

Thermal Disinfection Sterilization System (TDSS) Summary

Most clean water systems today use sterilization processes such as reverse osmosis, membrane (filter) technology, or UV light technology. These systems require regular maintenance, a large amount of energy, and routine replacement of major components, such as membranes, filters, or UV bulbs. As such, they are expensive to operate and maintain, particularly for high volume applications. Other solutions involve the heating of the water to a high temperature as a means to sterilize, which typically requires large heat-sink apparatus to contain and cool the water after heating. Prior thermal approaches typically required heating water to a fixed temperature and fixed pressure, utilizing a batch approach, to achieve a minimum, desirable sterility assurance level (SAL). As such, requiring the apparatus to be structurally large and generally immobile.

TDSS is a significant improvement on prior approaches to water sterilization. TDSS utilizes a continuous thermal fluid flow process, to sterilize fluid to a high sterility assurance level (SAL). Sterilization is achieved by passing the fluid through a heating section to super heat the fluid to such a degree as to sterilize any living transmissible agents including fungi, bacteria, viruses (including COVID-19) and spore forms in an economical and environmentally responsible way, no matter the level of contamination of the source. **The system operates within prescribed ranges for pressure and temperature to achieve the desired level of sterilization without need of maintaining a fixed temperature or a fixed pressure within any portion of the system, including the heating section, no other water treatment system can make this claim.**

Dirty water enters and sterile water exits in a continuous flow operation. TDSS uses a controller that implements proprietary software for controlling system operations, including controlled sequence of the valves and monitoring of sensors along the flow path. More specifically, TDSS includes a heating section to heat pressurized fluid above prescribed thresholds for temperature, pressure, and duration (e.g., dwell time) to achieve desired levels of sterilization, including a heat exchanger to both (a) preheat fluid prior to entering the heating section and (b) cool outflow of the heating apparatus, in which fluid travels through the apparatus by operating valves forward and aft of the heating section in a controlled sequence to facilitate flow through the system while maintaining prescribed pressure and temperature profiles.

As such, TDSS can be adapted for wide variety of uses such as household use, large-scale water treatment, industrial uses (such as in oil industry for fracking systems), ocean vessels for ballast water sanitation, portable water treatment, and others. Sterilization of all fluids including water can be accomplished.