



Graver Technologies

Application Brief

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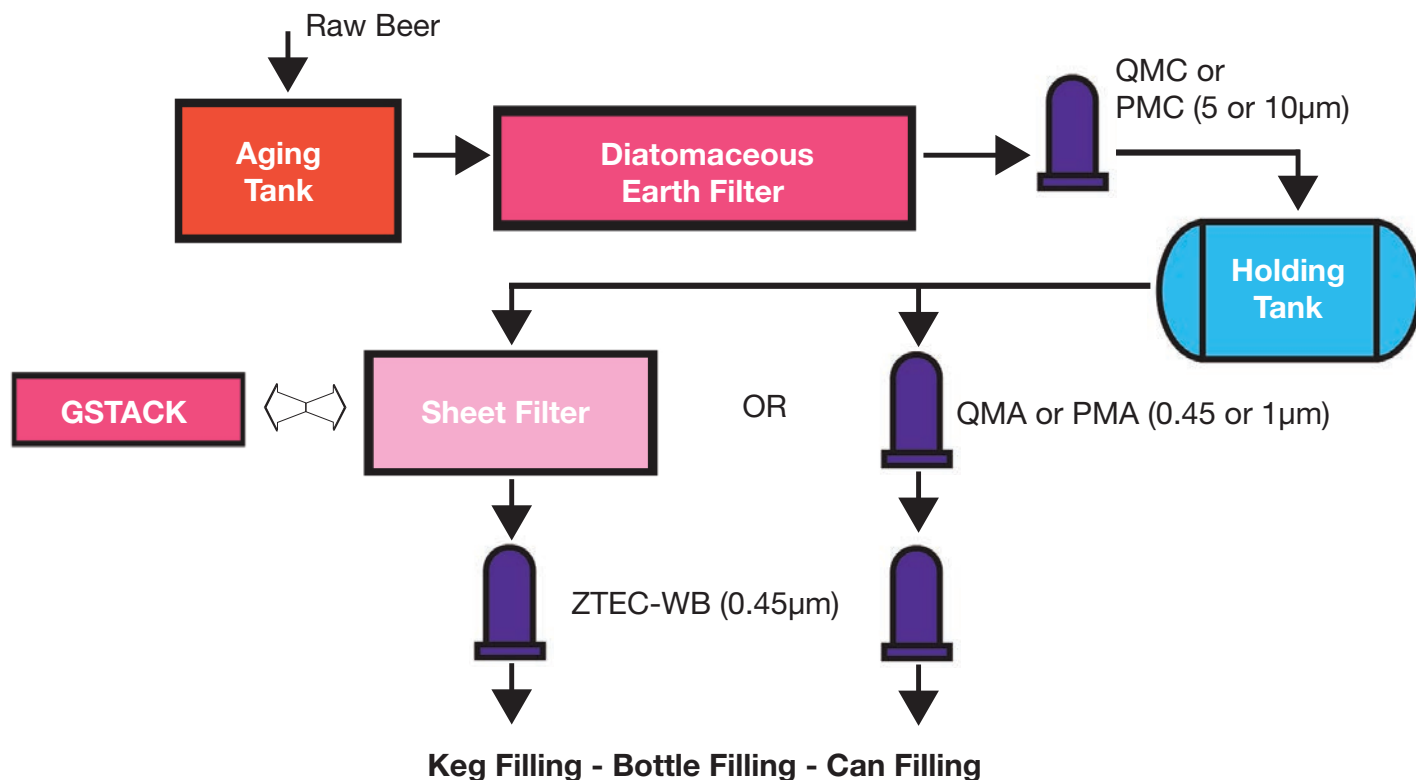
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AB-004

Filtration Opportunities with Microbreweries

Craft brewing accounts for about 6.5% of domestic beer sales by volume. There are over 2300 craft breweries in operation, about half of which are brewpubs and the balance are microbreweries that are serving local or regional markets. Growth within the market segment has exceeded 12% for the past several years, thus making it a market segment worth following. By definition, these operations produce under 15,000 barrels (1 barrel = 31 US gallons) annually. While some follow the Purity Laws of 1516 in the strictest sense, many filter in a post fermentation step and those that distribute either bottled or keg product, may use membrane filtration to assure shelf life.

