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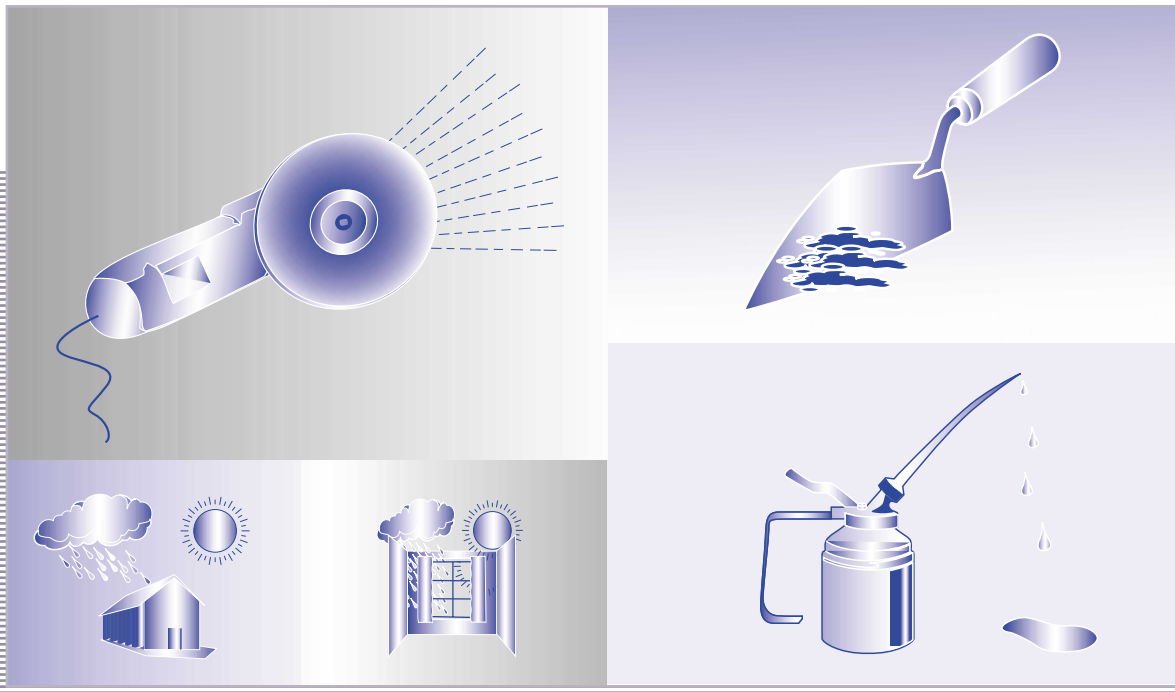
The European Stainless Steel Development Association

Cleaning and Maintenance of Stainless Steel Architectural Surfaces



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1. Introduction

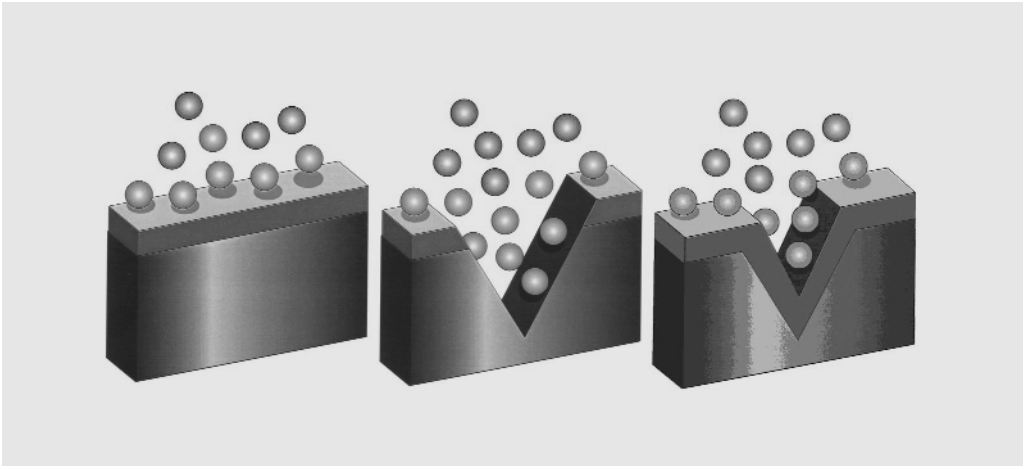
Stainless Steels are inherently corrosion resistant materials that do not need additional surface protection to enhance their appearance and durability. Some routine maintenance and cleaning is needed to keep stainless steel surfaces in good condition so that the aesthetic appearance and corrosion resistance are not compromised. In this respect, stainless steels are no different to other construction materials such as glass, plastics or coated steels, which are never maintenance free throughout the life of a building.

