

TECHNICAL SUPPORT MATERIAL

Routine and Preventative Maintenance

RUSTING INSTRUCTIONS

- Rusting (brown or reddish brown stain) is iron oxide (iron being corroded by oxygen from the air or an oxidizer).
- Chlorine is classified as an oxidizer, rapid oxidizer. Fire is the most rapid oxidizer—that is why car bodies are all brown and rusty after a car fire.
- When we find a stain that shows a brownish or tan color on the surface of stainless, this is an indication that iron is present on or in the metal and being oxidized by chlorine – OR-- that iron oxide was carried to that spot from a place where iron is being oxidized.
- The oxidizing action is more pronounced on dry surfaces than on wet.
- Chlorine is one of the elements found in nature and acts upon almost everything else.

When we come on a dishmachine showing surface rust on stainless parts, it got there by either “falling” iron precipitate or by iron in solution left to dry (salts with a dusty appearance). The chlorine salts are very corrosive to the surface of metals.



(Showing rusting above the water)

Stainless steel is nothing more than steel with a higher chromium and nickel content. Steel's largest component is iron. The chromium will form a chromium oxide on the surface in the presence of air (oxygen). This becomes a tight fitting film that protects the steel from corrosion or oxidation. Stainless steel is only stainless as long as its surface is clean and

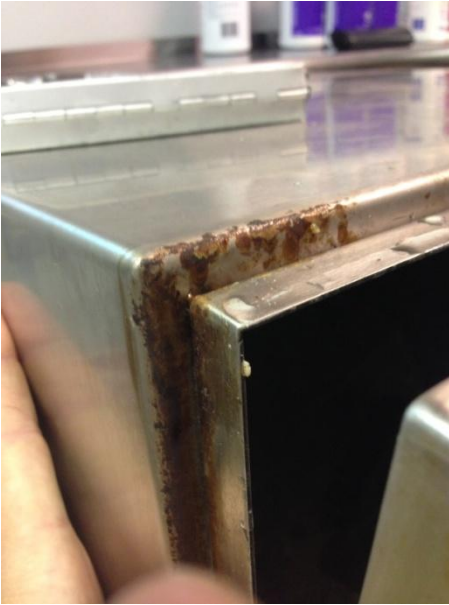
smooth, in the presence of air, and has no corroding elements dropped on its surface. Once that chromium film is disturbed, the iron elements in the steel will begin to oxidize. When this is left to grow through the base metal, the stainless will rust away like any other steel.

A sheet of “bad stainless” would rust as a whole and not just in a spot. There are many safeguards in the manufacturing process for steels, because there is such high cost to not getting it right. It is rare to see a bad batch of stainless, despite urban legends of this stuff being made up in the basement of a merciless blacksmiths.

When we see rusting of several parts that come from different manufacturers, different mills, that is almost proof positive that it is not related to the “bad stainless myth.”

While it is possible to get an inferior grade of stainless in a shipment or not-stainless at all, this kind of metal is usually found in the plant long before it is shipped. It has a marked difference in appearance and machining compared to stainless grades.

When it comes to rusting repairs on stainless, I’ve found the only tool I’ve needed is some acid. You can clean stainless that has a “stain” of rust. However, once the rust has begun to eat inside the protective film, that piece of metal becomes compromised. If the compromised area is cut out, it generally means doubling the square inches of the surface area beyond that of the affected metal before you reach solid base again. An indication that you are too close to the compromised area is when a welding torch heats the metal it will blow out even bigger holes. Sometimes the metal is so crystallized by chemical corrosion that nothing is left to repair—the part will need to be replaced.



(Stains at venting areas of a dishmachine)

When we see deposits form on metal surfaces near areas that vapor will escape the wash cabinet, the type of deposit will tell us what is in solution. When you see heavy, white crusty formations, this tells us that there is a high mineral and calcium level to the water. When we see sticky tan and dark slime, we know it comes from animal fats, and when there is reddish brown stain, we know it comes from high iron content in the water.

You can test this with acid. If it starts to clear and you see shiny clean metal underneath, this is telling us that the water being used for washing and rinsing has enough iron that it falls out during evaporation. A test kit can also verify iron in the water—but test from the machine, not the tap. There are only a few sources for this. Water conditions, utensils put into the machine, iron sources near the dishwasher (SOS pads), *rust stains can also be the trail of evidence of what happens when the phosphate agents are left out of the chemicals to cut expense, and/or grill parts are most of what we find.*



This picture is an excellent example of what is called “precipitate” where a substance or solution has been dropped or rained onto the surface of the metal. The evidence of this is the fact that the rust shows up in different spots, it is also occurring on stainless sheet metal and stainless castings and stainless tube and bar stock all originating from different mills and suppliers. If, on the other hand there was a sheet of stainless which was not protecting of corrosion—the entire sheet would show corrosion effects. The likelihood of several suppliers showing corrosion in a single unit caused by “bad stainless” is not something we see. So this is coming from outside the machine.

We can estimate something (iron) is being washed in the machine that should not be or iron water conditions. Grill parts, cast iron pots, some kind of none food item. People are ingenious when it comes to thinking up things to put into a dishwasher.

