Application Literature
Industry Overview

GAINING AN EDGE IN ETHANOL PROCESS EFFICIENCY

GO GREEN. THINK BLUE.

SUPERCHANGER®
Plate & Frame HE

SUPERMAX®
Shell & Plate HE

ULTRAMAX®
Welded Plate HE

PLATECOIL®
Prime Surface HE

TRANTER®
The heat transfer people

Tranter GFP Series Wide-Gap plate packs (shown in cross-section) may be configured in a wide/narrow arrangement (inset, top) for one channel with large particles or in a medium/medium arrangement (inset, bottom) for balanced flow.

Improve Your Process With Plate Heat Exchangers

Establishing 'green'-driven, economically sustainable processes in the ethanol biofuels industry is key to the industry's ultimate success and the 'greening' of the marketplace. But to meet the challenge of economic sustainability in ethanol means you must maximize process thermal efficiency and optimize uptime while minimizing costly maintenance. Fortunately Tranter's plate heat exchanger (PHE) technology helps accomplish exactly that.

Dry or wet milling, acid or enzymatic hydrolysis, catalytic or bioreactor gasification…the more advanced your process technology, the more you need PHEs. The advantages apply to any feedstock—whether corn, wheat, casava, sugar cane, switchgrass, municipal wastes or wood wastes.

PHE performance surpasses shell & tube units every time, with benefits such as:

- Higher thermal efficiency
- Greater heat recovery potential
- Easier maintenance
- Reduced fouling tendency
- Smaller footprint

PHE Applications

- Biomass dryer heating banks
- Batch hydrolysis vessel heating surfaces
- Evaporator heating banks
- Evaporator economizers
- Economizing and heat recovery
- Blow heat recovery
- Yeast coolers
- Beer/mash interchangers
- Thermal control of fermentation
- Vent condensers
- Distillation column heating surfaces
- Syrup condensers
- Ethanol preheaters
- Molecular sieve regeneration condensers
- Anhydrous condensers and coolers

To **Go Green** in today's biofuels industry,
it's smart to **Think Blue**…Tranter Blue.

PHE Standard Range General Specifications

	SUPERCHANGER® Plate & Frame Gasketed	ULTRAMAX® Welded Plate	SUPERMAX® Shell & Plate	PLATECOIL® Prime Surface
PERFORMANCE				
Max. Pressure Rating, barg (psig)[a]	27.56 (400)	45 (650)	70 (1015)	28 internal, 69 external (400 internal, 1000 external)
Max. Temperature Rating, °C (°F)	160 (320)	343 (650)	538 (1000)	260 (500)
CONNECTIONS				
Max. Connections, DN (ANSI RF in.)	Contact Factory Also Studded Ports	250 (10)	400 (16)	2-3/4 in. NPT
MATERIALS				
Standard Plate Material[b]	304 SS, 316 SS	316L SS	316L SS	Carbon Steel, 316L SS
Standard Frame/Shell Material	Carbon Steel	Carbon Steel	Carbon Steel, 316L SS	SA-240, 302 SS, 304 SS, 304L SS, 316 SS, Monel, Nickel, Inconel, Others

[a] Ratings offered as a general guide only. Certain combinations of physical and fluid properties may affect individual product specifications. Contact the factory with your specific application data.

[b] Higher performance materials are available.

Wide-Gap SUPERCHANGER® Plate & Frame

- Close temperature approaches and high U values
- Reduced fouling and plugging, thanks to plate-induced turbulence and high flow velocity
- Effective CIP performance helps reduce downtime
- Good performance with viscous and solids-laden fluids
- Wide/narrow or medium/medium plate arrangements help optimize specific applications
- Less susceptible to flooding and condensate blocking in steam applications

ULTRAMAX® Welded Plate

- Can handle liquids, gases and two-phase flow
- Special alloy construction available
- True countercurrent flow for full LMTD
- Large-capacity or multi-pass configurations; up to five cores
- Six different plate lengths, up to heat exchange area of 0.989 m^2 (10.65 ft^2)

SUPERMAX® Shell & Plate

- Welded construction comprises a pressure vessel of high integrity with good thermal cycling performance
- Optional flanged cover model allows the plate pack to be removed for cleaning
- Particularly suited for large flow imbalances—distillation vapor condensers, economizers, aftercoolers, intercoolers and related service

PLATECOIL® Prime Surface

- Panels can be formed into vessel shells or jackets
- Pre-engineered bank modules include piping, supporting structure and manifolds
- Configurations for steam applications offer high flow rates and low pressure drop
- Liquid types accommodate maximum velocities and high heat transfer capabilities at low-to-moderate flow rates