These guidelines are to give building owners, developers and facility managers advice on efficient, cost-effective cleaning that will allow them to take advantage of the corrosion resistant properties of stainless steel.

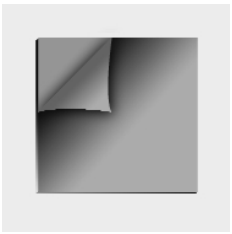
2. The Self-Repair Mechanism of Stainless Steel

First of all, it is important to understand why stainless steel is so corrosion resistant. The alloying elements in stainless steel form a thin, transparent "**passive layer**" on the surface. Although this protective passive layer is only a few atoms thick, it instantaneously reforms in the presence of oxygen from air or water, so even if the material is scratched or damaged the passive layer continues protecting the surface from corrosion.

This explains why stainless steel does not require any coating or other corrosion protection to remain bright and shiny even after decades of use.

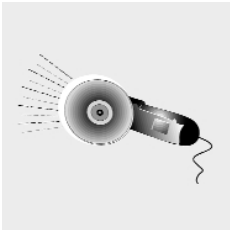


3. Initial Cleaning



The first cleaning is generally done before the building is handed over to the owner. If the stainless steel parts have been protected adequately then simple "maintenance cleaning" at the hand-over stage will probably be sufficient.

An **adhesive plastic film** during fabrication, transport and assembly often protects stainless steel parts.



Although providing excellent protection against damage and soiling, some plastic films deteriorate on exposure to the ultraviolet radiation in sunlight and which can make them difficult to strip. The film adhesives can also stick to the stainless steel surface. Protective plastic films should be removed as soon as they are no longer needed for protection during the installation / erection stage, starting at the top of the building and working downwards.

Mortar and cement splashes can be treated with a solution containing a small amount of phosphoric acid. Rinse with water (preferably deionised water) and dry. Deionised water reduces the risk of water staining marks.

Proprietary products are available from specialists finishing companies. Never allow mortar removers or diluted hydrochloric acid to be used on stainless steel. If they have accidentally been applied to or spilt over the stainless steel, rinse generously with fresh water.

Building contractors and tradesmen are not always aware of how dangerous proprietary building mortar removers containing hydrochloric acid are to stainless steel components. This should be stressed. If possible, the sequence of operations should be changed so that any ceramic tile fixing and cleaning is completed before neighbouring stainless steel components such as skirting boards or kick plates are installed.

Iron particles picked up from tools or from contact with structural steel, scaffold-tubing etc. must be removed immediately.

Steel dust particles created during operations such as welding, cutting, drilling and grinding of carbon (non-stainless) steel will rust quickly. Besides corroding themselves, these particles can locally break the self-healing "passive film" of stainless steel resulting in pitting corrosion in spite of their normally good corrosion resistance.

At an early stage, light deposits can be removed mechanically using nylon pads, such as the “Scotch-Brite” type used in the kitchen. Alternatively the contamination can be removed with a proprietary stainless steel cleaner containing phosphoric acid.

If pitting attack has occurred, depending on its severity, acid pickling treatments or mechanical rectification will be needed to restore the surface. Pickling agents in paste form are available for localised, on-site application. Care must be taken to use these products in accordance with the

supplier's directions so that there is a safe system of work and the relevant legislation on environmental protection is adhered to. Specialist finishing companies will often carry out this service on site.

While restoring the corrosion resistance of the surface, pickling may change the surface appearance of the steel. Further mechanical or chemical treatments may be necessary to restore the original surface finish. It is therefore advisable to avoid contamination, in the first place by either protecting the stainless steel parts, whilst other work is being done or by installing them after other operations that could cause contamination have been completed.

4. Maintenance Cleaning

On **external applications**, such as facades, rainfall can normally be expected to wash off accumulations of dirt and other deposits efficiently, depending on the amount of exposure of the elevation.

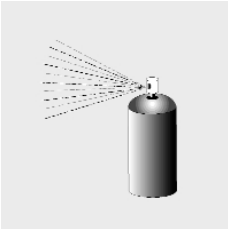
Special attention should be given to sheltered areas during routine cleaning to ensure that accumulations of airborne contaminants are removed. This is particularly important in marine and industrial environments, where build-up of airborne chlorides or SO_X can result in localised corrosion, if not effectively removed.

On **interior applications**, finger marks can be an issue. There is a wide range of finishes available for stainless steels, many of which are particularly suitable for use in heavily exposed (high traffic) public areas. Selecting finishes that are less sensitive to fingerprint marking in the design process will reduce the effort and costs of cleaning during the service life of the finished building.

Brushed finishes, which are a popular choice for interiors, may show finger marks in the period immediately after installation, but the visibility of the marking should become less evident after the first few cleaning operations.

