Infussion Series Mash Tuns – 10 and 20 Gallon

Configurations, Operation, and Best Practices

Congratulations on your purchase and thank you for choosing SS Brewing Technologies for your mash tun vessel needs. We have specifically designed our Infussion series with several efficiencies over standard mash vessels that will result in meaningful enhancements for both casual and professional brewers alike. This report is designed to better inform our users of these enhancements and share a piece of our knowledge and experience in the pursuit of the highest quality beer imaginable.

Single Step Infussion Mashes

The majority of home brewers utilize a single step infusion mash rest regimen; where a specific volume of strike water is added to the vessel at a predetermined temperature, then the contents of the grain bill is added to reach a target mash temperature. The contents of the mash will then remain at the specified target temperature for the duration of the mash rest.

One of the key differentiators of our vessel is that it utilizes a double stainless steel wall, with high density expandable foam injected into the cavity between the two walls. This process results in an extremely effective insulation barrier between mash temps and outside ambient temps. Furthermore, the lid also utilizes the same process; which has been proven to be choke point for non-insulated vessels and in turn becoming a key design element to retain heat, since heat naturally radiates up.

In fact, during our extensive testing in relatively temperate ambient climates, we've been able to consistently achieve heat-loss figures of roughly 1 degree or less throughout the duration of a 60-minute mash rest. This further contributes to temperature uniformity throughout the vessel and contributes to increased efficiency. Setting aside water chemistry, PH levels, grist composition, and other factors, precise temperature regulation has proven to be one of the single largest factors of high saccharification starch conversion outcomes.

Preheating

While several calculators have emerged to help brewers with determining what the temperature of the strike water should be in relation to grain temperatures, every vessel's insulation and heat retention properties are different.

Due to the inability to easily alter a single step infusion mash temperature once the ingredients are mixed. We recommend that users preheat the vessel to insure that the strike water's heat isn't inadvertently absorbed by the vessel that should otherwise be needed to reach your desired mash rest target temperature. To preheat the vessel, we recommend placing at least the volume of liquid required by your mash at the desired mash temp or 150 degrees into the vessel for roughly 10 mins.

Once you gain additional familiarity with the vessel and develop a comfort level with how much heat the vessel absorbs in your respective ambient climate. Measure the temperature difference between the water both before and after you preheat the vessel. With this simple calculation you can ascertain how

much heat is absorbed by the vessel, then add that differential to your mash calculator's recommendation and skip the preheating step altogether.

Efficiency

Efficiency of your system depends on many variables such as time, temperature, grain crush, grist thickness, diastic power, water chemistry, PH levels, and grain bill contents. While most of the variables are not a direct result of the mash tun itself, to improve your brew house efficiency here is a quick check list of important factors:

- *Time*. Mash for at least 60 minutes, however some mashes may benefit from 90 minutes.
- *Temperature.* Maintain mash temperatures in the between the enzymatic thresholds of 145-175 degrees Fahrenheit for complete saccharification starch conversion.
- *PH Levels.* Enzymes responsible for starch conversion are also sensitive to PH levels. Maintain mash PH levels between 5.3-5.7 measured at room temperature for optimal conversion efficiency.
- *Crush.* A course crush will not allow gelatinization of the mash, resulting in decreased efficiency. A fine crush will result in too many fine particles (flour), stuck sparges or cloudy beer. Ensure mill gap spacing is between 0.5-0.9 millimeters.
- *Grist Thickness.* Beginners should target 1.5 Quarts of water per pound of grain. However, advanced brewers can venture to thicker (1.25 Qts/lb) or thinner (1.7 Qts/Lb) based on their desired outcome.
- *Diastic Power and Grain Bill.* Recipe Formulation is an important variable to achieving excellent efficiency. Typically, recipes will call for 80% base malt to 20% specialty malts. Base malts typically possess greater diastic power because they contain more enzymes for starch conversion. Whereas, highly kilned malts such as crystal malts or unmalted grains contain fewer enzymes for a complete starch conversion.
- *Water Chemistry.* Be aware of your individual water chemistry. Hard waters typically brew better dark beers because of the abundance of specialty and dark malts, which helps to lower PH Levels because dark malts have greater acidity. Conversely, soft water typically brews better light beers because of less alkalinity to reach the target mash PH. Being aware of your water's total hardness and alkalinity can assist you in calculations for adding brewing salts to harden, or adding acidulated malt or distilled water to lower total hardness and achieve your desired PH level.

