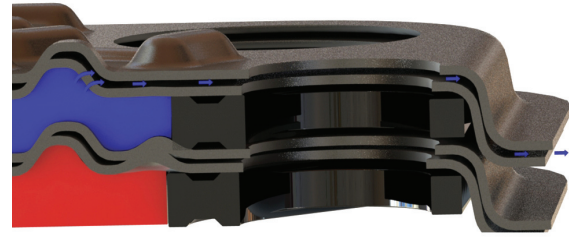


### Mix Proof Double Wall Plates

Thermaline's mix proof double wall plates prevent cross contamination of your low viscosity fluids. Two plates are paired together to form one plate with a safety micro air gap in between the plates. If either of the plates fail from corrosion or cracks the process fluids will not mix, rather the fluid against the failed plate will be directed through the micro air gap and to the outside of the heat exchanger where it becomes visible.



- Standard 0.4mm plates for exceptional service life
- Micro air gap maximizes heat transfer efficiency
- Clip on adhesive-less gaskets
- Bio-Pharma, Personal Care, Potable Water, Food, Beverage Processing.

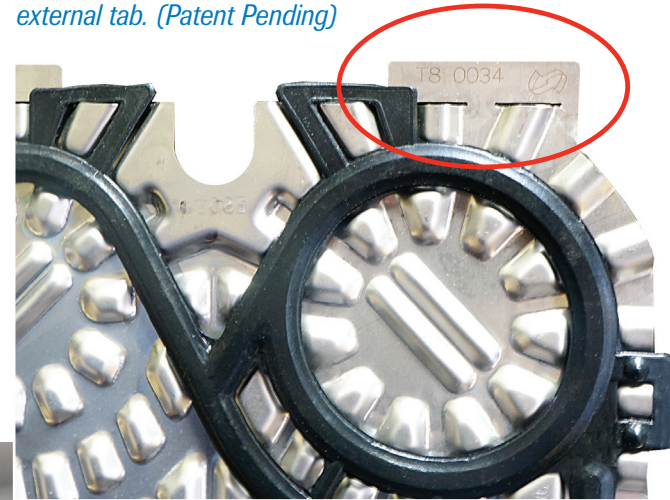
*\*Excellent choice for low viscosity processing.*

### Thermaline Plates: Manufactured in the USA

#### Worlds First Smart Identification System (SIS)

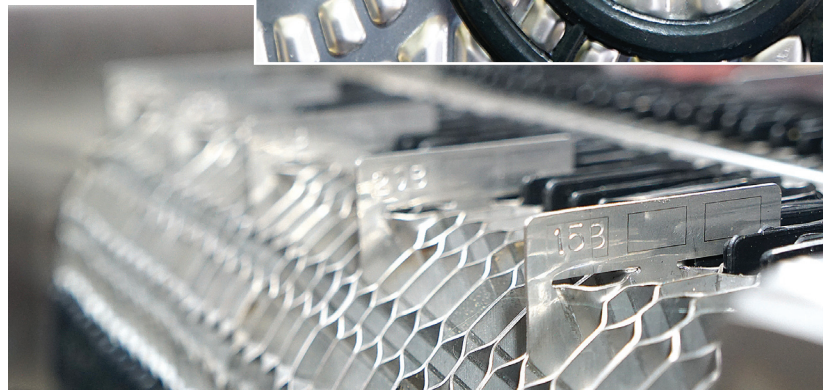
Even the most hygienic of designs cannot safeguard against human error. Until now, there wasn't a way to ensure your plate heat exchanger was assembled properly. One wrong move can cost more than just a financial burden; it may cause a recall destroying your brand. Thermaline's patent pending Smart Identification System (SIS) laser etches vital plate information on an external tab that is visible at a glance even when the unit is assembled.

*Smart Identification Code etched onto external tab. (Patent Pending)*



#### Predictive-Preventative Maintenance

Thermaline technicians tailor a maintenance plan around your process needs. Using our patented cross contamination test system (CCT 4.0) we can test the heat exchanger for internal leakage and provide a report of the results and best course of action.