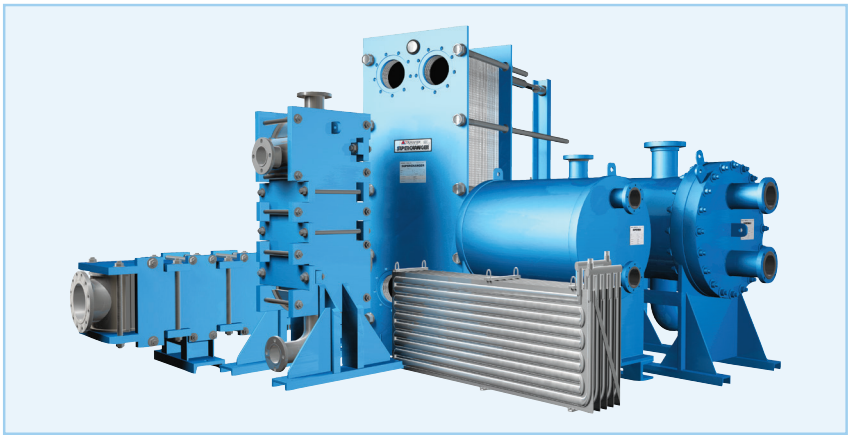


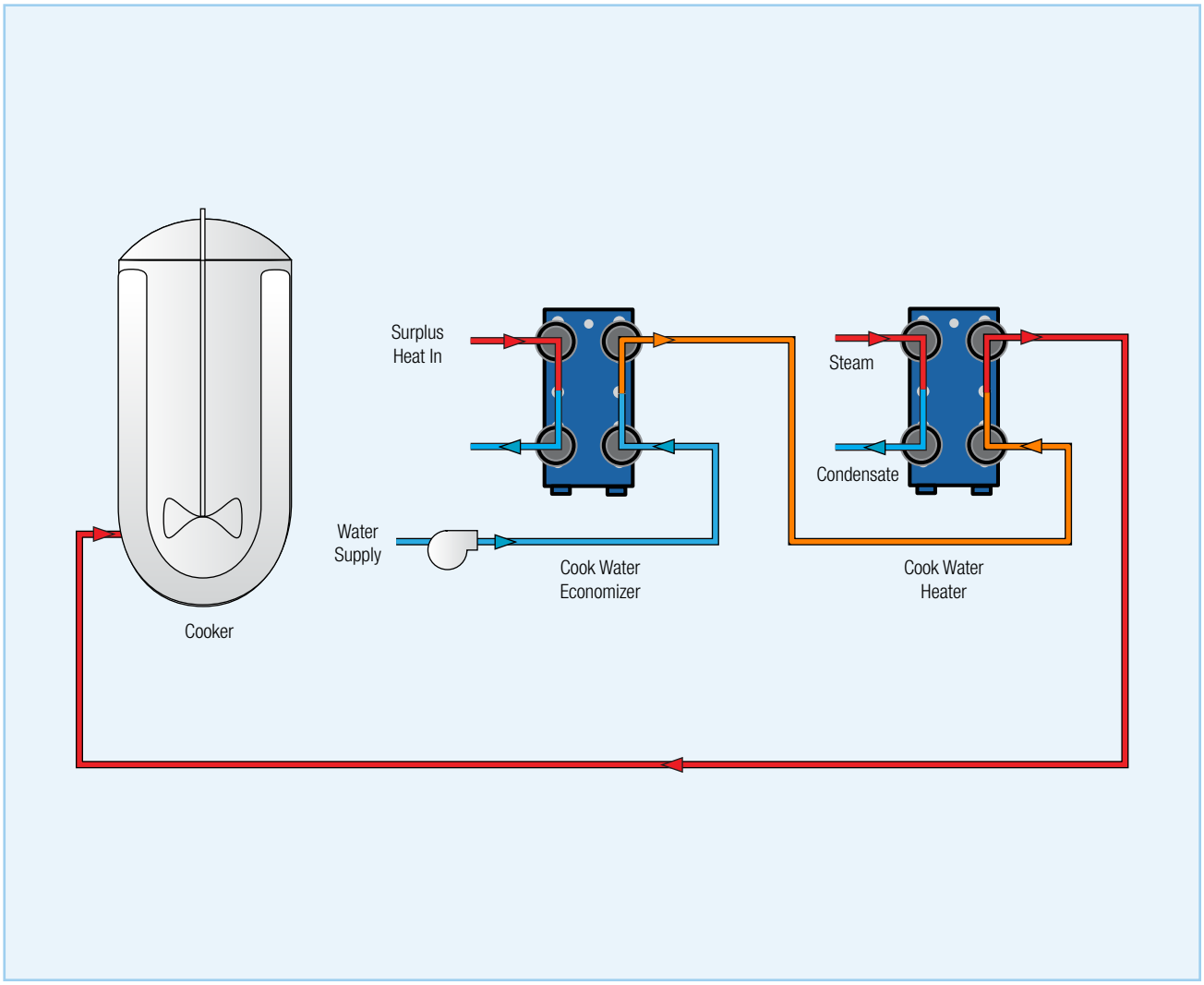
Plate technology for biofuels processing efficiency. From left: ULTRAMAX® Welded Plate, SUPERCHANGER® Plate & Frame, PLATECOIL® Prime Surface and SUPERMAX® Shell & Plate.

Idea Notebook

Tranter PHEs are ideal for the high flow rates, high-solids liquids and gas phase flows of biofuels processes. They deliver high-uptime performance in challenging applications such as beer mash heating and cooling, while their superior heat transfer efficiency reduces fuel costs. Specifying Tranter PHEs in new plant designs or retrofits is key to reducing operating costs and adding 'green' to your process. To go Green...think Blue.

