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Maintenance Advice for Stainless Steel in Catering



Although it has been used daily for nearly 100 years, many cooks and workers in the catering industry know little about stainless steel except its name. Numerous false ideas are current about this subject and a number of users know little of the precautions to take to keep it looking new.

Through the explanations contained in this document we hope to help you to be proud of your material even after years of use when you are in the kitchen.

This document is also for the installers of new kitchens and hardware manufacturers to help eliminate cases of corrosion unfortunately still encountered today in this sector.

01 The specifics of stainless steel

02 Products which cause corrosion

- 2.1 Chlorides
- 2.2 Acids
- 2.3 Soda

03 The right tools

04 Advice for manufacturers and designers of Kitchen hardware

Manufacture of stainless steel... like a cooking recipe

The main ingredients

- Chromium $\geq 10,5 \%$
- Iron
- Carbon $\leq 1,2 \%$

Iron + Carbon = steel

Iron + Carbon + Chromium = stainless steel

Some variations to the main recipe

It is of course possible to add many other elements such as nickel, molybdenum, titanium... to speak only of the most well known.

Very like adding salt or sugar to a preparation, each of these elements give a particular property to the stainless steel.

A careful preparation

All these components are melted together in very big pots called pockets, then poured out in the form of a sheet which very like chocolate solidifies on cooling. This sheet is afterwards cut into blocks called slabs which are reduced in thickness by rolling between two cylinders on the same principal as thinning pastry. During the different stages of manufacture the stainless steel is reheated in ovens.

At the end we obtain a bright or matt metal which is used in the manufacture of cooking hardware, utensils, work tops, oven interiors but also pans, lids...



Stainless steel: the material of chefs

Worldwide, the large majority of professional kitchen equipment is in stainless steel, ideal material by reason of its numerous properties.

Amongst all these properties, we are speaking mainly about corrosion which can be avoided by taking a few precautions that we shall present to you.





1. Stainless steel characteristics

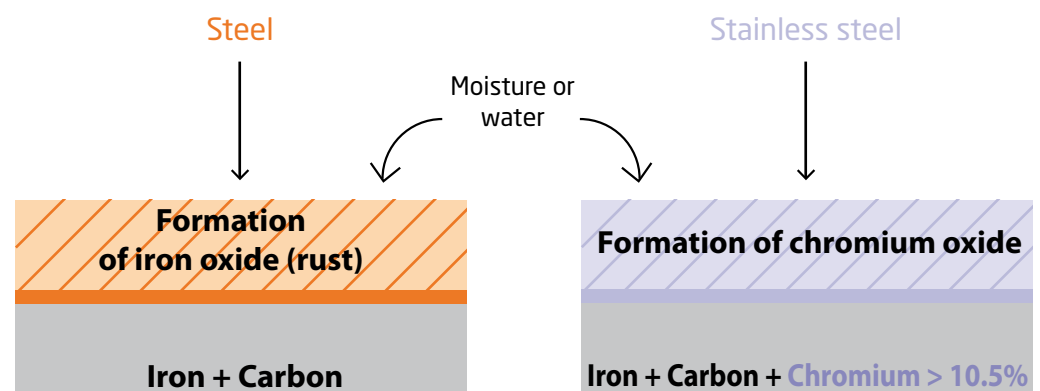


On contact with moisture or water, steel rusts, contrary to stainless steel which contains chromium. With the exception of precious metals such as gold or platinum, all metals are mineral extracts. During the course of time, they have a tendency to revert to their original state, that is to say, oxides.

The passive film = protective layer

One simple remedy to keep the new look of the stainless steel

Regular housekeeping by copious rinsing with water is enough to conserve its new look and guarantee its resistance to long lasting corrosion

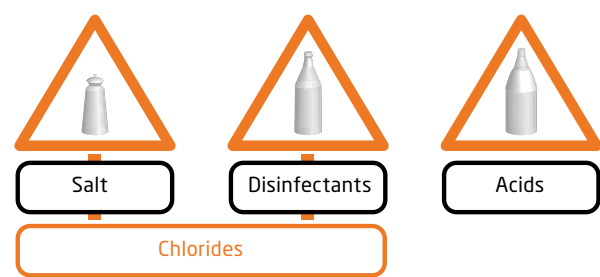


Because steel doesn't contain chromium, on contact with moisture or water, it forms an oxide on the surface called rust.

On the other hand, because it contains chromium, it forms naturally a protective layer of chromium oxide on the surface of the stainless steel called a passive film which protects it from corrosion.