Filtration in the Brewing Process



There are a number of filtration steps within the brewing process. Each will be discussed here:

Clarification Following Fermentation

During the fermentation process, yeast is used to convert sugars from grain into alcohol. This process produces large volumes of yeast and cellular debris that must be removed with a filter capable of handling high solids. Generally this is accomplished utilizing a plate and frame filter with a pad or cloth along with a precoat of diatomaceous earth (DE). DE has some unique absorptive abilities which make it desirable for this clarification step. An alternative to this step is lenticular technology such as the Graver GSTACK. The cellulosic filter provides for outstanding dirt loading necessary at this stage as well as the absorptive characteristics of DE. When a filter press is utilized, the risk of DE unloading or bypassing exists, therefore a 5 micron trap filter is used as precaution. This filter can vary from a nominal melt blown to a high efficiency pleated. As such, opportunity exists for Stratum C, QXL or PMA, depending upon price point desired, as well as quality of the plate and frame equipment. It should be noted that these post fermentation steps are similar to those utilized by large breweries.

Microbial Stabilization Prior to Bottling

While most regional and large breweries utilize flash pasteurization to ensure microbial control/stabilization in the bottling process, the capital expenditure for this equipment and energy consumption are typically too costly for a craft brewer. To manage this process, the craft brewer will use membrane filters that have bioburden reduction claims along with a suitable prefilter. The typical recommendation would be the 0.45 micron ZTEC WB which has specific claims for spoilage organisms. Multi-layered prefilters such as the 1 micron QMC offer ideal protection to the membrane filters, although depending upon the nature of the beer, the PMC or PMA are viable options. The bottling filters are most often reused and thus daily cleaning and sanitization procedures are utilized as outlined in TB-008, **Graver Cartridge Regeneration Procedures for Wine & Beer Applications**.

Other Essential Processes

Water

Product Water: As a key ingredient of beer production, water is typically used in large volumes and must be of a defined quality. Therefore treatment of incoming water may be of significant concern depending upon the source of the water.

Keg and bottle Washing: Failure to provide high quality water for bottle and keg washing can result in particles or organic materials that create aesthetic issues or lead to contamination and spoilage of the packaged product.

Sanitizing Water: Water >80°C is used to sanitize the system to reduce the risk of bioburden.

Cleaning/Rinse Water: Since the bottling filters are most often used in many bottling cycles, cleaning after production is critical. Particle contamination can result in plugging of the membrane and prefilters, further reducing the cycle life.

Product Recommendations: All water should be filtered to at least the same level as the final filter used for the beer, quite often 0.45 micron. The ZTEC WB is effective at particle and microbial control for these applications. Additionally, suitable prefiltration is recommended to increase the life of the membrane filter, possible Stratum A, Stratum C or pleated products such as PMA or PMC.

Air/Gas

Air and gas are two more critical, often neglected components of the brewing process. Both particle and microbial control are required to provide a high quality finished product. Since many media types can wet-out from water or atmospheric condition, the best choice in these applications is to utilize a PTFE membrane which is hydrophobic. As such, TefTEC is an ideal choice for these applications.

Tank Vents: Wild strains of yeast as well as other airborne microbes can lead to a rapid loss of quality or the introduction of off-flavors during the fermentation process.

Aeration: Sporadic quality issues may be traced to poor air quality during the aeration of wort. Reducing contamination of the air quality by controlling microorganisms in the feed air is critical.

CO₂: The final step prior to capping is the injection of CO₂. Ensuring that this gas is free of particles and microbial contamination will help protect the beer prior to closure.

The regional and large breweries can be difficult to penetrate, often requiring corporate approval or a high degree of testing and validation steps. Craft beer opportunities tend to be more accessible, allowing for testing and conversion in a short time frame. Craft breweries in your region are easily identified through internet searches or local published guides.