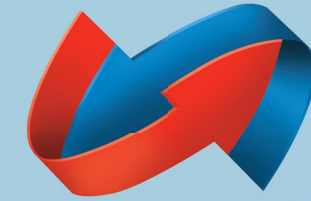


# THERMALINE

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# THERMALINE

INNOVATIVE HEAT TRANSFER SOLUTIONS

## Bio-Pharma Hygienic Heat Exchangers

### Our Mission

*To Soundly Exceed the Expectations of our Customers, Employees, Vendors and Competitors.*

For over a quarter of a century Thermaline has stood behind our Mission Statement. This powerful mission is evident in every heat exchanger we manufacture and the support you receive. With a mindset to view everything through the customers eyes first and years of real industry experience, we are just as committed as you are to take on today's challenges of stringent consumer safety and energy consciousness.

## Exceeding the highest purification and sanitization standards

### 30+ years manufacturing heat exchangers for hygienic processes

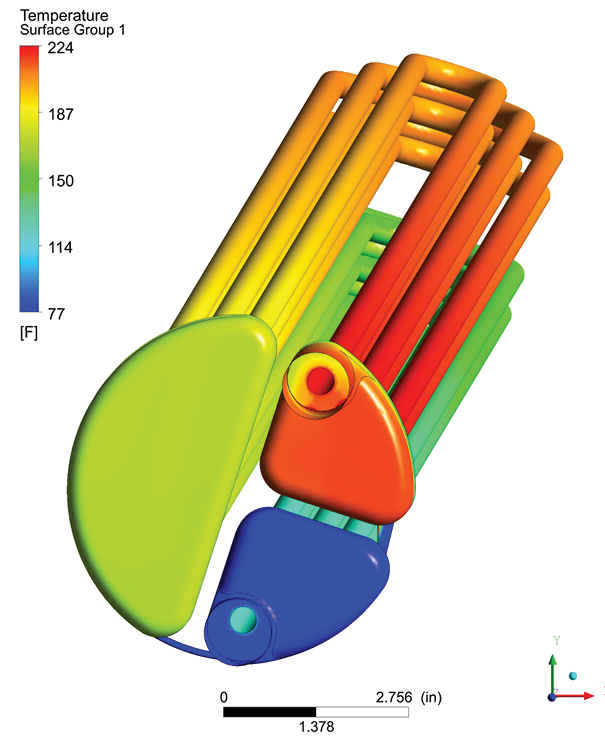
Bio-Pharm processes require high purity manufacturing to the most stringent quality standards and Thermaline Bio-X line of tubular heat exchangers are designed with the latest advancements in hygienic design practices to meet your demanding process performance requirements.

#### Key Partnership

Thermaline has now partnered with Advent Engineering, leaders in hygienic Bio-Pharm process designs to introduce a range of hygienic heat exchangers in accordance with the latest ASME/BPE design standards. The Thermaline Bio-X range of shell and tube heat exchangers for Bio-Pharma processing and sanitation systems are designed and manufactured by Thermaline and performance backed by Advent Engineering's expertise in Bio-Pharma Engineering and Computational Fluid Dynamics (CFD) analysis. Thermaline/Advent's CFD research into the relationship of drain-ability and how fluid bypass features can affect performance has led to new standards in thermal hydraulic and mechanical designs.

#### Thermaline Bio-X shell and tube heat exchangers:

- Backed by Advent Engineering CFD performance analysis
- Manufactured to the latest ASME/BPE standards
- Single or double tube sheet design
- Surface finishes from 32 to 10 RA / Electropolish
- Full documentation package. MTR's, weld maps, process certifications (Borescope and visual inspection, hydro-testing, FAT, EP QR)
- ASME/BPE certified welds and weld procedures
- Hydraulically H2O swaged double groove tube joints
- Stainless Steel, High Alloy, Super Austenitic, Hastelloy's and more
- Optional Advent Engineering CFD analysis specific to your process, fully welded insulation jacket, PMI, Videoscope and more



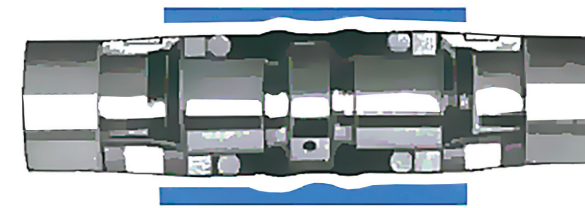
CFD of a four pass Bio-X heat exchanger with bypasses



