

## CLEANING OF METALS

### Common Contaminates

#### Type A (mild adherence)

- airborne particles – mild soot
- evaporation patterns

Type A contaminants can be cleaned from the surface of nearly any metal using hot water and a mild detergent. Pressure washing will also aid the cleaning of the metal surface. (Note care in not driving water into the seams between metal panels).

Such cleaning processes can be performed on most lacquered and patinated metal surfaces without harming the protective oxide layers. It is recommended to clean metal surfaces this way at least yearly.

#### Type B (mild adherence)

- greases and oils
- grease pencils
- fingerprints
- adhesives
- hard water spots and scale

Type B contaminants are more adherent and require something that will dissolve and displace the oils or organic polymers used as binders. Xylene will work on metal surfaces without harming them, as will window cleaners containing vinegar or citrus based, biodegradable cleaners. Note, if a lacquered coating is on the metal, solvents and strong cleaners can damage or remove the lacquer.

There are a variety of cleaners available at local hardware stores that contain varieties of solvents. Some solvents work well on dissolving and displacing hydrocarbon based oils and paints while others work better on acrylic polymer based adhesives. Thoroughly rinse the surface after cleaning. You can follow up with a window cleaner to remove streaking.

Type C (strong adherence – partial etching)

- dirt deposits from silicone joints
- bird waste
- concrete splatter
- plaster
- silicone
- baked on substances
- chlorides such as de-icing salts (before chemical attack or rusting)
- paint and graffiti

Type C contaminants can be daunting. Removal of these can remove the oxide layer and lacquers if present. Attempt the solution for the Type A contaminants first. Direct pressure of the washing nozzle to the proximity of the contaminant and see if this removes the particles. If the contaminant is new and has not yet developed molecular bonds with the metal surface it should release. At this point, various techniques for different metal finishes should be considered.

Aluminum – Mild abrasive slurry can be considered. Test an area of the surface first. Scratching anodized surfaces can ruin them so exercise caution. Lacquer thinners or paint removers will not have a detrimental effect on the metal surface.

Copper and Copper Alloys – Any abrasive will remove a portion of the oxide or patina that is present on the surface. This will have to be restored after cleaning. Removal of paints and graffiti using lacquer thinner or other paint remover should have little effect on the copper oxide. Sealants and the oils they exude will brighten the copper surface in the proximity of the seal or where run off waters collect. Compounds emitted from sealants, even years after they are applied, inhibit the natural oxide growth copper and copper alloys are known for. The sealant needs to be removed or sealed over with a paint coating if possible. Otherwise, expect continued brightening.

Stainless steels – Consider a copper knife or copper scraper to remove adherent particles. Used correctly, the soft copper will not scratch the stainless steel surface. Chlorides are the greatest concerns to stainless steels. These should be removed at the earliest possible time to prevent etching the surface.

Titanium – Titanium has an exceptional hardness and thus a copper knife can be used similar to stainless steel. The oxide can be scratched if other abrasives are used. Very few solvents will harm titanium. Salts can be washed from the surface.

Zinc – Zinc is a soft metal and its oxide is also very soft. Many substances will stain zinc surfaces as they decay and interact. Salts and bird waste should be removed before they have the opportunity to decay. Mild abrasives can be used. It is suggested that test areas be tried.

Most solvents used to remove paint will not affect the zinc oxide. The trouble is the porosity of the zinc surface holds the paint, making it more difficult to remove.

#### Type D (chemical attack)

- rust
- oxides, sulfides and carbonates
- heat tint / discoloration from heat oxidation
- steel rust particles

Type D Contaminants are molecular interactions with the ambient. The chemical and atomic bonds made are not removable without the removal of some of the surface. For stainless steels that have been attacked by de-icing salts or other halogen salts, the rusting that results can be cleaned with commercial rust removers. Generally, they involve dilute phosphoric acid. After removal, thoroughly rinse the surface. Heat tinting oxides on steel or stainless steels can successfully be removed using phosphoric acid based cleaners. Phosphoric acid based cleaners will dissolve the oxide surface from copper alloys leaving them bright.

Zahner has proprietary solutions for cleaning a number of oxides, sulfides and carbonates from metals. Stains such as white staining of zinc or galvanized surfaces, dark red stains on lead or terne surfaces can be removed. Feel free to contact us to discuss your specific requirements.