2. Products which cause corrosion

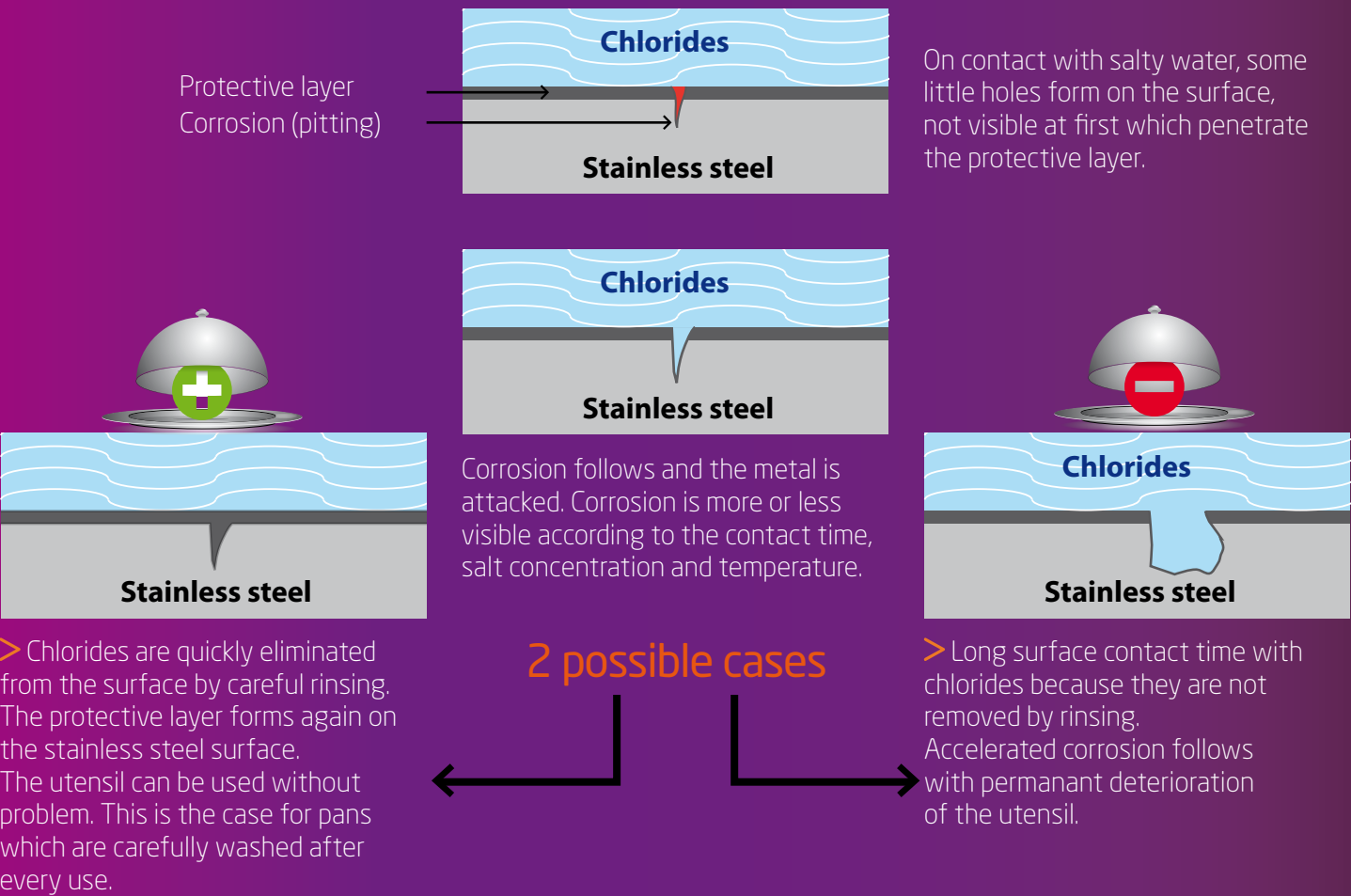
Most cleaning products (without disinfectant) are liquid soaps with no danger for the user and the stainless steel, which is not the case for products containing chlorides or acidic products which should be used with caution.



2.1 Chlorides: Salt and disinfectants

2.1.1 The Phenomena of corrosion linked to chlorides

The protective layer on the stainless steel surface in contact with liquids containing high levels of chloride can present a weaker resistance.



corrosion



2.1.2 Salt

In catering, chlorides are found in cooking salt, the coastal environment, chlorinated and softened water.

