

Temperature is Key to Brewing Success

Temperature plays a critical role in the beer brewing process. No one knows this better than Jason Schoneman, Head Brewer and founder, of Steel Toe Brewing in St. Louis Park, Minnesota. Until connecting with Burns Engineering, Jason struggled with premature temperature sensor failures causing unnecessary downtime. As a craft brewer, beer taste and quality is critical; it's not just a matter of dollars and cents it's his reputation on the line.

Jason's largest temperature challenges revolved around his mash tun temperature measurement. Mashing is where the beer brewing process begins. It is the process of combining a mix of grain (malt) and water and heating the mixture to allow the enzymes in the malt to break down the starch in the grain into sugars that can be fermented. The question is how much heat is needed to make this work. The temperature ranges between 143°F to 167°F depending upon the type of mashing process being used. Different temperatures and durations are used to activate different enzymes which impact the amount and types of sugars produced, which in turn, dictate flavor, body, alcohol content and caloric value. When the temperature is higher the yield is greater and the fermentability lower, and the opposite if the temperature is lower. Temperature control of $\pm 1^\circ\text{F}$ is typically required to optimize the mashing process.



After a brief discussion and a quick look at the location, it was decided that a Burns Series 300L spring loaded RTD for use in the existing thermowell would provide the accuracy and durability Jason required. The addition of a polypropylene connection head

completes the package by protecting the sensor from corrosion, moisture, and physical damage.

Temperature plays a significant role in the fermentation process as well. After mashing, the water is strained to remove the spent malt and hops are added to create the wort (pronounced “wert”) and it is brought to the boiling point to concentrate and extract the necessary essence from the hops. The wort is then cooled down to 55°F to 65°F via a heat exchanger. From there the wort is transferred to a fermentation tank where yeast is added to break the sugars down into alcohol and CO₂. Here again temperature is critical; fermentation takes place at 45°F to 85°F depending upon the type of beer that is being produced and the yeast that is used. Swings in fermentor temperatures can “shock” the yeast and kill it resulting in a ruined batch or “off” flavors. Fermenting above the normal temperature range may produce excessive fruity-flavored esters or harsh-flavored fusel alcohols. Fermenting below the normal temperature range can result in sluggish or incomplete fermentation. Heat generated by active fermentation can warm the batch 10°F to 15°F so accurate temperature monitoring and control is extremely important. In addition, as beer ferments, yeast “drops out” to the bottom of the tank and becomes a great insulator creating another potential opportunity for incorrect temperature measurements.



FYI: Normal Ale fermentation temperatures range from 68°F to 72°F and Lagers from 45°F to 55°F.



It's not enough to simply read a temperature, knowing the CORRECT temperature is vital to producing a great tasting beer. If you're not 100% confident in your measurements contact Burns Engineering, The Temperature Measurement Experts. Our mission is to ensure temperature measurement confidence.

Thanks Jason, for trusting Burns Engineering with your critical temperature measurement needs.

