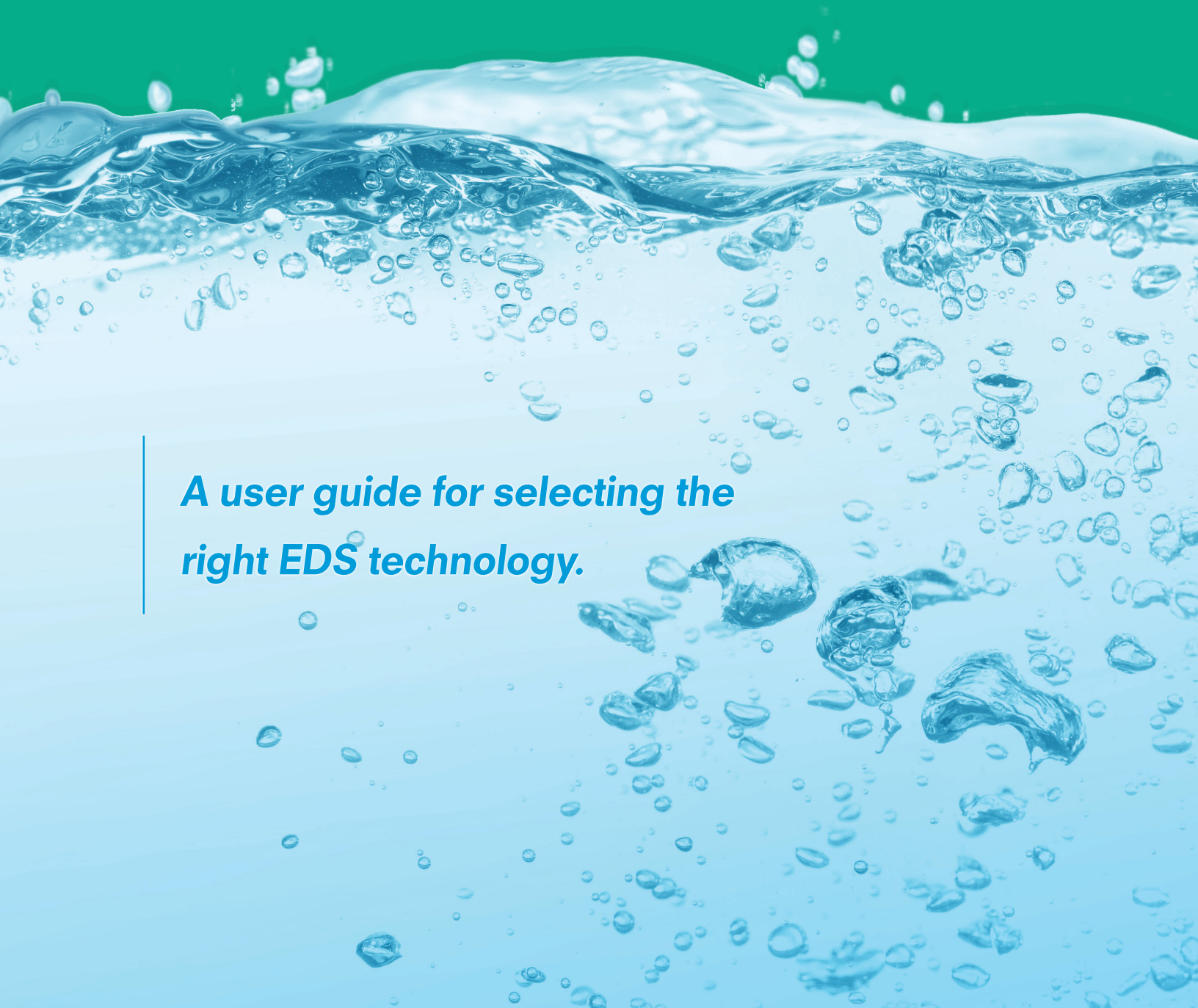
PRI BIO

Effluent Decontamination Systems

Liquid Biowaste Decontamination Systems for All Biosafety Levels



A user guide for selecting the right EDS technology.

Select the Right EDS for Your Application

Know Your Effluent Characteristics:

Selecting an Effluent Decontamination System (EDS) that will provide years of trouble-free service starts with a comprehensive understanding of the characteristics of your process waste from each source.