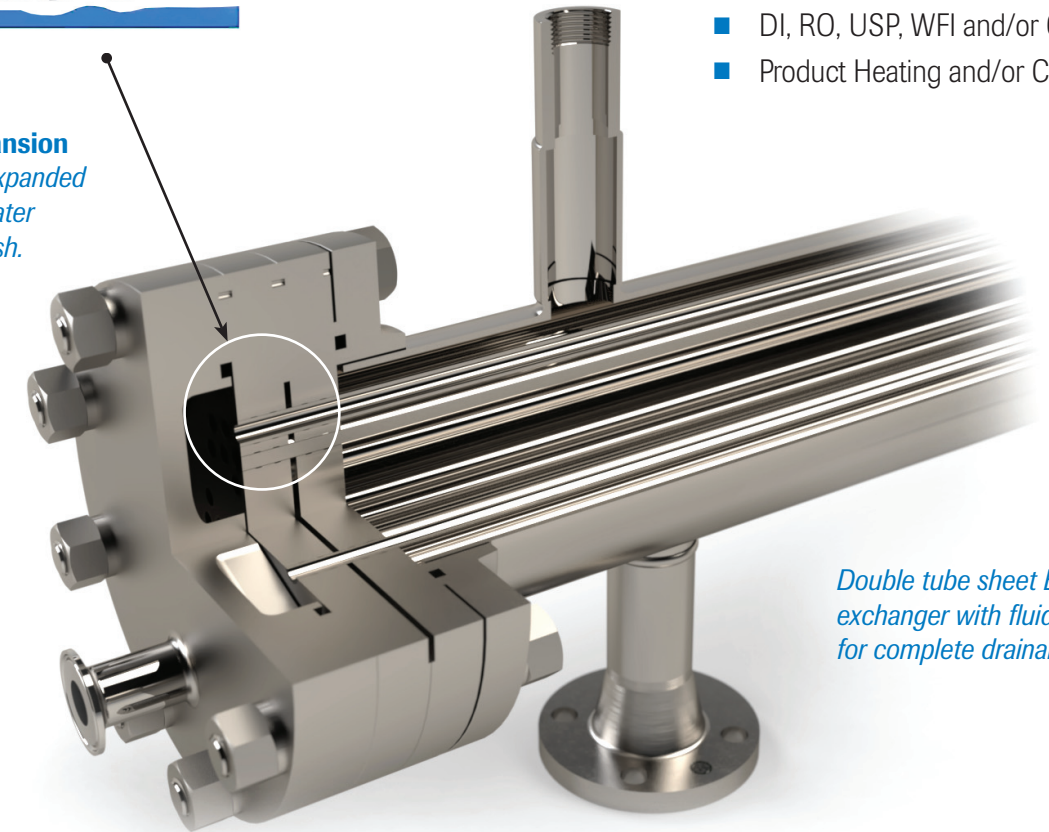
Bio-X single tube sheet heat exchanger



BPE



**High Pressure Expansion of Tube.** Tubes are expanded with high pressure water preserving the ID finish.



Double tube sheet Bio-X heat exchanger with fluid bypass for complete drainability.



#### Enhanced Plate Heat Exchanger (EPHE):

Thermaline's new EPHE is designed to be fully drainable by placing a drain channel in the upper and lower quadrants to allow for natural draining of fluids. The frame is then pitched per BPE slope standards to further enhance complete draining. Thermaline's patent pending SIS plate identification system is added to each plate to ensure proper reassembly after service.

- Single or double wall plates
- Full documentation package. MTR's, weld maps, process certifications
- ASME/BPE welds and weld procedures
- Stainless Steel, High Alloy, Super Austenitic, Hastelloy's and more
- Optional full PMI

#### Processes in Thermaline Bio-X heat exchangers

- Point of Use Heating and/or Cooling
- Neutralization
- Steam Generation and/or Condensing
- DI, RO, USP, WFI and/or CIP
- Product Heating and/or Cooling