

# COMPACT MAINTAINABILITY FOR THE OIL AND GAS INDUSTRY



**SUPERCHANGER<sup>®</sup>**  
Plate & Frame HE

**SUPERMAX<sup>®</sup>**  
Shell & Plate HE

**SPIRAL**  
HE

**PLATECOIL<sup>®</sup>**  
Prime Surface Plate HE



## Performance-Tuned HE Products For Oil And Gas

### Special demands require special solutions

Oil and gas upstream and downstream processing places special demands on heat exchangers. Such equipment must not only withstand corrosive media, two-phase mixtures, extreme pressures and temperatures, but also be extremely compact. Tranter offers a wide range of gasketed, welded and spiral heat exchangers, proven to meet the toughest customer requirements. Our customers include leading oil and gas companies such as Shell, ExxonMobil, British Petroleum, ChevronTexaco and TOTAL.

Our patented plate technology enables us to tailor thermal and hydraulic design to optimize performance, reduce investment costs and minimize footprint and weight.

### Wide capabilities to meet your demands

For heat exchanger units in critical service, Tranter can provide all major types of calculations and stability analysis, including motion load, wind load, seismic load, nozzle load and even detailed finite element analysis calculations if required. A dedicated Document Control Department produces documents in accordance with the most stringent of customer requirements.

Tranter fabricates in accordance with all major design codes, specifically ASME Section VIII Division 1 with U stamp, PED 97/23/EU with CE stamp and API 662 / ISO 15547. All Tranter manufacturing centers worldwide are certified according to ISO 9001:2000.

*Tranter plate HE technology addresses special oil and gas demands such as fouling resistance, ease of maintenance and compact footprint.*

*Because continuous improvement is an ongoing effort at Tranter, we reserve the right to make reasonable design changes to the equipment presented here without notice.*



*SUPERCHANGER® plate corrugations provide high turbulence, with heat transfer coefficients several times higher than shell & tube exchangers.*

## SUPERCHANGER® Gasketed Plate & Frame Heat Exchangers

The SUPERCHANGER® Gasketed Plate Heat Exchanger is a module-based heat exchanger with gasket sealing between the plates. By using plates of different sizes, draw depths, chevron angles and pass arrangements, the exchanger can be optimized for a particular application. The plate corrugations provide high turbulence, with heat transfer coefficients several times higher than shell & tube (S&T) exchangers. The high shear stress produced by the induced turbulence scours the heat transfer surface during operation, thereby reducing fouling. This turbulence also aids the effectiveness of CIP procedures. The gasketed plate heat exchanger provides full accessibility for cleaning and can also be expanded if required. Gaskets available: nitrile, hydrogenated nitrile, EPDM and PTFE/Viton.

## Spiral Heat Exchangers

Because of the single flow passages, a Spiral Heat Exchanger (SHE) offers excellent performance, especially in the case of highly fouling, viscous and/or particle-loaded fluids. Bypassing does not occur, resulting in a self-cleaning effect by which potential blockages are washed away before they become a problem.

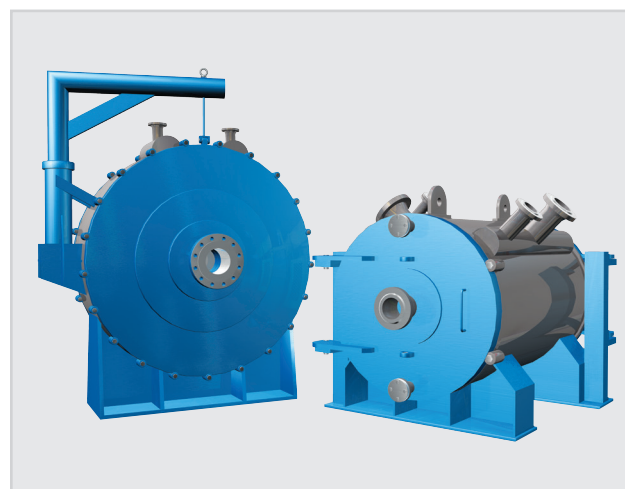
The concentric shape of the flow passages and the studs yields turbulence at low Reynolds numbers. By optimizing the flow pattern heat transfer is enhanced, while fouling is reduced. This compact and space-saving design can be readily integrated into most available footprints, reducing installation costs.

The covers are mounted with hook-bolts to enable easy access to the channels, which can also be readily cleaned mechanically. In particular for highly fouling applications, the covers can be executed with hinges or davits, thus enabling very fast access that reduces downtime.