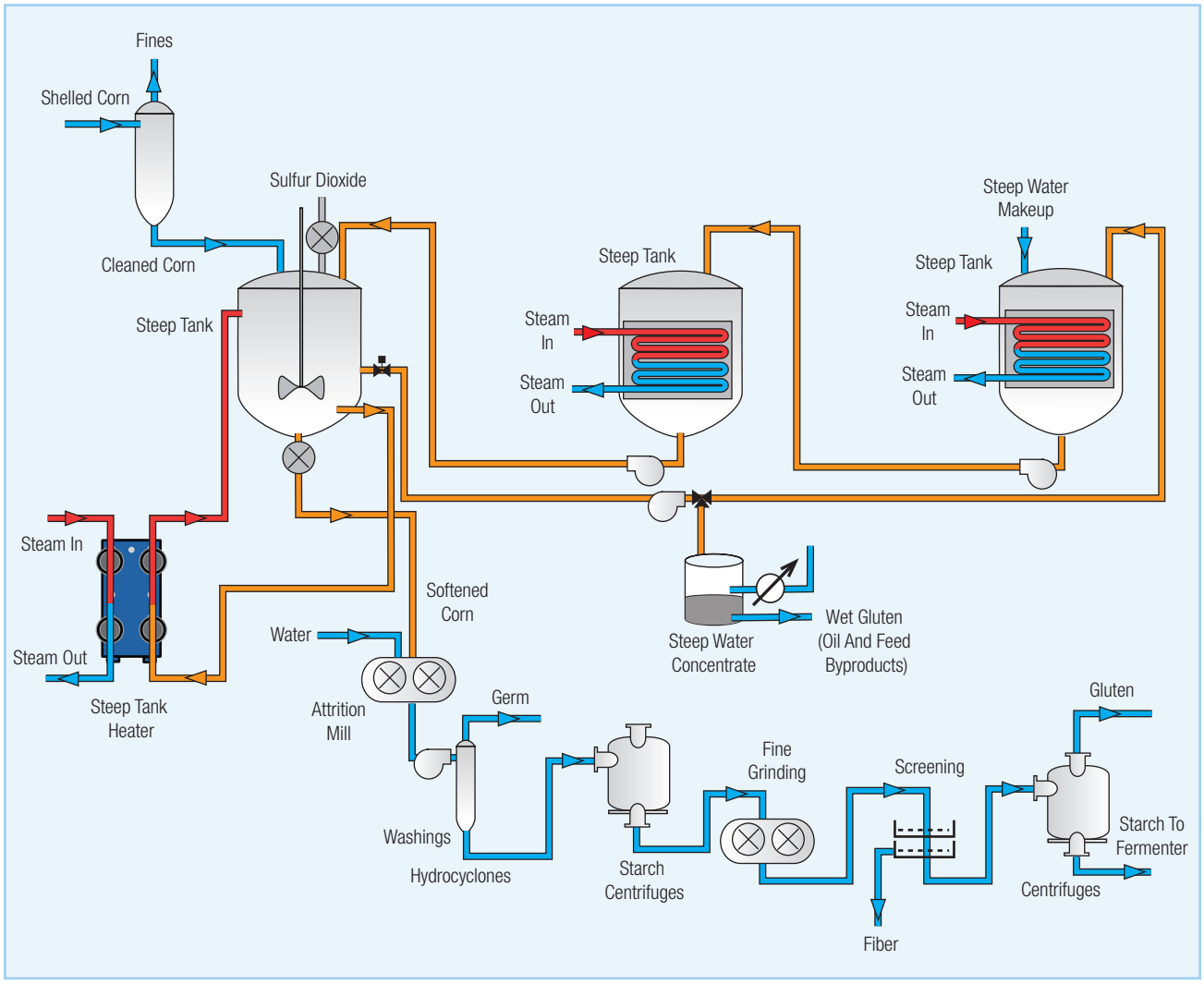
Dry Milling Cooking

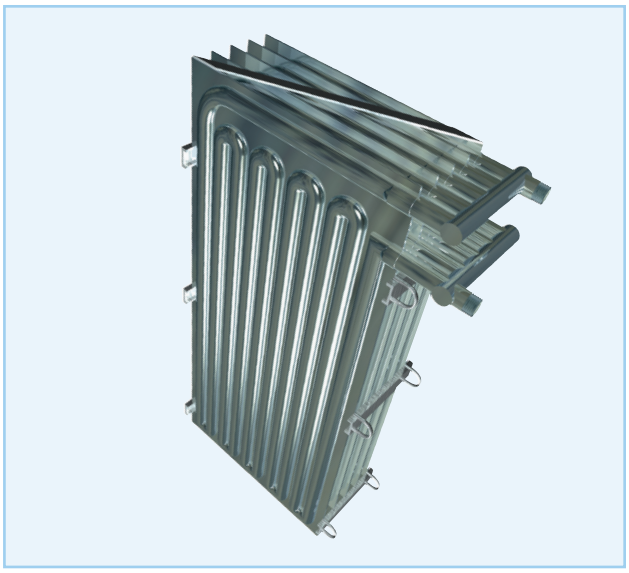
This cooking vessel uses an isolated heating fluid circuit with a SUPERCHANGER® cook water heater. A second SUPERCHANGER, employed as an economizer/preheater within the circuit, uses low-grade surplus heat streams to reduce steam consumption in the cook water heater.



Wet Milling Cooking

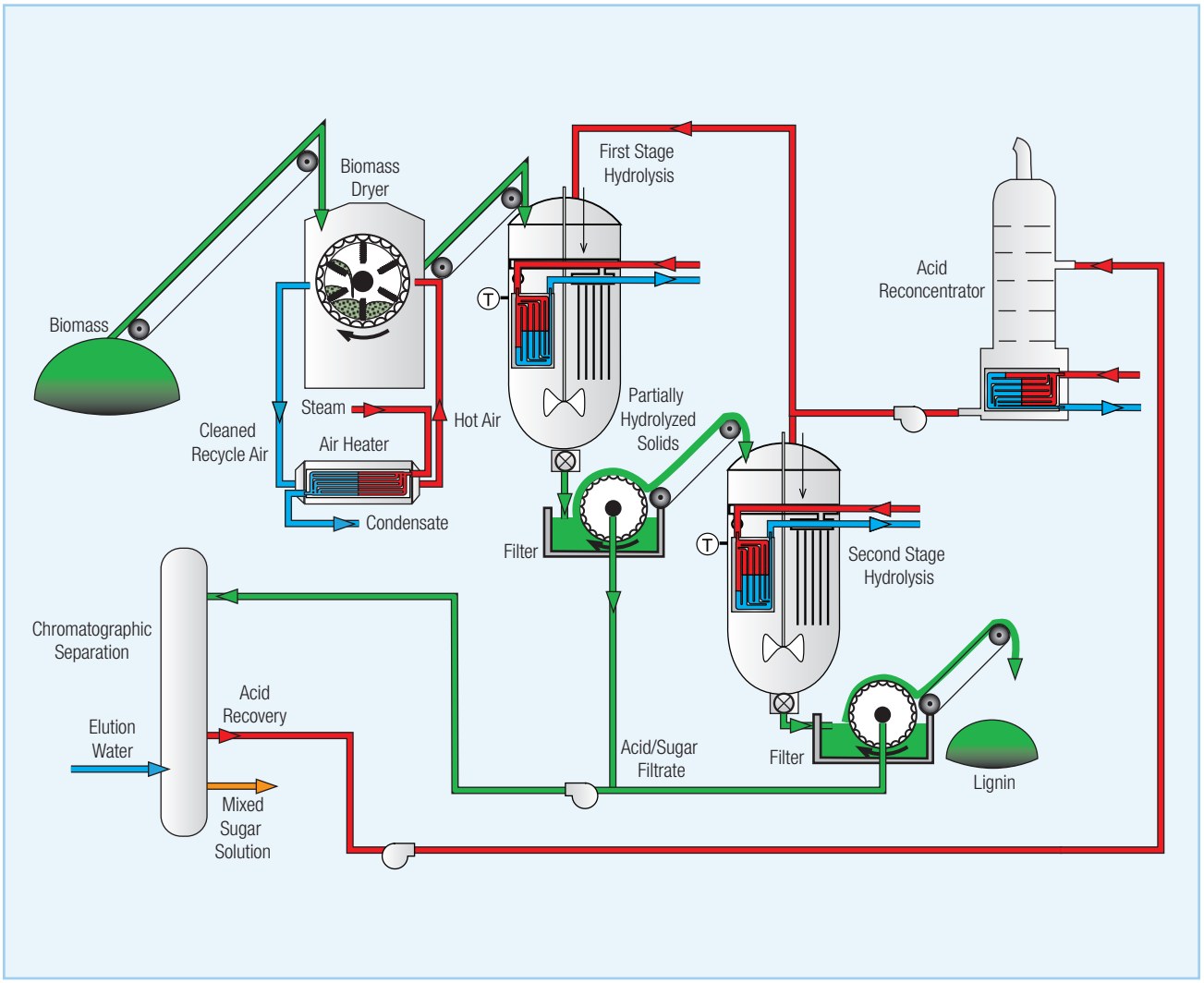
A Wide-Gap SUPERCHANGER Plate & Frame Exchanger used as an external heater maintains the correct heat in the stirred primary steep tank. The secondary steep tanks are fabricated using PLATECOIL® Prime Surface Exchangers as heating jackets.