> Cooking salt

When sea salt is put in water it accumulates at the bottom of the pan until the water starts to boil and swirl. That can start the formation of pitting corrosion.

To avoid all risk of corrosion, it is recommended to wait until the water is hot before adding the salt and stir the water rapidly in order to dissolve the salt and avoid the accumulation of salt in a small area. Another point: for the same reason, try to use cooking pots and pans whose base is the same diameter as the heating element. Never heat up an empty pan.

In the case of occasional contact with salty products (brines or fish), ensure that a careful cleaning is done after use. For the same reason, ensure that all cooking spills on the work surfaces are cleaned also. In the case of regular contact with very salty elements, the grade of stainless steel should be chosen with care by the manufacturer.

> The coastal environment

Sea water and particularly sea spray contain high levels of salt. If a material is placed either outside or in a building very close to the sea, ensure that the whole assembly is rinsed with clean water regularly to avoid corrosion starting.

> Chlorinated and softened water

For hygiene reasons, certain water supplies can occasionally be over chlorinated. You need to carefully monitor the condition of Bain-maries, bottoms of cooking pots and fryers and the drying after rinsing.

To combat scaling most fryer installations are equipped with water softeners.

The principal of a water softener consists of exchanging calcium and magnesium ions with sodium ions which are not scaling. If the water softener settings are not checked regularly, the water could contain high levels of sodium chloride and become very corrosive.

The resin or filters also need to be regularly regenerated, and the salt containers cleaned and filled.



First use of a kitchen utensil

Before the first use of a kitchen utensil ensure to remove the labels both inside and out and to clean off all traces of glue with a solvent. These often contain chlorides and could provoke corrosion from the first use in cooking. The apparatus is cleaned afterwards with a cloth and a mild liquid detergent followed by rinsing. Then, it is recommended to heat it gently with a little frying oil for 1 to 2 minutes maximum ensuring not to overheat the oil (it must not change colour or smoke). Empty the utensil. Clean with a wet cloth and mild detergent. This step is to remove all traces of the oil used from the pan. These oils sometimes contain chlorides which are removed in large part by the manufacturer while passing through the detergent baths, but complete removal can only be done by dissolving in another oil.



2.1.3 Disinfectants

The use of concentrated liquid disinfectant products can produce very bad skin irritation. Wearing gloves is obligatory to be able to use these products safely.

Cleaning of work surfaces, floors and many other areas of the kitchen requires the use of disinfectant products. These products often contain chlorides (salts) or active ingredients which can cause corrosion of stainless steel. It is essential to follow certain rules.



> The 5 rules to respect when using disinfectant products

Rule N°1: Respect the dosage

Using more disinfectant product than necessary does not increase the level of disinfection, but shall certainly start corrosion of the stainless steel.

It is imperative to respect the maximum concentration and not exceed it, as described by the manufacturer of the material or cleaning product.

Use a dispenser and prepare the product in a bucket. Never pour a concentrated product on the stainless steel.

In the case of accidental contact, rinse immediately with lots of water.

In the case of automatic dispensers, ensure that the dispensers are working properly and that the water circuit is open.



Manual



Automatic

Rule N°2: Respect the temperatures

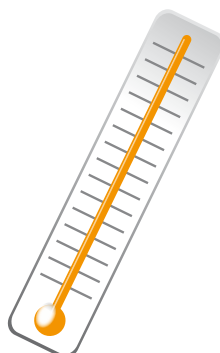
It is imperative to respect the material manufacturer's advice about temperatures or the cleaning product maker, if this is not available, when using disinfectant products.

An increase in the temperature of the disinfectant product greatly increases the risk of corrosion to the material.

Do not heat the product or use the product on hot surfaces.

As a general rule, disinfectants must not be used at temperatures higher than 40°C and a contact time higher than 30 minutes.

Be aware that most disinfectant products lose their disinfectant properties if heated.



Rule N°3: Respect the contact time

As seen previously the corrosion risk greatly increases with the increase in contact time between the stainless steel and the disinfectant product.

It is imperative to limit product contact time with the surface, conforming to the material manufacturers specifications, or if not available, the disinfectant product manufacturer.

In all cases, do not exceed 30 minutes. Ensure also that no product is left after rinsing particularly in gutters, siphons, but also in the drains of apparatus.



Rule N°4: Rinse well

A good rinsing is the best recipe against corrosion.

It eliminates chlorides and active products in the disinfectant product.