SHEs work as excellent condensers, especially in the case of condensing mixed vapors, with or without inert gases. As a result of the short flow passage, but high cross-sectional area available, high flow rates of vapor can be condensed at pressure drops as low as 0.0145 psi (1 mbar).

An outstanding advantage of the SHE as a condenser is that it can be flanged or welded directly onto a column as an overhead condenser. It is also frequently used to configure multiple-stage condensers. The assembly of the SHE onto a column greatly reduces installation costs, because connecting pipework is reduced to a minimum.

Because of the welded, robust design and the low fouling properties, maintenance costs are minimal. On a Total Cost of Ownership basis, the SHE is frequently the most cost-effective solution.



*The Tranter Spiral Heat Exchanger offers compact size, easy maintainability and good performance with particle-laden flows and difficult condensing applications.*



*SUPERMAX® exchangers are available with round and oblong plates.*

## SUPERMAX® Shell & Plate Heat Exchanger

The SUPERMAX® Shell & Plate Heat Exchanger is designed for pressures to 70 barg (1,015 psig) and temperatures up to 538°C (1,000°F) for standard range units. Extended range units are available for higher temperature and pressure applications. The exchanger is particularly suited to oil and gas applications having a large flow imbalance, allowing

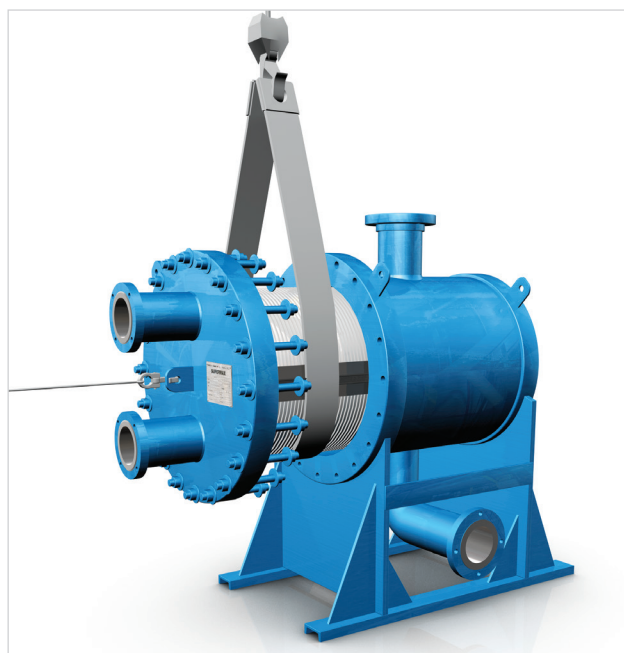
higher flow rates on the shell side. Horizontal orientation and low pressure drop makes the SUPERMAX an excellent choice for condenser/boiling applications.

With alternating channels for hot and cold media, the SUPERMAX can be configured to provide true countercurrent or co-current flow. The SUPERMAX line offers three different diameters of circular plates. An optional flanged cover allows the plate pack to be removed for cleaning. SUPERMAX plate materials may be Type 316L stainless steel or other alloys; shells may be fabricated

of carbon steel, Types 304, 316, 316L stainless steel and titanium. The unit can be fabricated from dissimilar metals when only one side will be exposed to corrosive conditions.

Various optional configurations of the SUPERMAX unit enable this versatile exchanger to meet wide-ranging application needs. The Removable Cover SUPERMAX exchanger provides full accessibility to the plate pack for inspection and/or mechanical cleaning by removing the plate pack bundle.

In the Multi-Duty SUPERMAX, multiple separate plate packs share a single shell. The ability to combine plate packs with different plate counts affords broad flexibility in combining multiple applications within a single exchanger. For flows that require a high flow rate, the two inlets and outlets can be piped together. The Multi-Pass SUPERMAX establishes multiple passes through separate plate pack zones on both the plate and shell sides.