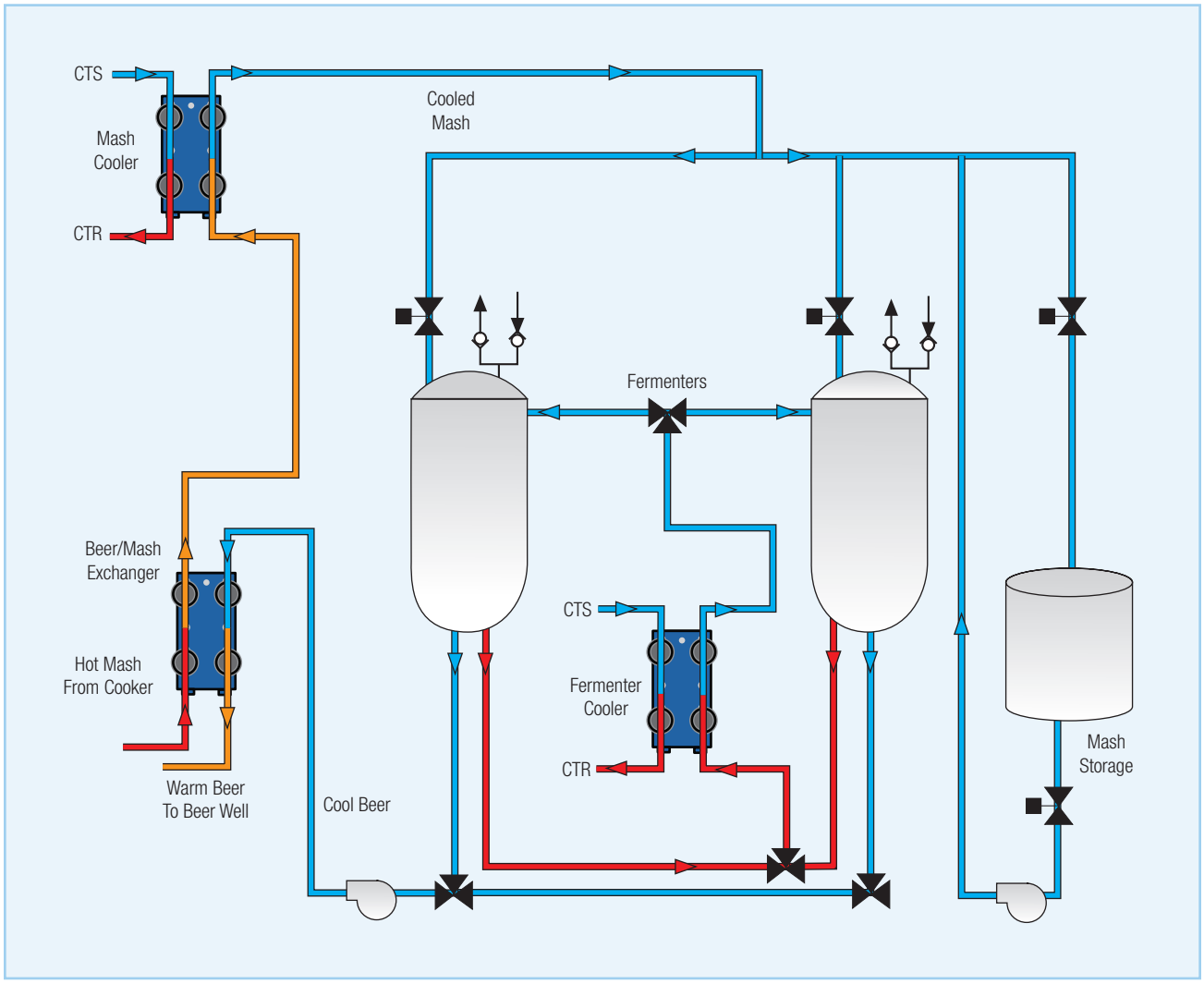
Acid Hydrolysis Cellulosic Cooking

Heated vessels in this continuous process can be fabricated using PLATECOIL heating banks as immersion heaters. These include both first- and second-stage hydrolysis vessels and the acid reconcentrator tower. PLATECOIL banks can also be configured as air heaters in systems such as the biomass dryer.