It favours the reinforcement of the protective layer of the stainless steel and therefore corrosion resistance.

It is particularly necessary to rinse abundantly the base and legs of furniture, areas where a floor cleaning product has splashed.



Rule N°5: Dry well

Drying using a rubber squeegee will avoid the formation of white marks associated with the presence of water hardness.



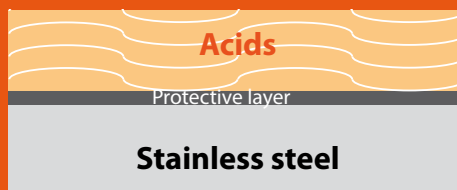
The special case of Bleach (product containing sodium hypochlorite)

- > Bleach is a disinfectant. It does not wash. You need, first, to clean the surface with a detergent, rinse, then apply it to the clean surface.
- > Bleach must always be diluted in cold water before being applied on stainless steel.
Respect the concentrations recommended by the material manufacturer or if not available the cleaning product manufacturer.
- > Diluted bleach must never be used hot. It is more efficient at 20°C to 40°C, because it decomposes with temperature, loses its disinfectant property and corrodes very rapidly stainless steel.
- > It must be stored away from light and heat, to avoid decomposition. Using bleach stored in bad conditions is equivalent to greatly increasing the chloride content in the disinfectant medium and therefore greatly increasing the risks of corrosion of material in stainless steel.
- > Bleach must never be mixed with a cleaning product or acid: vinegar, lemon, descaling products...
That causes the evolution of a gas which attacks the respiratory system and can be fatal.
- > Contact time with diluted bleach needs to be limited to the recommendations of the material manufacturer or if not available, the cleaning product manufacturer. Afterwards, it needs to be abundantly rinsed, and finish by drying the stainless steel with a squeegee.
- > Attention, respect the use by date.



2.2 Acids

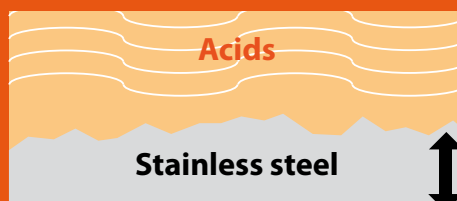
2.2.1 The phenomena of acid corrosion



When stainless steel is placed in prolonged contact with strong acid, the protective layer formed on the surface dissolves quickly.



Stainless steel is no longer protected and there is attack to all the surface with often formation of rust, red, brown or black in colour and a thinning of the thickness until it is completely pierced.



2.2.2 Foods

In catering, acids are found in foods and descaling products. Some foods are:

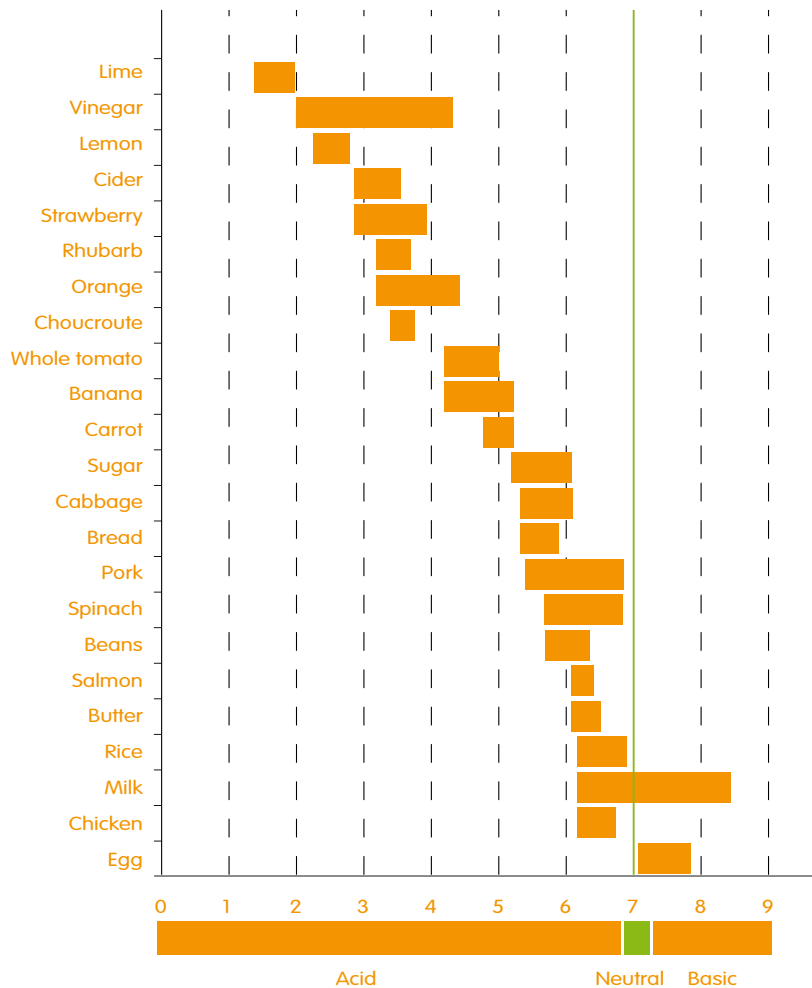
- > **Acid:** pH less than 7
- > **Neutral:** pH between 7 and 7.5
- > **Basic:** pH greater than 7.5