*Flexibility is the hallmark of SUPERMAX units: low pressure drop and suitability with unbalanced flows makes them well suited in condensing and reboiling applications. The removable cover makes cleaning fast and simple.*

## PLATECOIL® Prime Surface Plate Heat Exchanger panels and packages

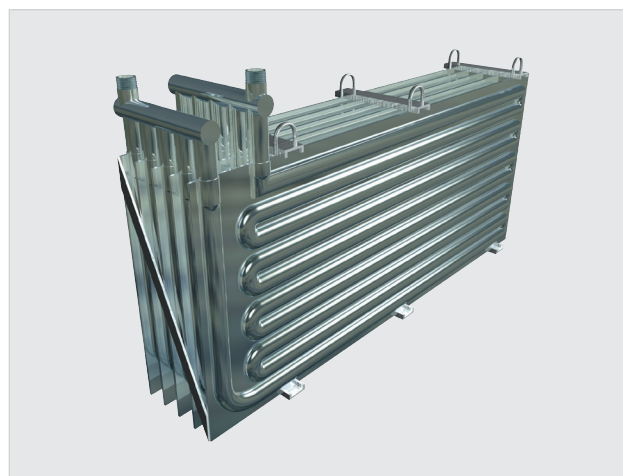
PLATECOIL® Prime Surface Plate Heat Exchanger panels are made from die-formed channels pressed into flat sheets. Panels are then fabricated into pre-engineered modules, complete with piping, supporting structure and manifolds, or formed into vessel shells or jackets. Embossing pattern and number of panels are functions of capacity and pressure drop specified for the application. Two embossing patterns are used in oil and gas applications:

- Multi-Zone PLATECOIL provides uniform heating when using steam, especially with high flow rates and where low pressure drop is necessary.
- Serpentine PLATECOIL offers high heat transfer capabilities at low-to-moderate flow rates for heating or cooling of liquid phase mediums.

As integral, one-piece units, PLATECOIL banks comprise a rugged, high-strength design well suited as suction heaters and tank heaters for use with viscous products. There are only two connections, one inlet and one outlet, to make in the field.



*Multi-Zone PLATECOIL® Prime Surface Heat Exchangers excel in steam heating applications.*



*PLATECOIL banks find widespread use in tank heating applications to optimize pumping of heavy fractions.*

## PHE Standard Range General Specifications


	SUPERCHANGER Plate & Frame Gasketed	SPIRAL	SUPERMAX Shell & Plate	PLATECOIL Prime Surface
<b>PERFORMANCE</b>				
Max. Pressure Rating, barg (psig) <sup>a</sup>	27.56 (400)	>45 (>653)	70 (1015)	28 internal, 69 external (400 internal, 1000 external)
Max. Temperature Rating, °C (°F)	160 (320)	>450 (>840)	538 (1000)	260 (500)
<b>CONNECTIONS</b>				
Max. Connections, DN (ANSI RF in.)	Contact Factory Also Studded Ports	DN500 (20) <sup>b</sup>	400 (16)	2-3/4 in. NPT
<b>MATERIALS</b>				
Standard Plate Material <sup>c</sup>	304 SS, 316 SS	Carbon Steel, Stainless Steel, Super Austenitic Steels, Duplex, 6%-Mo, Nickel and Nickel Alloys, Titanium, Others	316L SS	Carbon Steel, 316L SS
Standard Frame/Shell Material	Carbon Steel	Carbon Steel/Same As Specified For Standard Plate Material	Carbon Steel, 316L SS, 254 SMO, AL6XN	SA-240 SS, 302 SS, 304 SS, 304L SS, 316 SS, Monel, Nickel, Inconel, Others

<sup>a</sup> 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.

<sup>b</sup> For Spiral HEs, column mounted diameters up to 3,000 mm (118 in.) and maximum shell diameters up to 2,400 mm (94.5 in.) are available.

<sup>c</sup> Higher performance materials are available.