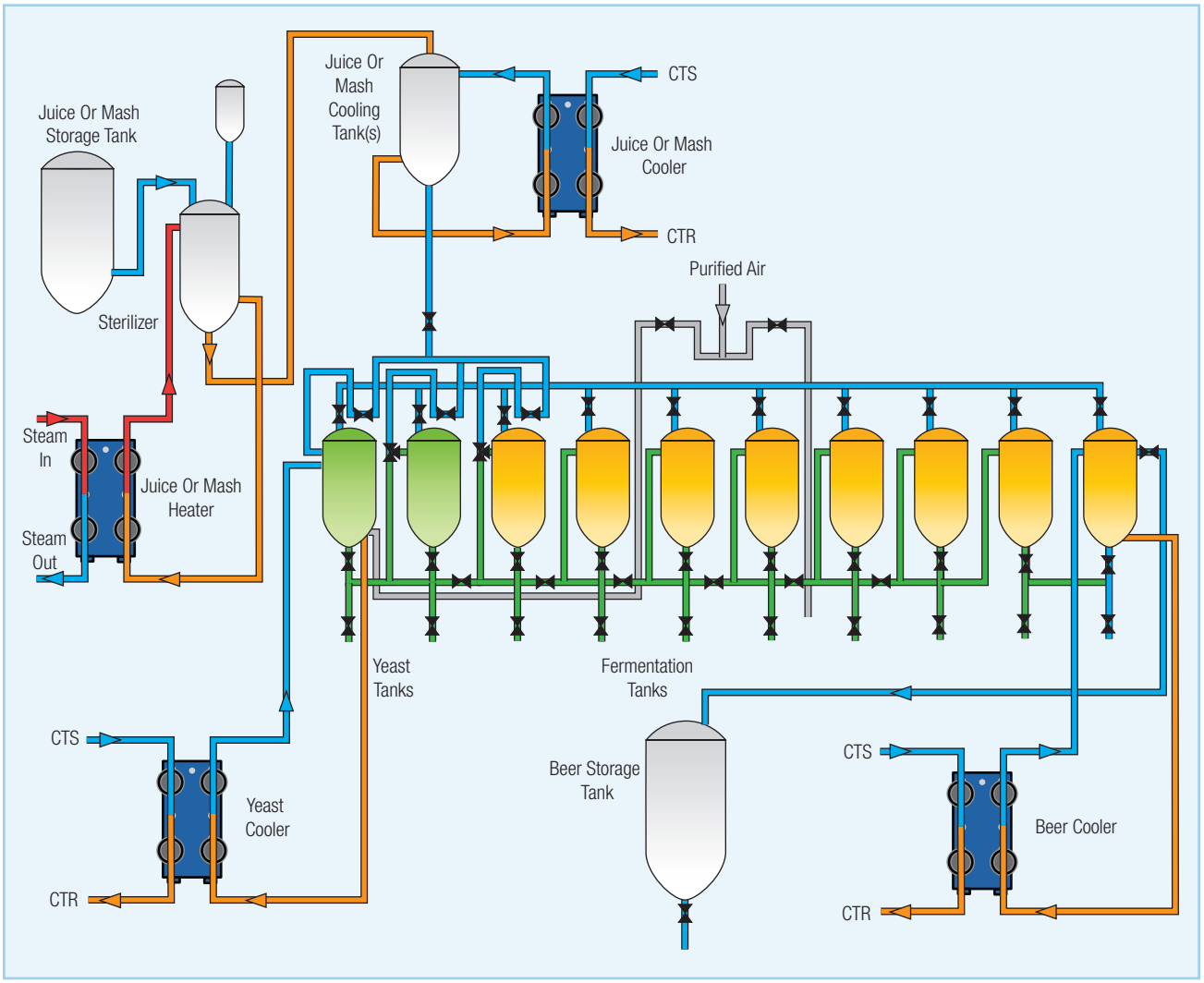
Batch Fermentation

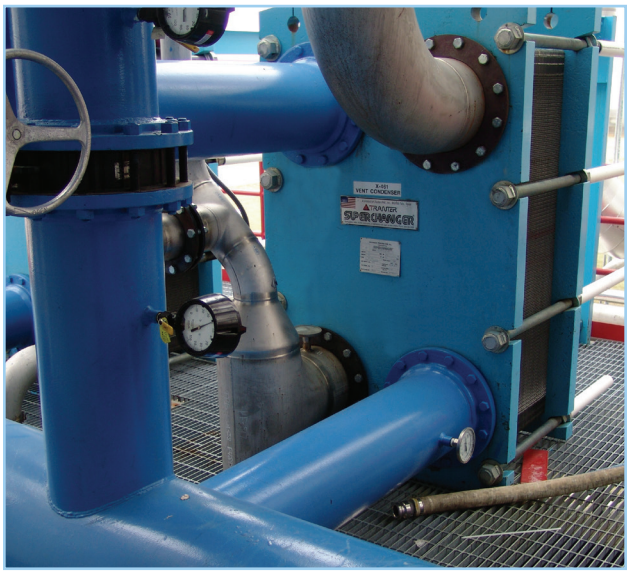
A Wide-Gap beer/mash SUPERCHANGER uses hot mash to preheat beer pumped to the predistillation centrifuge while cooling the mash. A second SUPERCHANGER further reduces the temperature of the mash for the yeast cast and fermentation to begin. A third SUPERCHANGER provides closed loop cooling of the fermentation vessel to maintain the optimal temperature.



