

THE BREWING PROCESS

1

Use flow meters to measure the hot liquor input into the mash tun to prevent overflowing.

Avoid using acids with high BOD (such as citric acid) to balance the pH of the mash. Consider using inorganic acids phosphoric, nitric or potassium bisulfate.

2

Minimize last running by measuring or estimating sparge water quantity.

Use a dry method (brush or rake) to remove spent grain from lauter tun.

Add excess/weak wort to the next brew or store with trub for animal feed.

3

Solids/trub formed during the hot break should be separated and added to the spent grain.

Add grains and leaf hops to a filter sock or sparge bag for easy removal after boiling.

Settle, decant, or sieve (no greater than 1000 microns) all liquids to allow solids to settle out for collection, disposal and/or recycling.

4

Solids/trub should be separated and added to the spent grain.

5

Limit cooling water to the volume needed for the next mash (1.1 times the wort volume), then use that heated water for next mash.

6

Avoid overfilling fermentation vessels to prevent spillage. Use detergent sprays and foams to help soften solids on the sides of the fermentation tank before cleaning. Use brushes or scrapers to clean walls of tank before rinsing. Collect used yeast slurry and filter to recover more beer and use as livestock feed. Filter tank bottoms and use for livestock feed.

7

Consider investing in cross-flow or membrane filtration system which consumes less water, and also traps bacteria, reducing or eliminating the need for further pasteurization

9

Invest in a Clean in Place (CIP) system that can recycle and reuse wash water.

Last rinse may be used in the pre-rinse of the next tank.

Use water efficient nozzles and high pressure/low volume sprayers.

Choose using compressed air over water to remove solids.

Reuse wash water for crate and external barrel washing.

Settle, decant or sieve (no greater than 100microns) used cleaning water to recover and reuse chemicals.

8

Properly maintain the conveyor belt system to avoid the need for more water

Consider a plastic belt system that uses less water

Use metered systems to gauge beer volume



CLEANING AND SANITATION

Cleaning vs. Sanitizing, What's the Difference?

Cleaning agents remove scale, dirt and debris from equipment, while sanitizers kill bacteria, yeasts and molds.

Cleaning

Most cleaners are alkaline based including caustic and non-caustic products. Caustics hydrolyze or emulsifies soil while non-caustics use displacement to remove soil so it can be rinsed away, like dishwashing detergent. Caustic or Sodium hydroxide is widely used in the brewing industry, however it is extremely dangerous to skin and eyes and corrosive to soft metals like brass and copper.

Sanitizing

To be approved and registered by the EPA, sanitizers must be able to kill over 99.999% of the original bacteria present. **Post rinse sanitizing, means that no rinse is required after application when used in appropriate concentrations.**



Physical versus chemical sanitation:

Hot water, steam and UV light can be good sanitation options that reduce or eliminate the need for chemicals, however this can be costly in energy and water consumption.

Best Post Rinse Sanitizers

Chlorine Dioxide, peracetic acid, iodophor, phosphoric/anionic surfactant. Bleach and ammonia are the worst for post rinse as they leave a residual flavor.

Chlorine/Bleach

Chlorine based cleaners are widely used in the food industry. Chlorine is relatively inexpensive, works at low temperature, and leaves minimal residue on surfaces. When prepared correctly, these compounds work extremely well as broad spectrum germicides while being non-staining and non-toxic. However, chlorine must be triple rinsed to prevent flavoring beer, increasing water consumption. This makes it a poor option as a post rinse sanitizer!

Chlorine Dioxide (ClO₂) – these sanitizers are more environmentally friendly than bleach, which can form trihalomethanes (THM) when broken down in wastewater. ClO₂ is a popular choice for drinking water disinfection as it does not leave a chlorine taste profile. Ideal for use as a post rinse sanitizer.



The Brewery Industry and municipalities working together to handle waste and conserve resources for a more sustainable future.



SUSTAINABLE BREWING