- **Solids:** Continuous flow systems are much more susceptible to fouling from solids than batch systems. Small particles like cellular waste will function well in continuous systems while larger solids such as animal waste, foodstuffs and bedding will require a batch system to function properly.
- **Flow/Viscosity:** Batch systems can handle highly varying waste volumes, whereas continuous systems prefer to operate more smoothly. To make up for this, buffer tanks can be used to store material until sufficient volume is attained, but storage volumes can become quite large. Understand if your waste is heat sensitive and may gel, or increase in viscosity, at high temperatures such as growth media.
- **Peak & Daily Volume:** Large daily volumes favor continuous flow systems, but care must be taken to address the waste characteristics and not just evaluate the footprint and cost. Non-functional or problematic operations may result from ignoring the basic waste characteristics.
- **Composition/Corrosiveness:** be aware if your waste includes organic material, corrosives such as strong acids, caustic or other chemicals which may react differently at high temperatures.

Know Your Required Treatment Level:

Required treatment will be dictated by the local regulation and biological risk factors involved. If you have human or animal pathogens, the design decisions may be different than simply inactivating non pathogenic materials. High Level Disinfection (4 log reduction of spores) and Practical Sterilization (6 log reduction of thermophilic spores) are typical in many environments. Other lower levels of treatment may be acceptable depending on the risk and governing regulations.

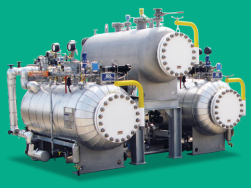
The "lethality rate" (or F_0) is used in many applications to denote a treatment level, or level of thermal insult. PRI offers systems that achieve different levels of treatment with F_0 values exceeding several hundred. We can assist you in determining the most appropriate system for your application.

Know Your Required Biological Validation:

Users must also consider the validation of process efficacy required by the overseeing authorities and biosafety officials. The use of BioIndicators, including spore suspensions and Self Contained BioIndicators (SCBIs) are common. All PRI systems are built with "Validation by Design," for ease of biological validation using multiple methods, in addition to metric monitoring and data logging.

Compare EDS Technologies

AutoFlow™



ThermoBatch™ High Temp

ThermoBatch™ Low Temp

ChemFix™

	AutoFlow™	ThermoBatch™ High Temp	ThermoBatch™ Low Temp	ChemFix™
Treatment Level				
Level III High	✔	✔	✔	✔
Level IV Sterilization	✔	✔		
Solids Handling				
Animal Solids, Bedding, Food Materials		✔	✔	
Cell Cultures, Heat Sensitive Liquids	✔ (certain conditions)	✔	✔	
Flow Volume				
Low	✔	✔	✔	✔
Medium	✔	✔	✔	✔
High	✔	✔		
Temperature				
Treatment Range	<150 °C	<150 °C	<96 °C	<55 °C

AutoFlow™ Series

Continuous sterilization of simple biowaste streams.

Designed for pharmaceutical applications such as biologics, virology, vaccine, GMO and CMO pilot plant research labs and large-scale continuous manufacturing facilities. Capable of efficiently treating both small and large volumes of liquid process waste. The continuous flow design allows for a smaller footprint than traditional batch systems, but requires effluent with less solids content.

- Continuous flow systems – 500 to 6,000 L/Hour (or more upon request)
- Sequential batch systems – 500 to 4,000 L/Day
- High efficiency – lower acquisition, low operating costs
- Compact design – modular, easy to install, cabinet models fit through doorway
- Hygienic construction – manufactured for pharma environments
- Self-cleaning CIP, SIP and sterile filter options
- Easily validatable – designed with PRI exclusive validation protocols

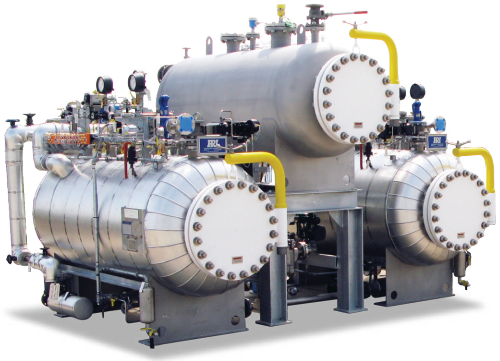
LIQUIDS THERMAL CONTINUOUS BSL 1-3

ThermoBatch™ High Temp Series

Max flexibility, batch sterilization of complex biowaste streams.

Capable of handling liquid and liquid/solid mixtures, making it the most versatile effluent treatment system. ThermoBatch™ easily adapts to the requirements of your waste stream and program changes. ThermoBatch™ sterilizes biologically active wastewater and provides “proof of process” documentation, ensuring that steps are being taken to protect public safety and the environment.

- Maximum flexibility – any capacity, flow profile, or treatment process
- High level sterilization – greater than 6Log10 reduction
- Highly configurable – scalable, redundant, feature-rich options
- Suitable for BSL-1 through BSL-4 containment facilities
- Sterile filter modules available
- Easily validatable with widely accepted protocols



LIQUIDS + SOLIDS THERMAL BATCH BSL 1-4, AG

ThermoBatch™ Low Temp Series

Batch, atmospheric temp, low volume decontamination.