MTSs

We recognize that colder ambient temps can result in additional heat loss during the duration of a 60 or 90-minute mash rest. Furthermore, we also recognize that many brewers seek to automate their mash process through the use of a controllable thermostat and active heat source. We designed the Mash Tun Stabilization System (MTSs) as an add-on accessory to our Infussion Mash Vessels to fit this dual need.

The kit is made up of an adhesive backed 60-watt heating element that attaches to the underside of the 5-degre slopped bottom alongside a digital thermostat that allows the user to input their target mash temp after mixing their ingredients using the aforementioned single step infusion mash process. The thermostat will monitor the internal mash temp through the included weldless thermowell, and

automatically activate the heating element to mitigate even the relatively small heat-loss that occurs naturally.

Keep in mind that the MTSs is only designed to stabilize mash temps, and not rapidly raise mash temps as part of a more advanced multi-step mash regimen. During our tests, the MTSs exhibited enough strength to raise standard mash volumes roughly 3-4 degrees over the course of a 60-minute mash rest.

Lautering and Sparging

The lautering and sparging process is key to maximizing efficiency and producing the clearest wort possible. The Infusion Mash Tuns were originally designed to operate with a lautering/run-off velocity up to 1.5inches/minute, which is equal to about 1.4 gallon per minute. You can potentially increase your efficiency by slowing down the run-off rate, yet testing has indicated that a rate of less than 0.5 inches/minute is considered to be slower than necessary. Conversely, run-off rates greater than 1.5 inches/minute will be less efficient and elevate the risk of a stuck sparge.

Whether you are batch sparging or fly sparging, the distribution of water from the hot liquor tank should be as even as possible to maximize maltose extraction. We designed the optional Ssparge Arm to seamlessly integrate with our line of Infussion Mash Tuns and provide users with an affordable turn-key option to achieve the best possible results. Our sparge arm has adjustable height to adapt to different size grain bills and offers 3 flow discs that adjust the volume of water that flows through the arm's nozzle.

Lastly, our line of mash tuns were designed with near zero dead space, and a 5-degree conical shaped bottom to direct wort to a center mounted drain. This fundamental enhancement works to further increase the volume of wort extracted from the vessel when compared to other popular options. As a result, users should remove the dead space factor from their recipe building or volume calculation software and expect to receive virtually all wort volume, notwithstanding the standard grain absorption consideration.

Manometer (20 Gallon)

The purpose of a manometer in a mash tun application is to monitor the pressure differential both above and below the false bottom. The manometer offers a visual representation of how fast you are drawing wort through the grain bed, based on the difference in level between the two tubes. When wort is run-off quickly it creates a pressure differential within the grist, and can actually compact the grain bed, typically resulting in a stuck sparge. While grists consisting of 100% barley are rarely at risk; wheat, rye or oat blends will compact more easily because they do not have a comparably rigid grain husk. While lautering, if you observe the difference between the upper and lower manometer tubes approaching ¾ inch, you are running-off too quickly. Ideally, the difference should be zero to ¼ of an inch.

When you get a number of brews under your belt on the 20 gal Infussion Mash Tun, you can react quickly to the Manometer's real-time feedback for adjusting your system's pump speed or ball valve orientation. Moreover, they are also convenient because they double as an external sight glass.

In real world applications, the manometer will offer insight into adjusting the crush of your grain juxtaposed your efficiency numbers and lautering performance. Until recently they have only been

included with pro equipment to keep things simple. However, we feel that equipping more home brewers with pro tools will contribute to the evolution of our craft!

Multi-Step Mashes and Recirculation

Many advanced brewing practices call for a multi-step mash regimen; whether that include dough-in, protein rest, multiple saccharification rest temps, or a mash-out step, an external heat source will be required to ramp the temperature once you mash-in. That heat source in conjunction with a pump will encompass the recirculation loop to drive the flow of wort through the mash vessel and ultimately result in a well-timed multi-step mash process.

Our line of Infussion Mash Tuns double as the perfect multi-step mash vessel because of their ability to retain heat so efficiently. Heat that would otherwise be lost to wide ambient temperature differences in a non-insulated kettle-style mash tun. We understand that advanced brewers care deeply about having the flexibility to engage in more complex recipe production, which is why we have integrated a standard ½" MPT upper recirculation port into our 20 Gallon vessel, and now offer a kit to add the optional fitting to our 10 gallon vessels.

Furthermore, as an optional accessory we offer a ½" stainless steel T-fitting to allow an auxiliary supply line to feed your RIMS or HERMS equipment. This enables a complete multi step mash process, without swapping tubing runs and risking coming into contact with hot wort.