In cooking, lime, vinegar and cider are very acid products, since their pH is much lower than 7.

There is not generally corrosion to work surfaces which are used to prepare acidic foodstuffs because the contact time with the stainless steel is limited if washed with clean water at the end of the preparation.



pH of foods



For the intensive cooking of acidic or salty foods, for example, the bottom of cooking pots, this problem is generally taken into account by the material manufacturer who uses a specific stainless steel containing an addition of molybdenum that shall resist this type of severe medium.

In the case of cooking utensils like pans, remove the acidic foods as soon as the cooking is finished then clean the pan systematically. Finally avoid scratching the bottom of utensils with sharp accessories used to mix the foodstuffs.

2.2.3 Descaling products

The use of these products in concentrated form can cause severe irritation to the skin. Wearing gloves is obligatory to use these products safely.

> The 5 rules to respect when using descaling products



Rule N°1:

Respect the material manufacturers recommended dosage, if not available, the descalant product manufacture, using a measuring dispenser.

Never pour the concentrated product on stainless steel.

Rule N°2:

Respect temperatures.



Rule N°4:

Rinse well.



Rule N°5:

Dry well.

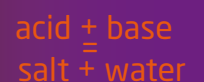


Rule N°3:

Respect contact time.



Never mix an acid product (descalant) with a basic product (soda or product to remove baked on grease),



As seen previously, salt formation will cause corrosion of stainless steel. Ensure systematically, therefore, a rinse between each application of the product.

cleaning



Forbidden: hydrochloric acid!



The severest cases of corrosion are generally with the use of hydrochloric acid based products used by tilers or plasterers to clean floors.

All splashes of hydrochloric acid (concentrated or dilute) on the bases of units or articles in stainless steel will start severe and irreversible material corrosion. In the case of contact, rinse immediately with copious amounts of water.

Note also the catastrophic effect from the very corrosive fumes of hydrochloric acid on stainless steel. All stainless steel material can be permanently destroyed.

The cleaning of tile-work after building or renovation work

2.3 Soda based degreasant products

If soda based degreasant products are generally less corrosive for stainless steel than salt or acids, the rules for use remain the same. Pay particular attention to respect a maximum temperature of 60°C. Do not spray the product in an oven which has just been switched off, nor on a tray that just came out of the oven.

To remove baked on grease, alkaline (basic) products based on soda are generally used.

The use of these products in concentrated form can cause severe skin irritation and burns by inhalation. The wearing of gloves and a mask are obligatory to use these products safely. It is also recommended to protect the eyes.



> The 5 rules to respect when using degreasant products

Rule N°1:

Respect the recommended dose.

Rule N°3:

Respect the contact time.

Rule N°2:

Respect the temperature.
The temperature of the oven should be less than 60 °C.

Rule N°4:

Rinse well.

Rule N°5:

Dry well with a cloth.



3. The right tools

> Use preferably a dish cloth (particularly on brilliant finishes) which of course should be clean.



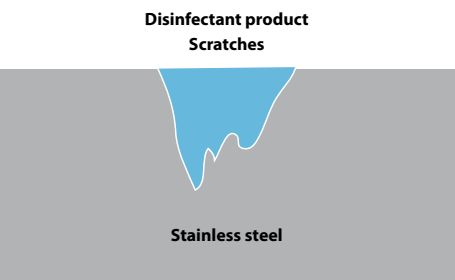
> Uniquely in case of need, use a NON metallic scouring pad to avoid scratching the stainless steel surface.



> In this case, polish always with the grain of the metal if this exists to avoid damaging the look of the unit.



> Deterioration in the look of the surface, especially if it is smooth and brilliant.



