APPLICATION NOTE

INDUSTRY-SPECIFIC APPLICATIONS FOR UV TECHNOLOGY

APPLICATION: UV Treatment | UV SERIES: SwiftBeverage®

Aquafine SwiftBeverage Fully Complies with PMO (Pasteurized Milk Ordinance) for the Dairy Industry

UV Treatment for PMO-compliant Pasteurized Equivalent Water

The Pasteurized Milk Ordinance (PMO) is an important guidance document for the US dairy industry. The PMO specifies the equipment and processes required to produce Grade-A milk approved for interstate shipment. The PMO document is prepared by the National Conference on Interstate Milk Shipments (NCIMS) and is incorporated by reference into Federal specifications. Submissions for changes to the guidance document are voted on biennially at the NCIMS, and accepted changes are promulgated in the next publication. The NCIMS then presents the document to the Food & Drug Administration and associated state Regulatory agencies for review and approval for use. The ordinance is a "grass-roots" consensus of current knowledge & experience, representing a practical & equitable milk sanitation standard for the nation.

The PMO specifies that water for use in contact with milk in Grade-A plants must be pasteurized. Since 2011, Ultraviolet treatment has been approved to replace thermal pasteurization for this water, as long as certain criteria are met.

*For representational purposes only. Please contact Aquafine Corporation for additional product options.

PMO Requirements for UV

Appendix H, Section IX outlines the Accepted Process for the Creation of Pasteurized Equivalent Water with UV Light Technology

1. UV dose of 40 mJ/cm² ☑
2. Downstream diversion supported ☑
3. Designed for frequent cleaning ☑
4. Flow restricted to design maximum ☑
5. UV intensity sensor ☑
6. Online UVT (water clarity) meter ☑
7. Flow diversion on low dose ☑
8. Non-toxic materials ☑
9. Recording of Flow, UVT, dose ☑

Aquafine SwiftBeverage PMO complies with PMO Requirements

The Pasteurized Milk Ordinance requires that all water treatment technology for dairy plant usage must be fail-safe, ensuring that 100% of the water is fully treated. UV treatment equipment must initiate flow-diversion if the UV dose falls below target, or if the system operation is otherwise compromised.

All Aquafine SwiftBeverage systems have been designed to meet the diversion requirement, to regulate flow and to have the required dose monitoring to ensure full compliance with the PMO. Aquafine works closely with the PMO specification organization.

Aquafine PMO Successes

Aquafine has supplied numerous PMO compliant units, including:

- Twelve SBV1200-PMO units treating water used in 3 butter production facilities in California
- SBV600-PMO unit treating water used in a cream cheese facility in New York
- SBV300-PMO & SBV600-PMO units treating water used in whey & cheese production in Wisconsin

Aquafine®

DAIRY

Heat Pasteurization vs UV Light Technology: Energy efficiency = cost savings

A major advantage that UV light technology offers for dairy processing is cost savings through lower power consumption of UV equipment due to high energy efficiency. Traditional heat pasteurization is expensive. Even though the pasteurizer equipment itself may not be expensive, the very high power consumption results in high operating costs. In contrast, UV technology total cost of ownership is very low because UV lamp power consumption is very similar to that of long fluorescent lamps used in houses. The overall cost of producing pasteurized equivalent water is just a fraction of that of pasteurizing water with heat.

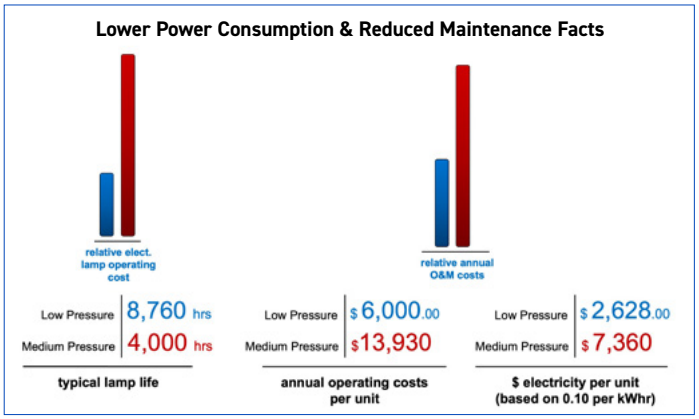
UV light technology utilizes much less energy compared to heat pasteurization for dairy processing. A heat pasteurizer raising 480 gpm of water from 5 °C to 72 °C, with 95% heat recovery requires more than 400 kW, while the equivalent UV system uses less than 5 kW. Regardless of whether the energy comes from electricity or from steam, a large energy savings will ultimately result. If a dairy manufacturing facility is switching from steam to UV they are able to eliminate the heat exchangers, eliminating possible leakage, failed seals, mineral fouling and many other issues associated with them.

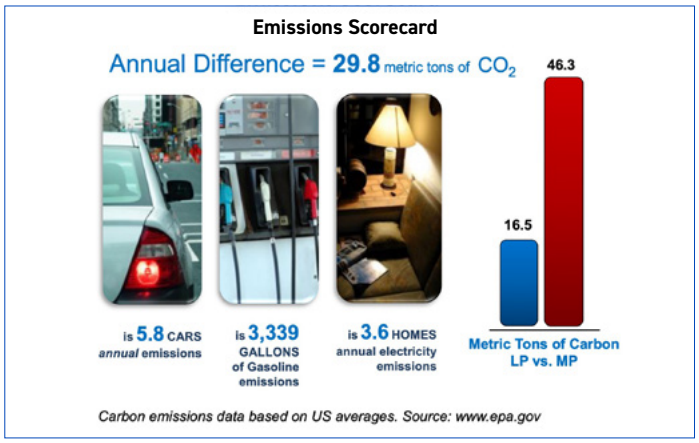
Benefits of Aquafine's Low Pressure UV Lamp Technology over Medium-Pressure (MP)

SwiftBeverage incorporates low-pressure high intensity amalgam lamps. When comparing low-pressure (LP) vs. medium-pressure (MP) lamp technology for UV treatment cost, maintenance and sustainability are important factors. For example, annual operating and maintenance costs for LP technology is as little as 50% of MP lamp technology. Environmental impact is also dramatically better on an annual basis, with a comparison of 16.5 metric tons of carbon dioxide (CO_2) for LP technology vs. 46.3 metric tons for MP technology for a single system. That's a difference of 29.8 metric tons of CO_2 per year.

- LP lamps produce UV energy 3-4 times more efficiently than MP lamps.
- LP UV is less expensive to operate and more energy efficient than MP UV = cost savings.

*Product appearance may differ from the image displayed.





- Less fouling due to significantly lower operating temperature of LP lamps, requiring lower quartz sleeve cleaning frequency.
- LP lamps have four times less mercury to dispose of compared to MP lamps.
- LP lamps do not promote nitrite generation. MP lamps have many different wavelengths, even beyond the treatment range of 250 nm to 280 nm, that can negatively affect the water through conversion of any nitrates present into dangerous nitrites.
- Less maintenance, replacement lamps are changed annually while MP lamps require at least two changes per year.

Summary of LP lamp advantages

- High Efficiency and Performance
- Energy Savings
- Low Maintenance Cost
- High System Stability, Low Downtime

To learn more about the brands and affiliates of Trojan Technologies, please visit www.trojantechnologies.com

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