Vorlauf

Vorlaufing is the process of clarifying the wort that is drawn out of the mash tun, resulting in fewer grain particles or flour making their way into the boil kettle. While many home brewers have become accustomed to drawing a few liters of wort out until it begins to run clear, we have determined the best way to vorlauf is to recirculate the wort for at least 5-7 mins. This will result in "setting" or lightly compacting the grain bed to establish it as a filter to clear even the smallest mill finings. In our tests we have been able to achieve ultra-clear wort virtually free from any small grain particulate.

To accommodate this practice, we designed our Vorlauf fitting to easily attach to the recirculation bulkhead. The fitting inserts directly into the smooth inner diameter of the bulkhead and seals with two o-rings. It is held in place by a knurled FPT locknut that will thread onto the outer dimension of the bulkhead. Furthermore, it was designed with a splash relief to avoid disturbing the top of the grain bed, and provide a neutral backdrop to fan out the wort to visually insure its clarity before run-off.

In real life practice, wait to vorlauf until after the duration of your mash-rest is complete. Attach your pump's intake header to the mash tun's ball valve or optional T-fitting, then attach the pump's supply header to the outer bulkhead fitting, and finally attach the vorlauf fitting to the interior of the bulkhead. If using the optional T-fitting, we strongly recommend a ball valve be included in the loop to moderate the flow of wort to avoid over compacting the grain bed, resulting in a stuck sparge.

Start the vorlauf process with all ball valves closed, then start your pump and slowly open them; carefully insuring that too much vacuum doesn't cause a stuck sparge. 20 gallon users can refer to the manometer for this key measurement. Once the vorlauf process is complete, divert your run-off into the boil kettle and proceed normally.

RIMS/HERMS

We support the ability to employ advanced brewing practices in virtually all equipment designs, and our Infussion Series Mash Tuns are no exception. For those users that are considering utilizing one of the widely practiced Recirculation Infusion Mash System (RIMS), or Heat Exchanged Recirculation Mash System (HERMS); our mash tuns make excellent vessels to integrate into your brew house.

For those that are not proficient on the design of each type of system, in a typical RIMS setup; a relatively high-wattage heating element (2500-5500 Watts) is placed within a stainless tube as part of an ancillary recirculation loop. Driven by a pump, wort circulates through the tube and past the heating element to maintain temperatures (single step mash) or ramp temperatures (multi step mash), typically in a non-insulated brew kettle style mash tun. While early concerns with RIMS systems centered on direct wort contact with the heating element and the risk of scorching, with modern ultra-low watt density elements and modern temp controllers, these risks are largely mitigated.

Comparatively, in a HERMS setup; a pump recirculates wort through a stainless steel coil mounted and submerged in the Hot Liquor Tank (HLT); which in turn has the ability to gently exchange heat as a result of the temp differential between the mash and HLT. The positive attributes of a HERMS setup are the ability to operate it without an electrical controller, instead using propane, and the fact that there is no risk of scorching. The downside to a HERMS design is that the temp differential between common HLT temps of roughly 170-180 degrees, and mash temps 145-175 is too little to effectively ramp the temp in a reasonable amount of time. Especially when many multi-step mash regimens suggest a mash-out step.

The beauty of adding a RIMS/HERMS setup to our Infussion Mash Tuns is that ramp speeds will be extremely quick as a result of minimal vessel heat-loss. As a result, if you decide to go with a RIMS/HERMS setup, the MTSs will not be required since the higher wattage of the RIMS element, or the temp differential of the HLT is plenty to overcome any heat loss from the vessel or recirculation loop.

In addition, we offer several accessories to easily integrate with new or existing RIMS/HERMS brewing equipment. To easily create a loop, users can utilize the optional lower T-fitting installed before the ball valve and upper recirculation bulkhead to connect their RIMS tube or HERMS coil. Lastly, we offer a knurled barb that threads onto the inner bulkhead fitting to connect our new recirculation manifold.

We designed the manifold specifically for heated recirculating mash systems because it evenly distributes heated wort across the grain bed similar to a sparge arm. However, the manifold is designed to be submerged in the mash and sit directly on top of the grain bed, resulting in minimal heat loss, grain bed disturbance, and uniform heat transfer within the vessel.

Depending on the typical style of brewing that you gravitate towards, a single step infusion mash may be all you will ever need. In that case, invest in the MTSs and it will cost effectively automate your single-step mash process. Yet if you desire the additional complexity of a RIMS/HERMS system and multi-step mashes, then by all means utilize our optional accessories since each system is mutually exclusive from another. Just remember that a RIMS tube or HERMS system will require ancillary brewing equipment such as a pump, HERMS coil, 115/220v electrical temperature controller, RIMS tube, element, and hardware to name a few.