Compact, energy efficient, simple, low cost effluent decontamination system. Designed for use in small laboratories, virology, vaccine, GMO, CMO research facilities, forensic labs, or mobile clinics.

- Cost effective – low acquisition cost and power consumption
- Compact design – modular, easy to install, fits through doorway
- Electricity only – no air, no steam, no water needed (water recommended)
- CIP chemical injection port, gravity discharge
- Highly configurable – scalable, redundant, feature-rich options
- Suitable for BSL-1 through BSL-3 containment facilities
- Sterile filter modules available
- Easily validatable with widely accepted protocols

LIQUIDS + SOLIDS THERMAL BATCH BSL 1-3

ChemFix™ Series

Batch chemical disinfection and pH neutralization.

Batch chemical effluent disinfection process is an effective solution for facilities where costs and utility resources are of chief concern. High level disinfection inactivates vegetative bacteria, fungi, viruses, mycobacteria, and a 4Log10 reduction of B. Atropheus spores.

- Flexible treatment – capable of multiple chemistry inputs
- Cost effective – low acquisition cost and power consumption
- CIP system for all piping and tanks prior to maintenance
- Duplex operating vent filter system protects employees (optional)
- PLC-controlled pH balancing – no discharge unless pH target achieved
- Easily validatable – designed with PRI exclusive validation protocols

LIQUIDS CHEMICAL + PH BATCH BSL 1-2

Biological Validation by Design™

PRI Bio understands that validation should not be an afterthought, and we have made it a critical element to the design of our biowaste systems from the beginning.

Our validation design features are intended to achieve the following goals:

- **Cost Effective** – affordable enough to be done on a routine basis.
- **Easy to Implement** – not complex or requiring special equipment, facility downtime or long hours to complete.
- **Routine** – capable within normal facility schedules, without burdening or requiring special accommodations from the upstream operations.
- **Accurate** – a proven, tested, well-thought, repeatable validation plan that can be performed by a variety of staff members, delivering consistent results.
- **Documented** – can be archived for future reference. PRI offers a Batch Report system that provides a constant log of critical thermal data during a cycle, creates a table and graph, and auto-archives it for future reference.

PRI Bio's Unique Validation by Design™ Methodologies:

Biowells: For thermal treatment systems we incorporate biowells, a small port/chamber built into the treatment zone that allows for a Bioindicator (SCBI) or a Spore Strip to be placed inside. Biowells allow the bio-indicator to be isolated from the material being treated, but mirror the same thermal temperature curve, allowing for an accurate result. Users can simply place the bio-indicator inside, run a normal cycle, and remove it for testing once complete.

Spore Tank/Inlet: All effluent decontamination systems can be validated using spore suspensions if desired. But for continuous flow systems, in order to make this process easier and less expensive, we incorporate a combination of a specially-designed spore suspension tank and an inlet port and valve prior to the treatment zone. This method allows users to validate to a 6 log reduction. Users can fill the small spore tank, and "hot switch" directly to it while the system is running normal operation, and test at the discharge.

Direct Immersion: Spore strips offer an accurate method to validate treatment efficacy, because they allow the bacteria on the strips to have direct contact with the treatment chemicals. For chemical systems, we offer a port on the treatment tank where a porous spore strip holder can be lowered into the system. Once a treatment cycle is complete, the spore strip holder can be retrieved, and testing can be done to confirm efficacy.

Data Logging: All systems are engineered with instrumentation to monitor critical components such as temperature, pressure, flow, level, and mechanical components such as valve positioning, pumps and more, which provide feedback to a controller. We also offer a reporting software (called Batch Report) that displays a constant log of critical thermal data during a cycle, creates a table and graph, and auto-archives it for future reference. The control system also provides alarms and fail-safes if the target is not achieved.

The chart below indicates which validation method is recommended for each biowaste treatment system:

	AutoFlow™ (continuous or sequential batch)	ThermoBatch™ High Temp (thermal batch)	ThermoBatch™ Low Temp (thermal batch atmospheric)	ChemFix™ (chemical)
Biowell	✔	✔	✔	
Spore Tank/Inlet	✔			
Direct Immersion				✔
Data Logging	✔	✔	✔	✔

PRI BIO
EXPERTS IN BIOHAZARDOUS WASTE MANAGEMENT SYSTEMS.

Biowaste Sterilization | Solvent Wash & Recovery | Custom Process Skids | Service

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