UCEN, PES-Chem 554 RB Membrane, PES-Chem 555 Pesinox

Ultra High Pressure Hydroblasting

The ranges of pressures used in UHPH are 2,000-2,500bar (30,000-36,000psi). Steel surfaces produced by hydroblasting do not look the same as those produced by dry abrasive blasting, or slurry blasting. This is due to the water being unable to cut or deform the steel surface in the way abrasives can. Hydroblasted surfaces, therefore, tend to look dull prior to flash rust. Flash rust is caused by oxidation as the Hydroblasted steel dries and should be removed by hard bristle brush or by washing down with high pressure fresh water. Hydroblasting does not produce a surface profile like blast abrasives, the surface profile exposed by UHPH will have been produced by earlier preparation work, i.e. during original fabrication work, or by corrosion. To ensure UHPH produces the required surface profile for PES products it is advised to test a small area of the surface to check the original surface profile of the steel.

The energy created during the Ultra High Pressure Hydroblasting process can also cause the steel substrate to increase in temperature and therefore reduce the drying time of the steel prior to application of the chosen PES coating.

For this particular type of surface preparation it is recommended that the following PES coatings be used;

PES-Chem 501 CRSG, PES-Chem CRXF, PES-Chem 506 Aluprime, PES-Chem 507 DWPU, PES-Chem 511 UCEN, PES-Chem 554 RB Membrane, PES-Chem 555 Pesinox



Preparation of Concrete Surfaces



Concrete

As previously stated there are three ways of preparing concrete surfaces – blasting, scarifying and grinding.

- Blasting: generally blasting of concrete is achieved at lower pressures than with steel to ensure that the aggregates are not exposed. Blasting is recommended when existing coatings have to be removed from the surface and also when it is known the concrete has been badly contaminated.
- Scarifying: this should be used when the top surface of the concrete has been badly damaged or has severe oil or chemical contamination. Scarifying or scrabbling can plain up to 3" off the surface of the concrete.
- Grinding: this should be used on sound concrete surfaces or on existing coatings which are compatible with PES systems.

PES coatings will be affected by moisture in the concrete surface, as a rule moisture content must not register more than 6-7% in the slab. If moisture readings taken higher than this we would recommend the application of PES-Chem 505 Damp Seal on any surface reading up to 30%. Please contact your PES technical consultant with regards to any questions on this subject.

PES Recommendations and Method Statements

Please contact PES at PES1@PES-SOLUTIONS.COM or 888-778-6510 for further clarification or to request a method statement.