Continuous Fermentation

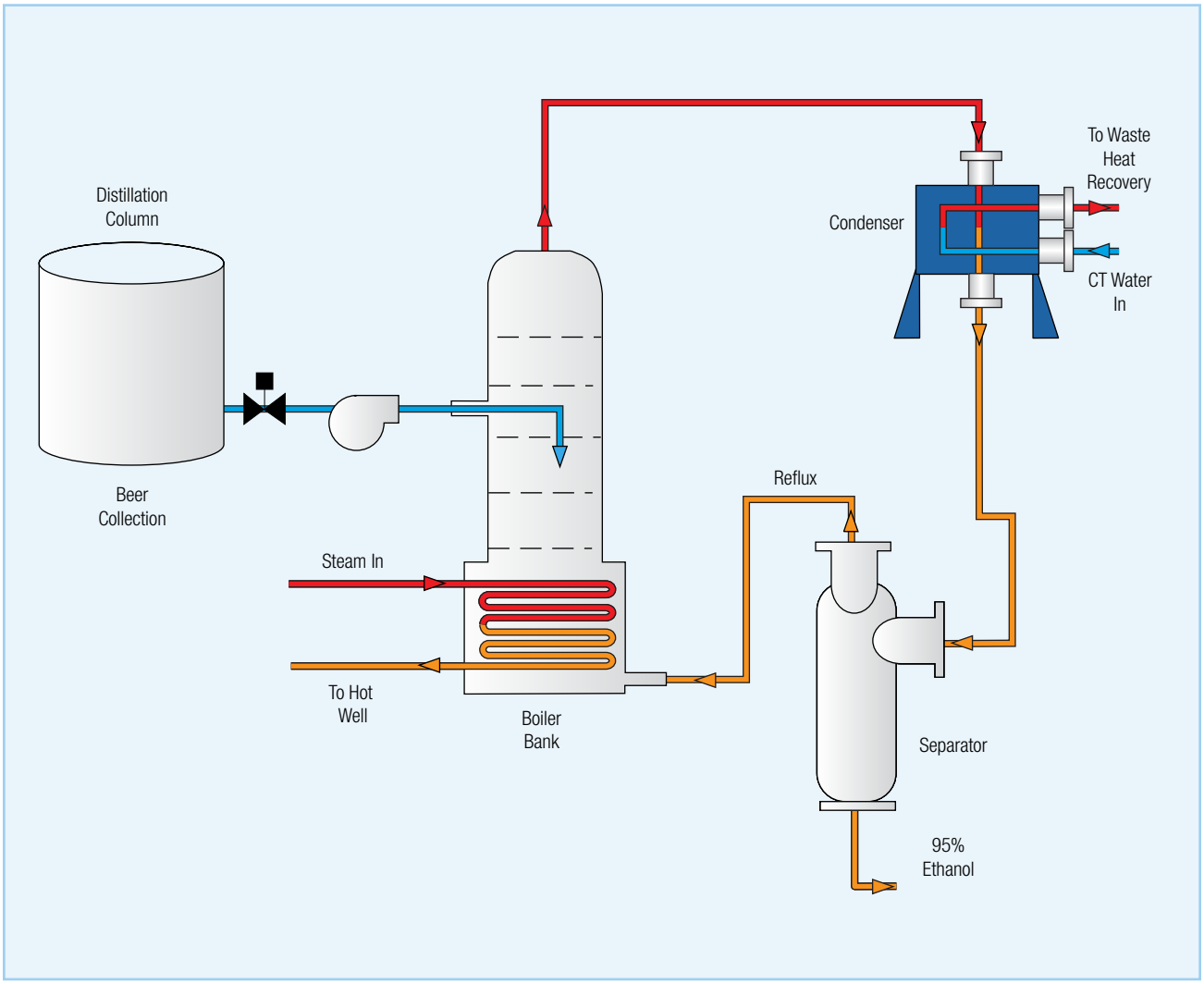
Wide-Gap SUPERCHANGER Plate & Frame Exchangers heat the high-solids solutions encountered as juice or mash heaters. These units likewise find success as juice, mash or beer coolers. The Wide-Gap SUPERCHANGER also provides accurate temperature control as a yeast cooler.





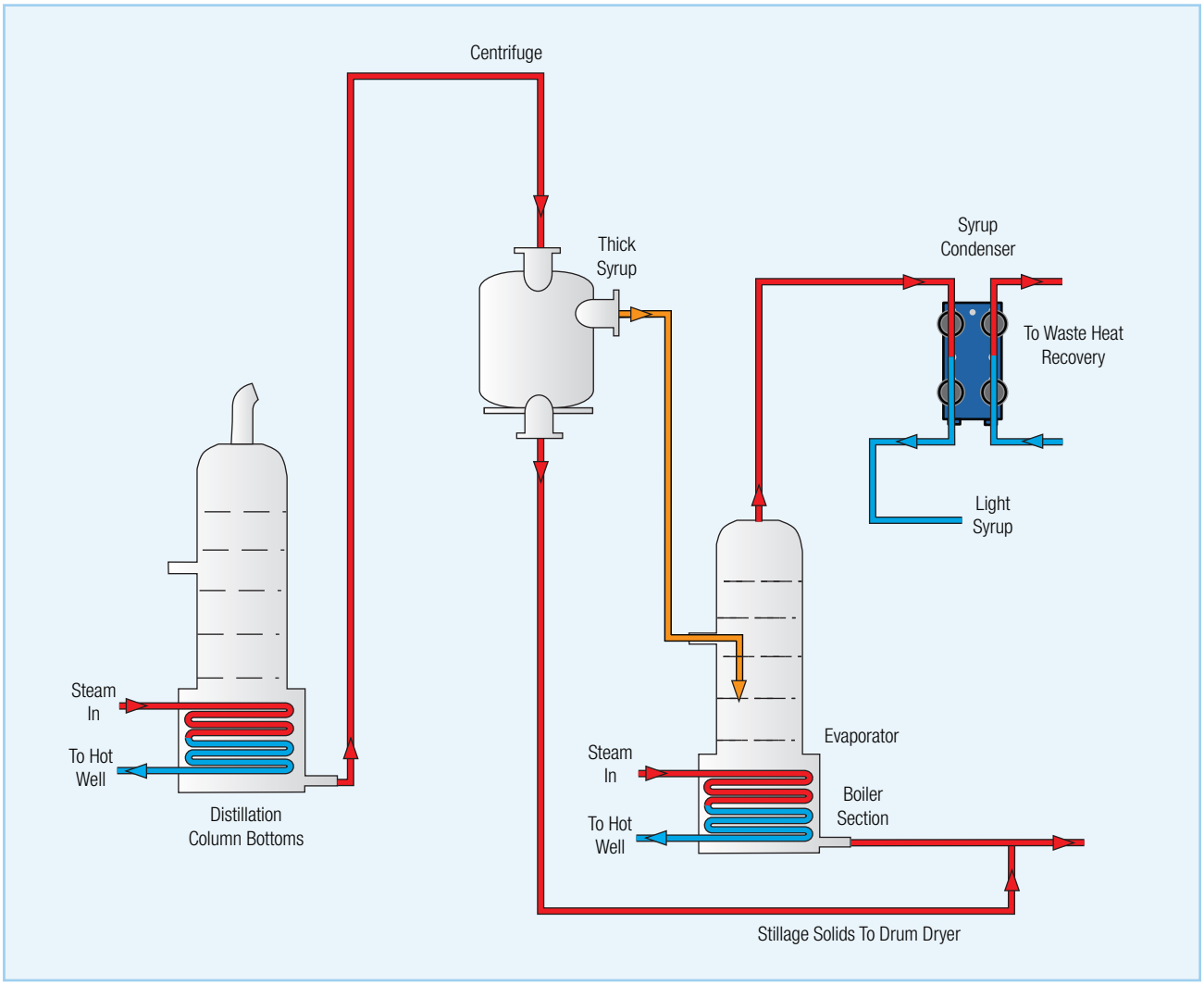
Distillation

A SUPERCHANGER condenser liquifies the 95% ethanol vapor produced by the distillation column. A SUPERMAX® welded unit could be used in this position under certain conditions. This unit is shown in the flowchart below.



