

CertiSafe™ Tank Mixers: Improving Water Quality in Texas and Beyond

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Water is the lifeblood of communities, and the infrastructure that delivers it safely and reliably is essential for public health and well-being. Among these infrastructures, water tanks and towers ensure a steady flow of clean water to homes and businesses. Citizens don't give water towers much thought, yet inside, a complex interplay of factors significantly impacts their performance, longevity, and the safety of the product they steward for the community. One such factor is thermal stratification—a phenomenon with far-reaching consequences for water quality and structural integrity. At its core, stratification is the vertical layering of water within tanks and towers based on temperature differences. This natural occurrence arises from the varying densities of warm and cold water. When water is heated, it becomes less dense and rises, creating distinct layers within the tank. At the surface, the warmest layer, known as the epilimnion, absorbs the sun's warmth. Below it lies the metalimnion, a transition layer where temperatures gradually decrease. Finally, at the bottom, rests the coldest layer—the hypolimnion, where cooler waters gather, often stagnant and isolated from the rest.

Thermal stratification leads to chemical stratification that can seriously compromise water quality. The upper layer contains the oldest, warmest water with low disinfectant residuals and the lower colder layer contains a higher chlorine residual. This can lead to bacteriological contamination and high concentrations of disinfection by-products. The warm conditions at the air-water interface on the interior sidewall allows biofilms to prosper.

This separation of water layers sets the stage for challenges. Firstly, it provides a fertile breeding ground for bacteria and microorganisms. In the warmer months, the surface layer becomes a thriving hub of microbial activity, fostering the growth of biofilms and unpleasant odors. These unwelcome guests not only compromise water quality but also pose a health risk to consumers. Moreover, as the warm air meets the cool depths of the tank, condensation forms, creating ideal conditions for algae and mold to flourish—a visible sign of the hidden forces at play.

Secondly, the stagnation of colder water in the hypolimnion exacerbates water quality issues. Without proper circulation, dissolved oxygen levels plummet, creating an environment ripe for the proliferation of harmful pathogens. Left unchecked, this can pose a serious threat to public health, underscoring the urgent need for effective solutions.

Furthermore, the physical properties of water add another layer of complexity to the equation. As temperatures drop, water undergoes a remarkable transformation—becoming less dense and buoyant. In colder climates, this can lead to the formation of ice within the tank—a potential nightmare for infrastructure managers. The expansion of freezing water exerts

tremendous pressure on the tank's structure, risking damage and compromising its integrity. Ice formations, resembling cakes or donuts, pose not only a threat to the tank itself but also to the surrounding community. The sudden release of pressurized water can wreak havoc on plumbing systems, causing unforeseen damage and disruptions.

In the face of these challenges, innovative solutions are urgently needed. One such solution comes in the form of active mixers—devices designed to disrupt thermal stratification and promote uniform mixing of water within the tank. Kasco®'s CertiSafe™ Tank Mixers exemplify this approach, employing a combination of vertical and horizontal circulation patterns to maintain consistent temperature and chlorine levels throughout the tank. By eliminating the thermocline—the boundary between warm and cold layers—these mixers effectively thwart the conditions conducive to microbial growth and ice formation, safeguarding both water quality and infrastructure integrity.

Mixers as a solution—case studies from Texas



Case studies from Texas offer compelling evidence of the efficacy of such solutions. In communities grappling with the challenges of thermal stratification, the implementation of active mixers has yielded tangible benefits. By ensuring uniform mixing and temperature distribution, these devices have not only mitigated water quality issues but also extended the lifespan of critical infrastructure.

Shon Bellah, Supervisor for Water Production in the city of Rockwall, Texas, shared his story of how a CertiSafe Tank Mixer helped resolve a problem in his community.

“During the summer months, we were having lower residuals due to the heat,” Bellah said. “And the further you got into the tank, the lower the residuals were. You see, in our tank, the inlet and the outlet are fairly close together, which means the majority of the water in the tank stands still during normal operations.”

Bellah says the city discussed adding a chlorine injection system to boost the water - an expensive prospect - but opted to try CertiSafe instead. “We found adding the mixer evened the water out - we were getting one consistent residual throughout the entire tank. It was very impressive.”

Bellah used the analogy of a straw in a beverage to describe the mixer’s effects. “Adding a mixer means all the water in the tank is moving,” he said. “It’s agitating it and making it all move, like blowing bubbles in a milkshake. We’ve seen what it’s done, how well it works, and we decided to install it in our other ground tank as well.”



In Keller, Texas, Water Operations Supervisor Randy Worthen agreed. “A big concern we have is water age, and the degradation of the chlorine residual. Chlorine is a disinfectant that reduces any bacteria in the water that could cause illness or sickness. The lack of our transmission mains—we mainly have distribution mains—we would fill the tower up and then it would drain from use, then we would turn a pump on and push the rest of the water back up,

with no mixing. Adding the mixers to the water helped the chlorine residuals to rise.”

Kasco CertiSafe Tank Mixers offer a multitude of advantages that reach far beyond just preventing stratification. These innovative devices also eradicate thermal barriers, curtail energy consumption, and significantly prolong the lifespan of water tanks and towers. Moreover, by upholding uniform conditions, they play a crucial role in guaranteeing a continuous flow of fresh and safe water to communities.

Worthen said the CertiSafe Tank Mixer’s benefits for Keller go well beyond water quality. He noted they can also reduce the burden on human resources.

“We used to have to drain it three times a year, to eliminate water that had stood still too long,” Worthen said. “That meant having personnel inside the tank for a day or two doing that. It delayed those same people from getting out and actually doing their other work, like preventive maintenance. It’s helped the community that way, because more work can be done in less time.”



Implications for the future

In reflecting on the critical role of water infrastructure in sustaining communities, it becomes evident that the challenges posed by thermal stratification demand proactive and innovative solutions. Water tanks and towers, often overlooked by the public eye, harbor a complex



interplay of factors that profoundly influence their performance and the quality of the water they deliver.

The phenomenon of thermal stratification, characterized by the vertical layering of water based on temperature differences, presents formidable challenges to water quality and structural integrity. From microbial growth to ice formation, the consequences of stratification are multifaceted and far-reaching. However, the implementation of technologies such as Kasco CertiSafe Tank Mixers offers a promising solution.

By disrupting stratification patterns and promoting uniform mixing, these mixers not only safeguard water quality but also extend the lifespan of critical infrastructure. Case studies from Texas underscore the tangible benefits of these solutions, from improving water quality to enhancing operational efficiency and reducing resource burdens.

As we look to the future, the contrast between communities that address thermal stratification and those that do not highlights the imperative of proactive measures in securing sustainable water resources. Through collaborative efforts and the adoption of innovative technologies, we can ensure a continuous flow of fresh and safe water to communities, safeguarding public health and well-being for generations to come. Contact the CertiSafe sales team for more information at: kascomarine.com/contact-us.