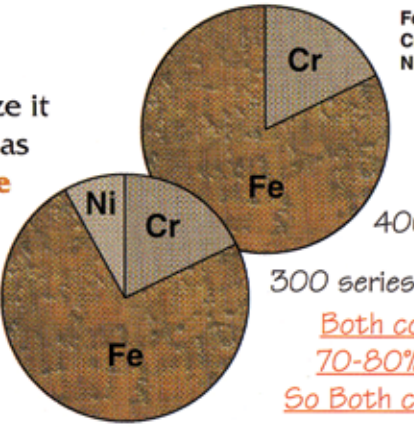
# STAINLESS STEEL EQUIPMENT CARE AND CLEANING

North American Association of
Food Equipment Manufacturers

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

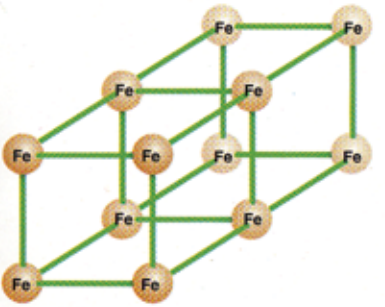



Corrosion on metals is everywhere. We recognize it quickly on iron and steel as unsightly **yellow/orange** rust. Such metals are called "active" because they actively corrode in the natural environment.

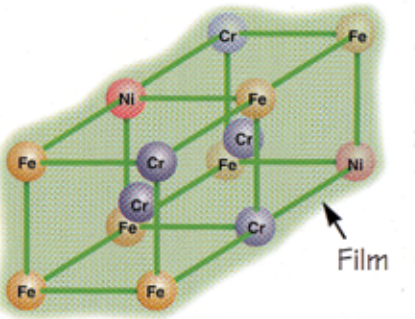
Stainless steels are passive metals because they contain other metals, like chromium and nickel. 400 series stainless steels contain chromium while 300 series contain both chromium and nickel.

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.**




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

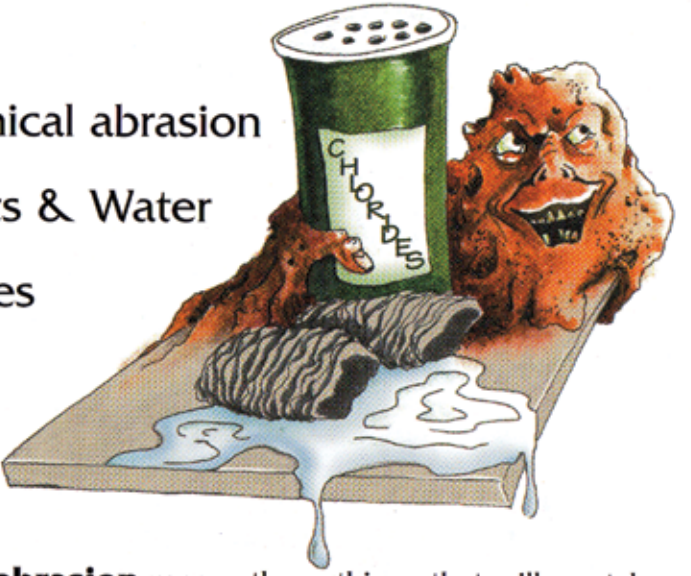



Stainless steel, when alloyed with other metals, has a protective film. But keep in mind that the film is only millionths of an inch thick!

# 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.

1. Mechanical abrasion
2. Deposits & Water
3. Chlorides




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

**Water** comes out of our tap in varying degrees of hardness. Depending on what part of the country you live in, you may have 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.

**DON'T USE**

Steel Pads

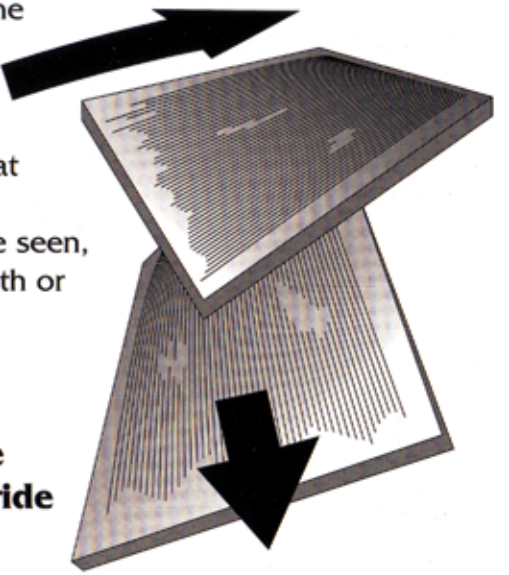
Wire Brush

Scrapers

## 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-chloride 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.

Chloride Cleaners

## 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<br>Medallion | Apply with cloth or sponge |
| Fingerprints<br>& smears | Arcal 20, Lac-O-Nu<br>Ecoshine | Provides barrier film |
| Stubborn stains<br>& discoloration | Cameo, Talc, Zud<br>First Impression | Rub in direction<br>of polish lines |
| Grease & fatty acids,<br>blood, burnt-on foods | Easy-off, De-Grease It<br>Oven Aid | Excellent removal<br>on all finishes |
| Grease & oil | Any good commercial<br>detergent | Apply with sponge<br>or cloth |
| Restoration/<br>Passivation | Benefit, Super Sheen | |

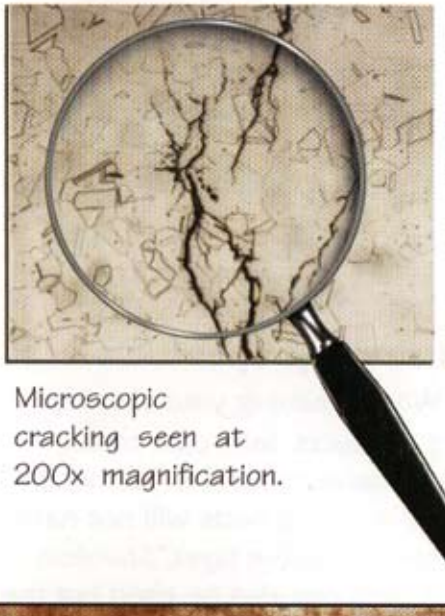
NAFEM
North American Association of Food Equipment Manufacturers

Reference: Nickel Development Institute
DiverseyLever
Savin
Ecolab

# What does Corroded Stainless Steel Look Like?

## Passive Film Breakdown

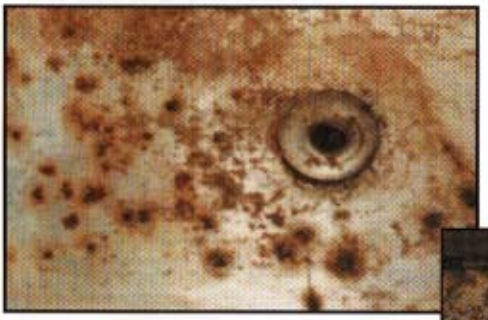
If the passive film of your stainless steel has been broken, your equipment will begin the long walk down the dark road of corrosion. At it's end; rust.



Microscopic cracking seen at 200x magnification.

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.



Pitting

Visible cracking

## Review

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

NAFEM
North American Association of
Food Equipment Manufacturers

North American Association of Food Equipment Manufacturers
161 N. Clark, Suite 2020 • Chicago, Illinois 60601
312.821-0201 • www.nafem.org

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