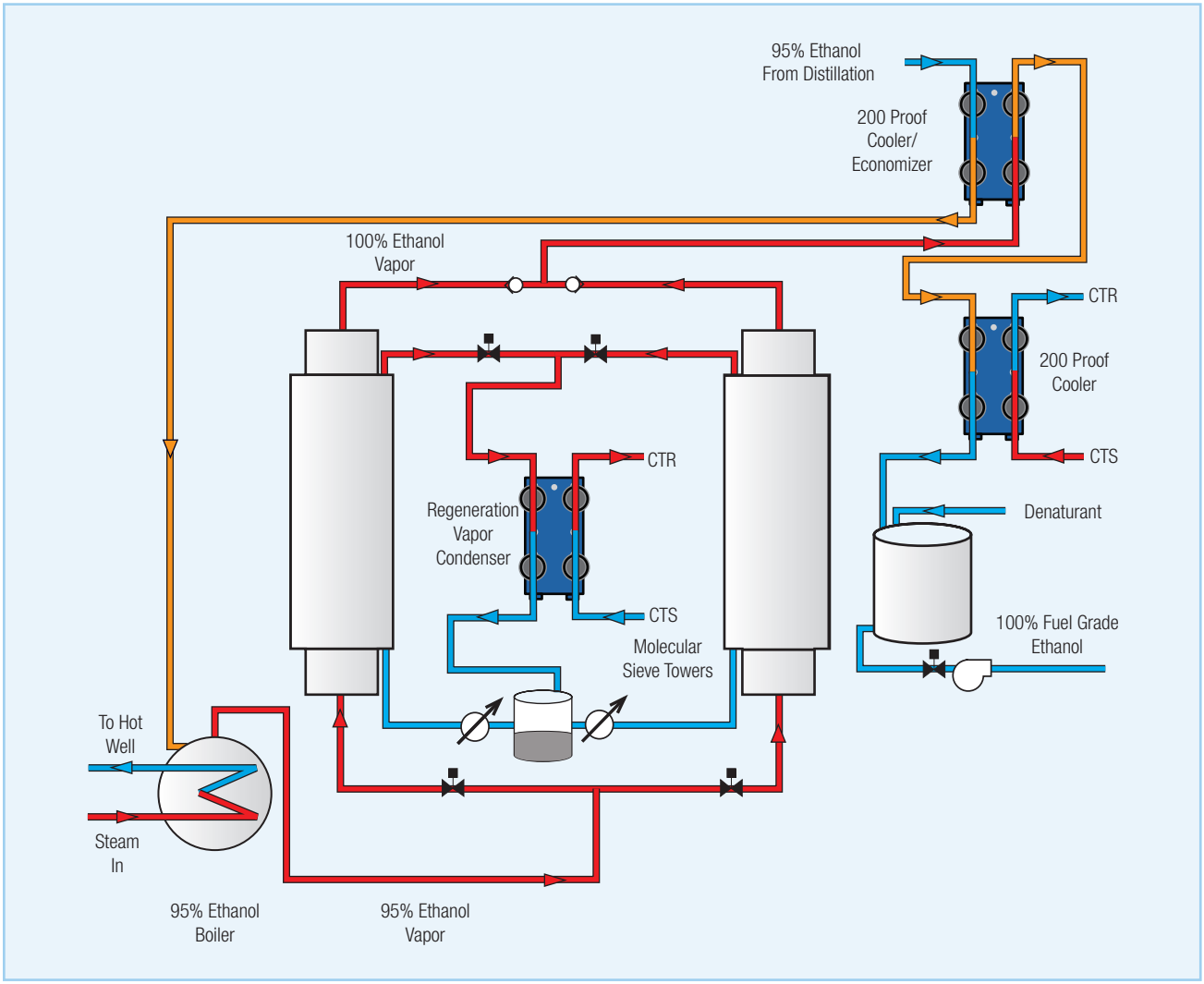
Evaporation

A Wide-Gap SUPERCHANGER condenses syrup from the evaporator. Its flow characteristics accommodate both high-flow-rate vapor and viscous syrup condensate. Maintenance and cleaning are simple. Relatively small hold-up volume makes start-ups smooth and efficient.



Dehydration

A SUPERCHANGER Plate & Frame Unit functions as an economizer to preheat the 95% ethanol feeding the superheater. SUPERCHANGERs function as condensers and coolers for the hot, anhydrous ethanol product. A SUPERCHANGER with asymmetrical GXD plates serves as a thermally efficient molecular sieve regeneration condenser.



Tranter PHEs Also Meet The Biodiesel Challenge

Thermal- and space-saving efficiency makes PHEs attractive for applications in biodiesel manufacture as well as ethanol. Preheating, cooling and condensing duties are well suited for multi-core ULTRAMAX® and SUPERMAX exchangers. Our units are at work as steam/water heaters, reboilers, methyl ester feed heaters and interchangers, methyl ester coolers and biodiesel heaters, among other process and heat recovery applications. Their gasket-free, welded construction makes them highly tolerant of thermal cycling and hydraulic pressure spikes. Best of all, their efficiency makes them a core strategy for any 'green' manufacturing initiative.

Go Green. Think Blue…Tranter Blue.

In the continuing quest for ethanol process efficiency, Tranter is your best partner of choice. Our quality heat transfer products, industry expertise, unmatched service and dedication to the 'green' manufacturing initiative means we have the understanding, resources and vision to help you meet the challenges ahead. And we are a gold sponsor of the Ethanol Promotion and Information Council (EPIC) and cosponsors of No. 17, Team Ethanol Rahal Letterman Indy Racing League car, driven by 2007 IRL Rookie Of The Year Ryan Hunter-Reay. Compete with the best at your side… Tranter, the heat transfer people.