> Risks initiating corrosion by creating areas where disinfectant products will be retained and are difficult to rinse.

Scratching the stainless steel surface has two unfortunate consequences:



To clean the legs of units, use a nylon brush which will avoid scratching the material. Never use a metal brush and still less one in steel, that will start corrosion linked with ferritic pollutants.



Steel on wet stainless steel.



A few hours later.



A scrubbing rinse with water does not remove these traces. The stainless steel is corroded.

Generally, avoid contact between different metals (aluminium, copper steel, galvanised steel, stainless steel) in moist conditions. That provokes the corrosion of at least one of the metals.



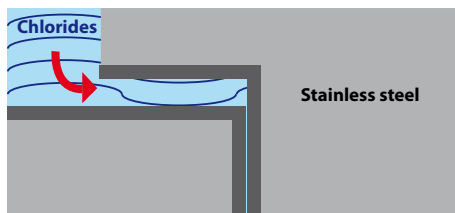
4. Suggestions for designers, manufacturers, installers and cooks

To avoid the proliferation of germs, the equipment design is paramount. Manufacturers understand this and respect the criteria by eliminating equipment with folds, crevices and retention areas.

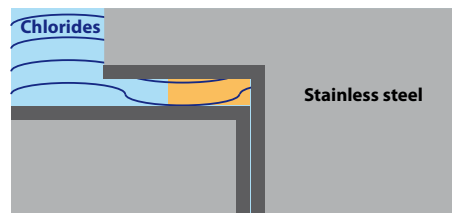
However, at the time of assembly with several materials, certain areas become difficult to access for efficient cleaning and rinsing. This will have a big impact on the initiation of corrosion.



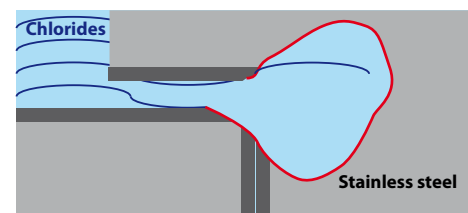
The Phenomena of corrosion



Disinfectant product that contains chlorides or other active ingredients penetrates the confined areas.

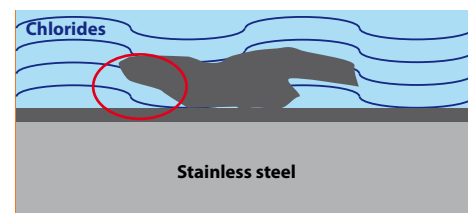


As it not eliminated by the rinsing water, the liquid starts to corrode the stainless steel and becomes more and more acidic.



The protective layer formed on the surface of the stainless steel dissolves and then the material is rapidly attacked.

Attention, this is equally true in all cases of deposit formation such as hardness, baked on grease or other dirt.



To avoid these cases of corrosion, Ensure that all areas of assemblies are accessible for cleaning and rinsing and that deposits are eliminated after every washing.

Summary of the precautions to take with stainless steel



Rule N°1: Respect the recommended dosage.

Rule N°2: Respect temperatures.

Rule N°3: Respect contact time.

Rule N°4: Rinse well.

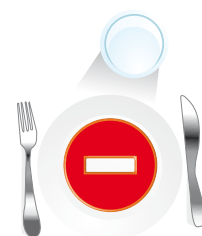
Rule N°5: Dry well.

But also

- > Use recommended cleaning products.
- > Respect material manufacturer's advice and if any, respect the advice given by the cleaning product manufacturer.
- > Ask for a written procedure from your supplier.
- > Do not use disinfectant or descalant products on hot surfaces.
- > For all new cooking equipment, perform a trial use first.
- > Dissolve salt in water.
- > Ensure that no electrical equipment is in contact with water.
- > Clean regularly. It is easier to eliminate dirt before it has dried or burnt on several times.
- > Do not use abrasive cleaning product or metallic scouring sponge which is NOT stainless steel.
- > Limit to the strict minimum the use of a metallic scouring sponge, use preferably a dish cloth on brilliant surfaces.
- > Never mix two different products.

The products never to put in contact with stainless steel

- > Concentrated or hot bleach.
- > Concentrated or hot disinfectant products.
- > Hydrochloric acid (tile cleaners) even diluted and cold.
- > Metallic brushes or sponges, particularly steel.



In addition, a film sponsored by the ISSF (International Stainless Steel Forum) and ICDA (International Chromium Development Association) is available.

<http://www.aperam.com/europe/markets-products/markets-2/catering-2/cleaning>



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