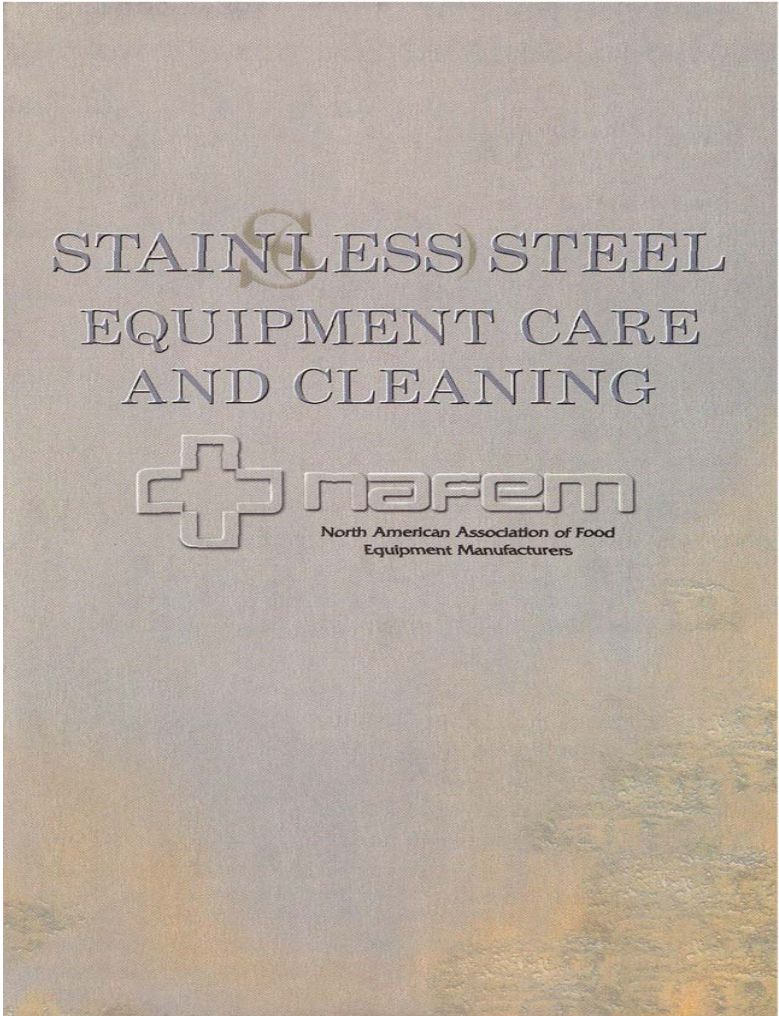




Contrary to popular belief, Stainless Steels ARE susceptible to rusting.

Corrosion on metals is everywhere. We recognize it quickly on iron and steel as unsightly **yellow/orange** rust. Such metals are called “active” because they actively corrode in the natural environment.

Stainless steels are passive metals because they contain other metals, like chromium and nickel. 400 series stainless steels contain chromium while 300 series contain both chromium and nickel.

Metals are crystalline solids made up in atom arrangements like tinker toys. With 12-30% chromium, an invisible passive film covers the steels surface acting as a shield against corrosion. The metal becomes “passive” toward corrosion.

As long as the film is intact; not broken or contaminated, the metal is passive and stain-less

400 series

Both contain 70-80% IRON So Both can Rust!

300 series

Both contain 70-80% IRON So Both can Rust!

Raw iron, shown here at the atomic level, has no protection from corrosion.

Stainless steel, when alloyed with other metals, has a *protective* film. But keep in mind that the film is only millionths of an inch thick!

Enemies of Stainless Steel

There are three basic things which can break down your stainless steel’s passivity layer and allow corrosion to rear its ugly head.

- Mechanical abrasion**
- Deposits & Water**
- Chlorides**

Mechanical abrasion means those things that will scratch the steel’s surface. **Steel pads, wire brushes,** and **scrapers** areprime examples.

Water comes out of our tap in varying degrees of hardness.Depending on what part of the country you live in, you mayhave hard or soft water. Hard water may leave spots. Also,when heated, hard water leaves deposits behind that if left to sit, will break down the passive layer and rust your stainless steel. Other deposits from food preparation and service must be properly removed.

Chlorides are found nearly everywhere. They are in water, food, and table salt. One of the worst perpetrator of chlorides can come from **household and industrial cleaners.**

So, what does all this mean?