5. Cleansers

To remove **fingerprints** and other marks from architectural finishes, soapy water or a mild detergent are usually safe and successful.



Proprietary spray cleaners are available, which combine ease of cleaning with a light film that produces an even and smooth lustre. These spray cleaners remove existing fingerprints and leave the surface in a condition that reduces the tendency for fingerprints to show in subsequent service. After applying the spray to the surface, polish with a dry cloth. Your nearest national stainless steel development association should be able to advise on products locally available.

Mirror-polished stainless steel can be cleaned with glass cleansers. These products should be selected chloride-free.

For **more stubborn stains**, mild household cream cleansers should be effective. This should also be suitable for cleaning off watermarks and light discolouration. After cleaning, remove the residues with (preferably deionised) water (available in supermarkets, e.g. for steam ironing or car batteries) and dry to avoid streaking and water marks. Scouring powers should not be used as these products can leave scratches on stainless steel surfaces.

Severe oil and grease marks can be removed with alcohol based products, including methylated spirit and isopropyl alcohol or other solvents such as acetone. These products are not a corrosion hazard to stainless steel.

Care is needed with solvents to avoid spreading the staining on the stainless steels, which can then be difficult to fully remove. It is advisable to apply clean solvent several times with a clean, non-scratching cloth, until all traces of the partially dissolved oil / grease are removed.

Paint and graffiti can be treated with proprietary alkaline or solvent-based paint strippers. The use of hard scrapers or knives should be avoided as the underlying stainless steel surface may become scratched.

Heavily neglected surfaces can be treated with metal polishes, such as those for cleaning chromium-plated items (e.g. automotive trim). Furthermore, polishes used for re-finishing car paint can be considered. Care must be taken as highly polished surfaces may become scratched with these cleaners.

Alternatively, use a proprietary stainless steel cleaner containing phosphoric acid to remove contamination, rinse with deionised water and dry. It is advisable that the entire surface of the component is treated so that a patchy appearance is avoided.

Before commencing any task, ensure that you have received the appropriate health and safety literature from the supplier and fully understand it. If in doubt, seek further advice.

Cleaners that should NOT be used on stainless steels include:

- chloride-containing cleansers, especially those containing hydrochloric acid,
- hypochlorite bleaches should not be used on stainless steels; if applied accidentally or spilt on stainless steel surfaces, should be rinsed off immediately with liberal amounts of fresh water,
- silver-cleaners must not be used on stainless steel.

6. Cleaning Utensils

A damp cloth or chamois leather will usually be suitable for removing normal soiling, fingerprints, etc.

For more stubborn dirt, **nylon pads** such those known as "Scotch-Brite" pads are usually satisfactory. Non-stainless steel based scouring pads, cleaning wool or wire brushes must not be used on stainless steel. Apart from scratching the surface, these pads can leave carbon steel deposits on the stainless surface, which can subsequently develop into rust spots, if the surface becomes wet.

Soft nylon brushes can be used for cleaning stainless steel with patterned finishes. Non-stainless steel wire brushes must not be used.

On "grained" directional finishes, such as EN 10088-3 types G, J and K the direction of cleaning strokes should be along the grain and not across it.

Where water has been used for cleaning or rinsing, **wiping the surface dry** to prevent watermarks, especially in hard water areas may be advisable. The use of deionised water will prevent the formation of hard water staining.

To avoid "cross-contamination" from iron particles, ensure that cleaning utensils have not been used for "ordinary" (i.e. carbon) steel before. Cleaning materials for use on stainless steel items should preferably be reserved exclusively for that purpose.

7. Cleaning Intervals

The cleaning of stainless steel items for building interiors is really no different to other materials. Cleaning should be done before there is a visible build up of soiling or finger-marking, so that the effort and cost of cleaning is minimised along with the risk of marking or altering the appearance of the surfaces.

On building exterior applications, stainless steel may be exposed to a wider range of potentially more aggressive environments as a result of contact with:

- marine atmospheres,
- environments laden with industrial pollutants,
- salt spray from road de-icing salt,
- atmospheric dirt and traffic film.

All cause brown staining to appear. It is a good practice to clean the stainless steel at the **same frequency as the building's windows (glazing)**. Depending on the severity of soiling and deposit build up, routine cleaning frequencies of 6-12 months for light soiling and 3-6 months for heavy soiling or environments such as those listed above is advisable. A stainless steel cleaner containing phosphoric acid will remove this form of contamination.

8. Literature

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The European
Stainless Steel
Development Association

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Diamant Building · Bd A. Reyers 80 · 1030 Brussels · Belgium · Phone +32 2 706 82-67 · Fax -69 · e-mail info@euro-inox.org · www.euro-inox.org