Protecting Your Stainless Steel:
Passivation for Brewery Equipment, Part 2

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This is a continuation of **Protecting Your Stainless Steel: Passivation for Brewery Equipment, Part 1**, which defines and discusses passivation in an existing brewhouse.

What about new equipment?
Assuming the metal has already been passivated at the factory, new stainless steel should be in fairly decent shape when it arrives at your brewery. There can however be residual machine oil, road grime, dust, dirt and debris on new metal. In this case, an alkaline hot caustic cleaning is recommended to remove machine oil and debris. If any surface rust is observed, a citric acid rinse does a nice job of removing surface rust. Follow with the six steps mentioned in Part 1.

Here is the procedure to passivate new stainless steel:

1. To remove any machine oil, road grime, etc., CIP with a 2 oz. heavy-duty, nonchlorinated liqud built caustic CIP Cleaner per gallon of hot water (140-180° F) for 15-30 minutes. Drain and then rinse well immediately.
2. If there is any surface rust, CIP using a 2 oz. citric acid per gallon of 120-130° F water CIP for 15-30 minutes, then rinse well.
3. Immediately after rinsing the citric acid, CIP with a phosphoric/nitric acid blend followed by and oxygenated noncaustic cleaner using the conversion coating passivation steps.
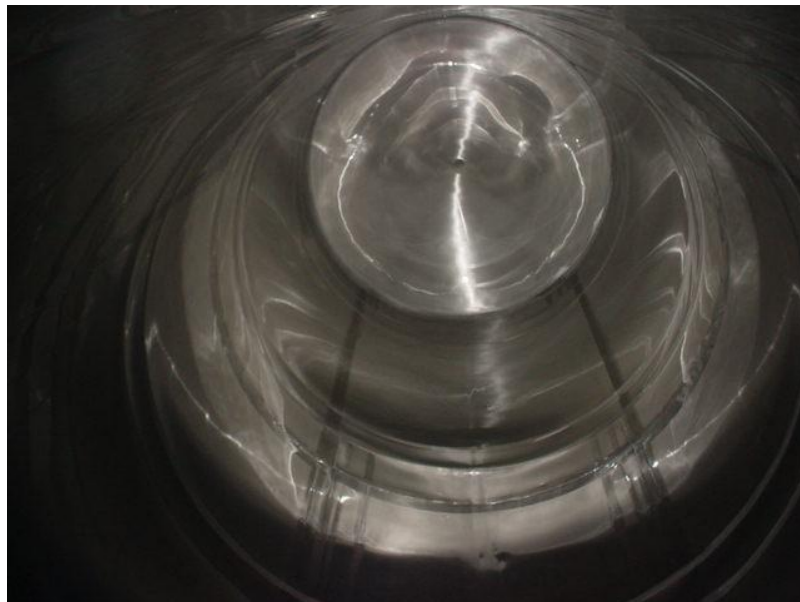
Conversion Coating Passivation Steps:
1. Rinse with ambient to warm water.
2. CIP with 2 oz. of nitric/phosphoric acid blend per gallon of 120-130°F water for 15-30 minutes.
3. Drain but **do not rinse**.
4. CIP with 2 oz. of phosphated, silicated and oxygenated noncaustic alkaline cleaner per gallon of 120-140°F water for 15-30 minutes.
5. Rinse well.

(continued)

When finished, the metal should look like this:

Remember, the aforementioned acid drained but not rinsed and immediately followed by noncaustic, oxygenated, alkaline cleaner method of passivation is known to metallurgists as a phosphate/silicate conversion coating, and should not be confused with the traditional high nitric acid method, which is drained but not rinsed and then followed by a 24-hour air dry to form a chromium oxide layer on the metal.

Cleaning with caustic and hydrogen peroxide to maintain passivation:
As I mentioned in my *The New Brewer* article last year, (Improving Brewhouse CIP, July/ August, 2017) cleaning with caustic and hydrogen peroxide and following with an acid finish is an excellent way to not only keep the metal clean and shiny, but it also offers some passivation properties as well.

Without completely going into the whole procedure for that again, here is what the fermentation vessel looks like after cleaning with caustic and hydrogen peroxide and followed with an acid rinse:

Before Cleaning:

After Cleaning:

Here is a fermenter after cleaning:
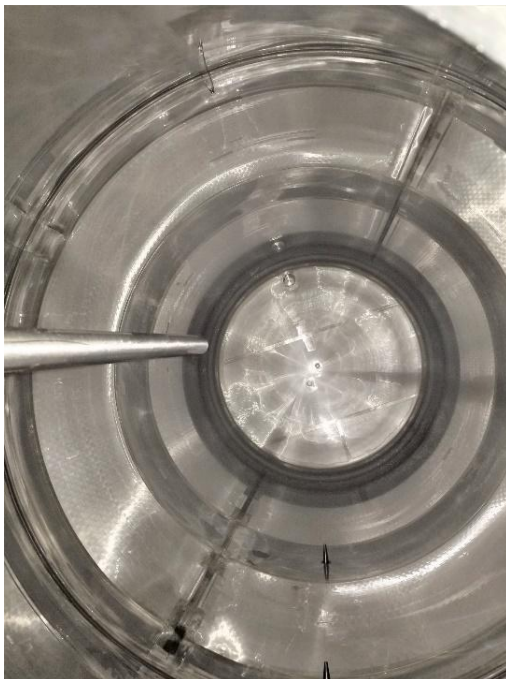
Conclusion:

Every brewer knows that keeping brewing equipment cleaned and sanitized is the key to making the beer taste its best batch after batch. Passivation has not been well understood by brewers but is also key to keeping the beer tasting fresh and flavorful. Consult your chemical provider for their recommendations to keep your equipment not only cleaned but passivated, too.

Contributing Author

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A homebrewer since 1989, Dana consults for craft breweries, wineries & distilleries on food safety & sanitation practices. He has more than 25 years of experience serving Birko's brewery customers and is known in the industry as one of the leading voices on sanitation. He has formulated many Birko products, has authored numerous articles, is a frequent speaker, and leads many industry support committees.