At this very moment you’re gritting your teeth and saying,

“Well, what am I supposed to do now? The only way to get that crusted lasagna off my stainless steel is to use some kind of scouring pad, and I certainly need to use a cleaner, and the water in this town is hard enough to cut diamonds.”

Don’t Despair!

Here are a few steps that can help prevent stainless steel rust.

1. Use the proper tools

When cleaning your stainless steel products, take care to use non-abrasive tools. **Soft cloths** and **plastic scouring pads** will not harm the steels passive layer. **Stainless steel pads** can also be used but the scrubbing motion must be in the direction of the manufacturers’ polishing marks. Step 2 tells you how to find the polishing marks.

2. Clean with the polish lines

Some stainless steels come with visible polishing lines or “grain.” When visible lines are present, you should always scrub in a motion that is parallel to them. When the grain cannot be seen, play it safe and use a soft cloth or plastic scouring pad.

3. Use alkaline, alkaline chlorinated or non-chloric containing cleaners

While many traditional cleaners are loaded with chlorides, the industry is providing an ever increasing choice of non-chloride cleaners. If you are not sure of your cleaner’s chloride content contact your cleaner supplier. If they tell you that your present cleaner contains chlorides, ask if they have an alternative. They probably will. Also, avoid cleaners containing quaternary salts as they also can attack stainless steel and cause pitting and rusting.

4. Treat your water

Though this is not always practical, softening hard water can do much to reduce deposits. There are certain filters that can be installed to remove distasteful and corrosive elements. Salts in a properly maintained water softener are your friend. If you are not sure of the proper water treatment, call a treatment specialist.

5. Keep your food equipment clean

Use alkaline, alkaline chlorinated or non-chloride cleaners at recommended strength. Clean frequently to avoid build-up of hard, stubborn stains. If you boil water in your stainless steel equipment, remember the single most likely cause of damage is chlorides in the water. Heating cleaners that contain chlorides has a similar effect.

6. Rinse, Rinse, Rinse

If chlorinated cleaners are used you must **rinse, rinse, rinse** and **wipe dry immediately.** The sooner you wipe off standing water, especially when it contains cleaning agents, the better. After wiping the equipment down, allow it to air dry for the oxygen helps maintain the stainless steels’ passivity film.

7. Never use hydrochloric acid (muriatic acid) on stainless steel

8. Regularly restore/passivate stainless steel

Recommended cleaners for specific situations

Job	Cleaning Agent	Comments
Routine cleaning	Soap, ammonia, detergent	Apply with cloth or sponge
Fingerprints & smears	Arcal 20, Lac-O-Nu Ecoshine	Provides barrier film
Stubborn stains &discoloration	Cameo. Talc. Zud First Impression	Rub in direction of polish lines
Grease &fatty acids, blood, burnt-on foods	Easy-off. We-Grease It Oven Aid	Excellent removal on all finishes
Grease & oil	Any good commercial detergent	Apply with sponge or cloth
Restoration/ Fassung	Benefit. Super Sheen	

Reference: Nickel Development Institute
DiverseyLever
Savin
Ecolab

What does Corroded Stainless Steel Look Like?

Passive film Breakdown

If the passive film of your stainless steel has been broken, your equipment will begin the long walk down the dark road of corrosion. At it’s end; rust.

The first signs are on the microscopic level. If you were to look at them under a microscope or through a magnifying glass, you would see small pits and cracks staring back at you. Given time, these pits and cracks will grow and deepen while all the time exuding unsightly, red-orange rust. More severe and visible cracking can also take place.

Review

- Stainless steels do rust when: Passivity (film-shield) breaks down by scrapes or scratches by deposits and chlorides
- Stainless steel rust starts with pits and cracks.
- Use the proper tools. Do not use steel pads, wire brushes or scrapers. (Step 1)
- Use non-chlorinated cleaners at recommended concentrations. Use only chloride free cleaners. (Step 3)
- Soften your water. Know the hardness of your water. Use filters and softeners whenever possible. (Step 4)
- Wipe off cleaning agent(s) and standing water ASAP. Prolonged contact will cause eventual problems. (Step 6)

To learn more about chloride-stress corrosion and how to prevent it, contact the manufacturer of your equipment, your cleaning materials supplier or NAFEM.

North American Association of Food Equipment Manufacturers
401 N. Michigan Avenue Chicago, Illinois 60611-4267
(312.644.6610). E-mail: NAFEM@hq_sba.com

Developed for NAFEM by an independent testing laboratory,
Packer Engineering of Naperville, Illinois