Qualified Service Adds To Your Bottom Line

Dirt, deposits, scale and other foulants rob your PHEs of their efficiency. Continuing to operate them risks damage to your plates—damage that could lead to leaks, faulty operation and reduced exchanger service life. Faulty PHEs in turn pose damage risks to upstream and downstream equipment with expensive, unscheduled downtime for repairs.

Whether at your plant or in one of our authorized service centers, Tranter expertise will keep your PHEs running at peak efficiency. Our staff offers comprehensive OEM diagnostic and repair services on Tranter units, plus OEM-class parts and service standards for work on other brands of plate & frame units.

On-Site Services

- Performance diagnostics
- Plate pressure washing
- Plate inspection
- Gasket checks and replacement
- Unit closing to factory specs

TRANTER MULTI-BRAND SERVICE & PARTS

Your tailor-made on-site service contract will establish known costs for easier budget maintenance and reduce your process downtime. When you need to add plant capacity, Tranter's experienced field service/installation crews can complete HE modifications and reconfigurations efficiently within the constraints of your production schedule.

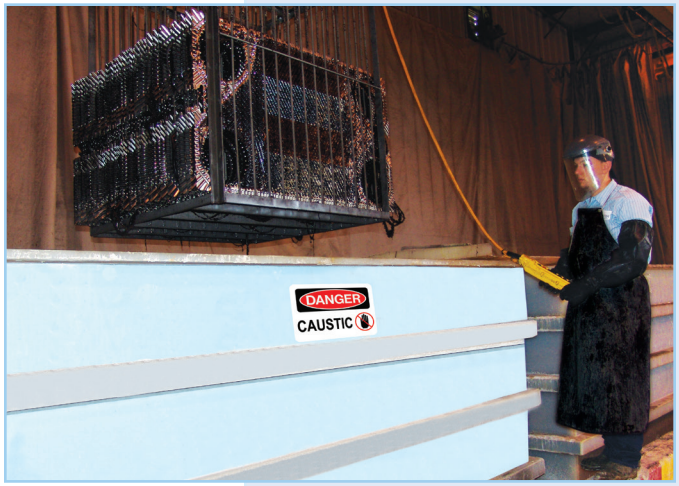
Tranter Center Services

- Plate pressure washing and chemical cleaning
- Plate dye penetrant tests, checking for defects/pinholes
- Regasketing (with nameplate database-matched OEM gaskets)
- Unit refurbishment (frame repair, sandblasting and repainting)
- Complete plate pack service
- Reassembly and closing to factory specs
- Unit hydro testing (to confirm performance and process compatibility)

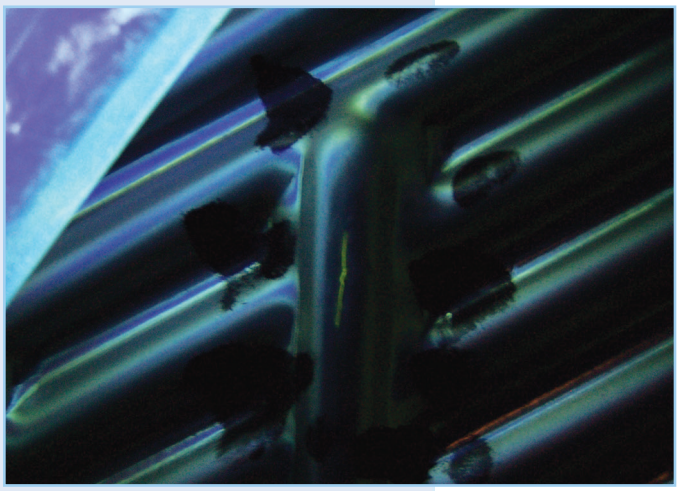
Why OEM Service Counts

Our experienced technicians safely clean and regasket your plates, with all work guaranteed by written warranties covering materials and workmanship.

Plates and gaskets from other manufacturers are analyzed to determine if original specs still apply, and what cleaning procedures will be most effective.



Plates are immersed in caustic and acid baths compatible with the plate material.



Cleaned plates are 100% visually inspected and a sample is dye penetrant-tested for damage.

Plates are regasketed with OEM replacement gaskets, using a non-hardening, OEM-spec adhesive that does not require heat curing.

Tranter on-site teams stand ready to restore peak efficiency to your exchangers with minimal downtime.

You purchased a standard of performance with your new PHE. We are dedicated to restoring your unit to that standard. That's why we offer OEM parts and service. Following are examples of the care we offer to every customer:

1. If gaskets are failing drastically, we verify your current operation before replacing them.
2. Instead of conventional two-part epoxy adhesive that cracks, causing leakage, Tranter Service Centers use a softer Pliobond® adhesive, skillfully and evenly applied.
3. If plate damage was caused by over-tightening, we assist you with procedures to prevent this from recurring.
4. For Tranter SUPERCHANGERs, we compare your heat exchanger serial number with our model database to verify its original design conditions. Any deviation alerts us to ask for clarification.

With Tranter and its authorized service facilities, you can be sure you always get the right gaskets, the right plates, the friendliest service and our OEM Guarantee (a one-year warranty on new parts and a guarantee on workmanship and labor for on-site service).

Waste Heat Recovery Saves Energy

Today's biofuels plants require optimized thermal integration technology. Heating and cooling of liquids comprises the core of ethanol manufacturing. Capturing surplus process heat and redirecting it to other areas of the plant significantly reduce energy costs. To go Green…think Blue.

Your Tranter representative can help survey all your surplus and counterflowing heat streams, providing you with recovery feasibility models, prioritized for economic impact:

- Juice
- Mash
- Beer
- 95% ethanol condenser
- 100% ethanol condenser
- 100% ethanol cooler
- Distillation column bottoms cooler
- Syrup condenser
- Dryer exhaust heat recovery

GO GREEN. THINK BLUE.

At the forefront of heat exchanger technology for more than 80 years

Tranter top quality, high-performance, proprietary products are on the job in demanding industrial and commercial installations around the world. And in every application, Tranter HE technology is contributing to 'green' initiatives with higher thermal efficiencies, easier maintenance and greater heat recovery potential. Backed by our comprehensive experience and worldwide presence (with subsidiary companies, agents, distributors and representatives worldwide), Tranter provides exceptional system performance, applications assistance and local service to every customer. Tranter makes it easier being 'green.' Contact us for a qualified discussion of your needs.

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