Chloride Pitting of Stainless Steel

We're all familiar with the risk of mixing chlorinated cleaning solutions accidentally with acid...resulting in the production of chlorine gas (lethal), causing flash rusting on the tops of CIP tanks and, potentially, product tanks.

However, fewer people know that high chlorides (the Cl- portion of NaCl salt) in the presence of low pH (acidic environment) is also corrosive, even if less aggressive than chlorine. It often appears over time as pitting in stainless equipment.

Chloride pitting of stainless is irreversible if it has progressed this far.

The key is to prevent it from happening by:

1. Check plant water for chlorides. Some parts of the country naturally have high chlorides in ground water. Greater than 80 ppm Cl- should require special steps to minimize acid mixing with this water.
2. Reduce acid washes on CIP, by substituting with high chelation caustic wash, and reduce frequency of acid recirculation.
3. Minimize lines sitting with acid sanitizer and high chloride water. Sanitize just before production and flush out if needed.
4. Reduce temperature of acid washes – higher temps accelerate pitting.
5. Suggest upgrading process equipment to 316 SS or AL6XN SS – chloride resistant stainless for cheese brines. (Note most sanitary valves are usually already made from 316 SS, but pipes and tanks are 304 SS due to cost).
6. If the plant uses brining solutions for their process, very important to not push acid CIP sanitizer with the brine. Recommend a freshwater rinse first! (That was the combination of conditions that led to pitting in the below picture).

Example of chloride pitting of a heating tube in a high salt product processor (taken after CIP).

Reach out to the RITE team for more information on preventing corrosion from cleaning solutions.