

Master Brewers

Food Safety Bite

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Current Good Manufacturing Practices—Equipment and Utensils

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The MBAA Food Safety Committee publishes regular Food Safety Bites to update members on food safety issues related to the brewing industry. The current focus is on Good Manufacturing Practices (GMPs) published in the FDA food and beverage regulations (Code of Federal Regulations [CFR] § 117, Subpart B). When referring to food safety in the brewing industry, GMPs are oftentimes called Good Brewing Practices (GBPs). After all, beer is food, and it must be treated as such. The Food Safety Modernization Act (FSMA) requires that all food facilities, including breweries and packaging facilities, comply with current GMPs (cGMPs), as described in 21 CFR § 117.10–117.110.

- § 117.10 Personnel
- § 117.20 Plant and grounds
- § 117.35 Sanitary operations
- § 117.37 Sanitary facilities and controls
- § 117.40 Equipment and utensils
- § 117.80 Processes and controls
- § 117.93 Warehousing and distribution
- § 117.95 Holding and distribution of human food by-products for use as animal food
- § 117.110 Defect action levels

The last [Food Safety Bite](#) covered sanitary facilities and controls, including water supply, plumbing, and handwashing facilities (21 CFR § 117.37). This Food Safety Bite covers equipment and utensils (21 CFR § 117.40).

Contamination and spoilage can occur when beer is made with poorly designed equipment or inadequate materials (Rench 2019). For example, wooden casks traditionally used for beer storage have largely been replaced by stainless-steel vessels, but they may be used intentionally for certain products (De Roos et al. 2019).

During prohibition, breweries that didn't close shifted production to malt extract and non-alcoholic "near beer." Tanks and equipment used for cellaring beer were obsolete, and much of the equipment was dismantled to gain space for other uses (Gusmer and Hind 1936). After prohibition, U.S. beer demand resurged, but cellaring capacity was inadequate. Lumber for making wooden fermenters and storage tanks was scarce at the time, so breweries moved to using new vessels manufactured with steel. At first, construction was rushed and shoddy, but it was what breweries could afford at the time. Stainless-steel tanks with proper design and construction were introduced around the same time, and they became more common in breweries during the mid 20th century. Modern breweries are hygienically designed with robust, cleanable materials to help repeatedly make high-quality beer (Manzano et al. 2011).

What You Need to Do

Design and Cleanability of Equipment and Utensils

Fortunately, most modern brewing equipment is made from stainless steel, and it can be maintained, cleaned, and sanitized effectively. According to the FDA, equipment (e.g., kettles, tanks, packaging lines) and utensils (e.g., buckets, paddles, scoops) must be designed in such a way that they can be adequately cleaned and sanitized to prevent contamination. When not in use, equipment and utensils should be stored in a manner that helps prevent cross-contamination.

Facility design (e.g., brewhouse, cellar, packaging, etc.) must allow enough space for appropriate maintenance and cleaning of equipment and utensils. Inspection and cleaning must take place during and after preventative maintenance procedures to prevent contamination of raw materials, food products, and food contact surfaces. Bushings, other metal-to-metal connections, seals, and other connection types need to be inspected regularly to detect signs of wear before they can damage equipment or contaminate the food stream. Before returning to normal operations, the area must be cleaned after performing maintenance tasks. A preventative maintenance schedule that ensures accuracy and precision must be established for in-line and bench-top measuring devices and other control equipment, such as equipment needed for cleaning and sanitation.

Food Contact Surfaces

Food contact surfaces, including tanks, pipes, hoses, and kegs, must be corrosion resistant, and they must be nontoxic. This is common practice for the brewing industry because of persistent moisture and chemical threats, but it is not uncommon to see equipment that is corroded and pitted, especially in legacy breweries and in non-food contact situations. All food contact surfaces must be able to withstand the physiochemical stresses associated with making beer (e.g., pressure, temperature, pH). For more information on brewery cleaning and sanitation, refer to "Brewery Cleaning: Equipment, Procedures, and Troubleshooting" (Rench 2019).

Furthermore, seams on equipment and utensils must be smooth and consistent, so they remain free from biofilms and other harborage sites for spoilage organisms. For more information on use of metal in the brewing industry and corrosion, refer to Palmer's review (2021).

Other Considerations

Non-food contact surfaces, including warehouses, conveyors, and coolers, must be designed and maintained so they do not pose a risk for

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Ask the Food Safety Team

Ever have a food safety question you don't know the answer to or for which you would like a second opinion? The Food Safety team is there to help! Just post your question in the "Ask the Brewmasters" section of the community site, and the Master Brewers Food Safety Committee will weigh in or get another expert's answer for you!

cross-contamination. Furthermore, freezers and refrigerators used for storing ingredients must be appropriate and monitored for temperature abnormalities. Thermometers and other instruments used for process control (e.g., pH meters) must be accurate and properly maintained. Compressed gasses that come in direct contact with beer (e.g., carbon dioxide, steam, and nitrogen) must be stored and handled in a way that helps prevent contamination and they should be food grade.

References

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- Manzano, M., Iacumin, L., Vendrames, M., Cecchini, F., Comi, G., and Buiatti, S. 2011. Craft beer microflora identification before and after a cleaning process. *J. Inst. Brew.* 117:343-351.
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- U.S. Food and Drug Administration. 2022. 21 Code of Federal Regulations. Part 117—Current good manufacturing practice, hazard analysis, and risk-based preventive controls for human food. § 117.40: Equipment and utensils. FDA, Silver Spring, MD. www.ecfr.gov/current/title-21/chapter-I/subchapter-B/part-117/subpart-B/section-117.40