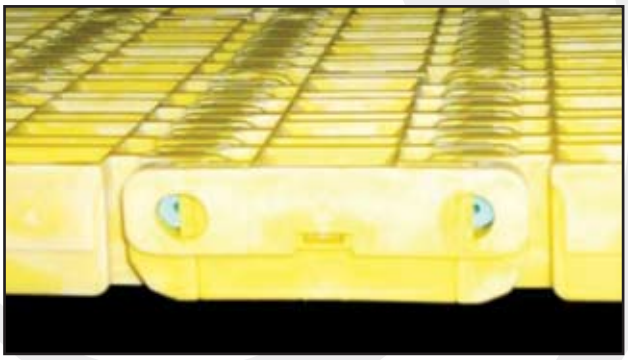
REXNORD® MATTOP® CHAINS FOR PASTEURIZER APPLICATIONS

Pasteurizers see a wide range of water quality because of the chemicals used to reduce biological growth and maintain operation. However, some chemicals can attack conveyor chains used in the pasteurizer as well as the biology they are intended to target. This can cause a white, flaky appearance on the chain and embrittlement that will eventually lead to premature failure. Below are some basic guidelines that should help to select a treatment program that will help maximize the life span of your chain.



Chemical Degradation on Rexnord YP 2000 MatTop Chain

Chemical Degradation on Rexnord HT 5997 MatTop Chain

Oxidizing Biocide

The higher the oxidizing potential (likelihood for a molecule to donate an electron) for a biocide, the more likely it is to damage the chain. However, this does not necessarily relate to how effectively it can control biological growth. Ozone, Chlorine Dioxide and Hydrogen Peroxide have very high oxidizing potentials (approx. 2.0 Volts) but should never be used within pasteurizers because of how aggressively they damage the plastic chain. Comparatively Chlorine has a much lower potential at 1.4V and Bromine is close to 1V. Compounds such as these with lower oxidizing potentials are less likely to damage the chain but will still effectively control the biological growth. They may require relatively higher dosing concentrations and contact times, but they are more easily controlled and monitored than some of the more aggressive chemicals.

Free Chlorine Eq. (ppm or mg/L)

Chlorine is the most widely used oxidizing biocide used in industrial pasteurizer applications, but the concentration used can vary greatly. In plants with more prolific biological growth it may seem necessary to dose at high concentrations to maintain acceptable bacteria counts; however, when starting with a clean environment it is typically adequate to keep chlorine concentrations between 0.5 and 1.0 mg/L. With concentrations greater than 1.0 mg/L possible damage to the chain is greatly increased, while concentrations below 0.5 mg/L are not typically effective enough to control the biomass. It is also not necessary to dose chemicals directly into areas of the pasteurizer where the temperature is high enough to prevent the biomass from reproducing (above 50°C / 120°F). For every 10°C (18°F) increase in temperature an oxidizing reaction rate increases 2 to 3 times, so having higher concentrations at elevated temperatures functions to destroy plastic chains even more quickly.

pH During Normal Operation

With all of our plastic applications we recommend not using cleaning chemicals in direct contact with our chain where the pH is outside of the range of 4 to 10. However, that is for a short cleaning cycle at room temperature as opposed to any prolonged exposure at elevated temperatures. For pasteurizers it's ideal to stay as close as neutral (a pH of 7.0) to possible to maximize chain life. Having a neutral pH will also help to alleviate any complications with dosing which relate to overcoming the buffering capacity of the chemicals in the water.

Hardness ($CaCO_3$ Eq.)

Hardness, typically measured as a concentration of Calcium Carbonate ($CaCO_3$) Equivalents, is a measurement of mineral content in the water. These minerals can affect the pasteurizer system by forming a scale deposit onto the chain and creating an abrasive surface that leads to premature wear. The issue with scaling can occur with all chain systems which use water as a lubricant. Typically hardness can be addressed in a system using a water softener to remove the minerals from the system, or through the use of an appropriate anti-scaling agent.

Boilouts

Regular Boilouts (intense cleaning of the pasteurizer during plant downtime) typically involve a pre- and post-sanitation step around a physical spray clean done by operators. Most sanitation can be effective simply by using a well diffused hot water spray (65-75°C / 150-170°F) and a biodispersant to encourage the loosening of large biomass growths. Using elevated temperatures in combination with strong oxidizing chemical together should be avoided: while the sanitation efforts are redundant, the damage done to the chain can be significant. Conveyor chain should remain in motion during Boilouts to distribute wear evenly, and all pasteurizer doors should be shut to contain heat and vapors.

Typical Dead Zone above Nozzle Bed

No combination of temperature, chemicals and contact time will effectively sanitize a pasteurizer if the water spray is not directed into all zones. It may be necessary to adjust the direction of nozzles (or add additional piping to redirect flow) to achieve effective sanitation. Physical washes (usually a high-pressure spray wash) should be performed by trained personnel wearing proper PPE to prevent any exposure to potentially active biomass dislodged by the cleaning. Frequency of cleaning should be determined by regular biological sampling to effectively control biomass growth, but typically pasteurizers need to be cleaned no more frequently than 3-6 times per year.

Each of the above variables, along with some others (overall chain stress, chain lubrication, specific biological microbes) can have a cumulative negative effect on the pasteurizer chain. Any adjustments that can be made to your cleaning/ disinfection strategy that improve any individual variable can lead to greatly improved chain life and performance.
We can also offer on-site analysis of your current conveyor system to determine the current chain quality and overall expected remaining life, along with further studies after installation which will allow you to prepare for chain replacement before downtime occurs, as opposed to having unexpected breakage with costly results.

If you have any questions, please contact our Application Engineering Department at 1-262-376-4800 in North American or +31 174 445 111 in Europe.

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