## Idea Notebook



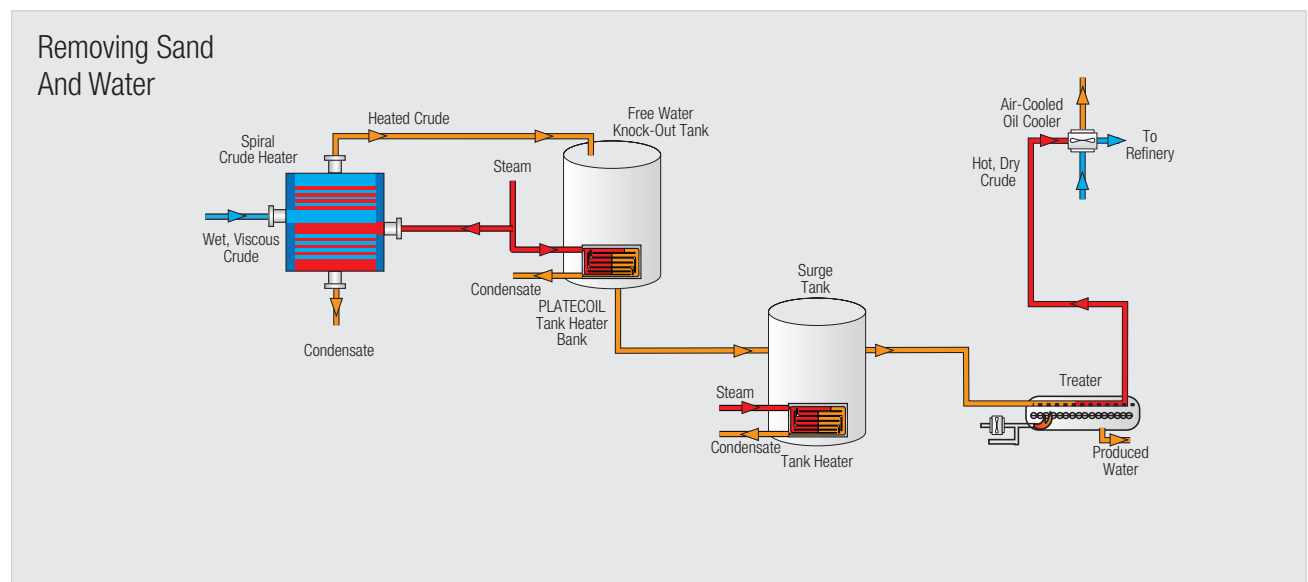
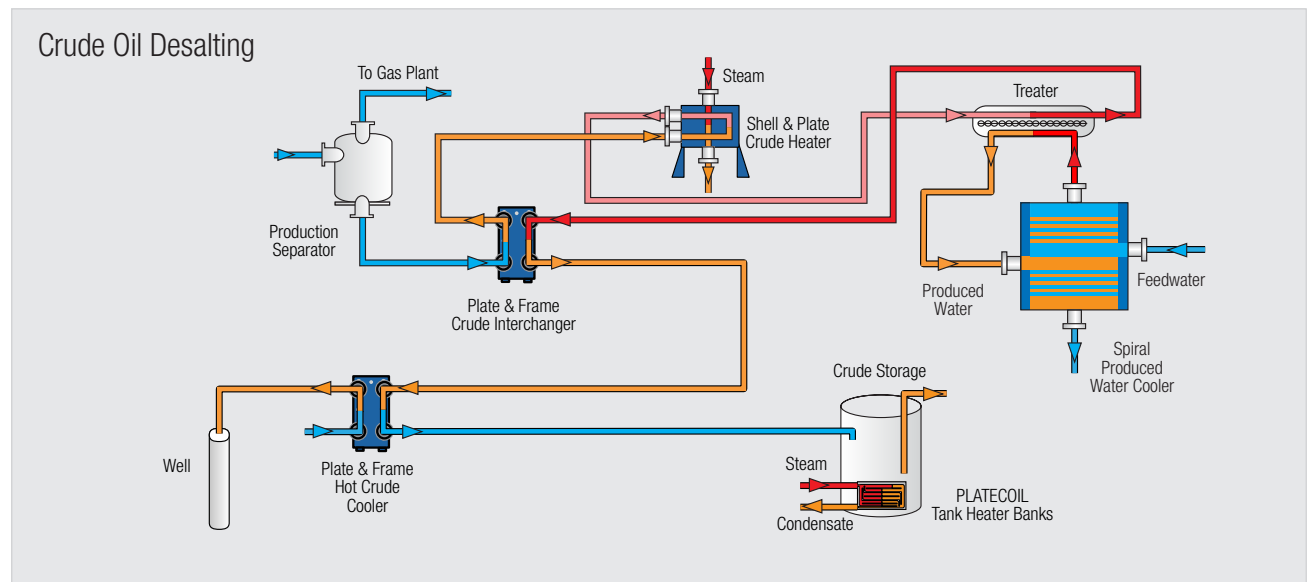
Efficiency and ease of maintenance mark the versatility of Tranter plate heat exchangers in oil and gas applications. Consider the benefits of thermal efficiency and compactness offered by plate heat exchangers in applications traditionally handled by S&T heat exchangers, such as:

- Crude Oil Desalting
- Waste Water Treatment
- Gas Compression
- Gas Desulfurization
- Gas Dehydration
- Atmospheric & Vacuum Distillation
- Alkylation
- Fluids Catalytic Cracking
- Vis-breaking
- Coking
- Storage Tank Heating

## Production

**Crude Oil Desalting.** Raw crude oil contains many contaminants that have to be removed before it can be further processed, particularly water and salts. Depending on the process used for dehydration/desalting, gasketed, welded or Spiral plate heat exchangers can be utilized for many different services.

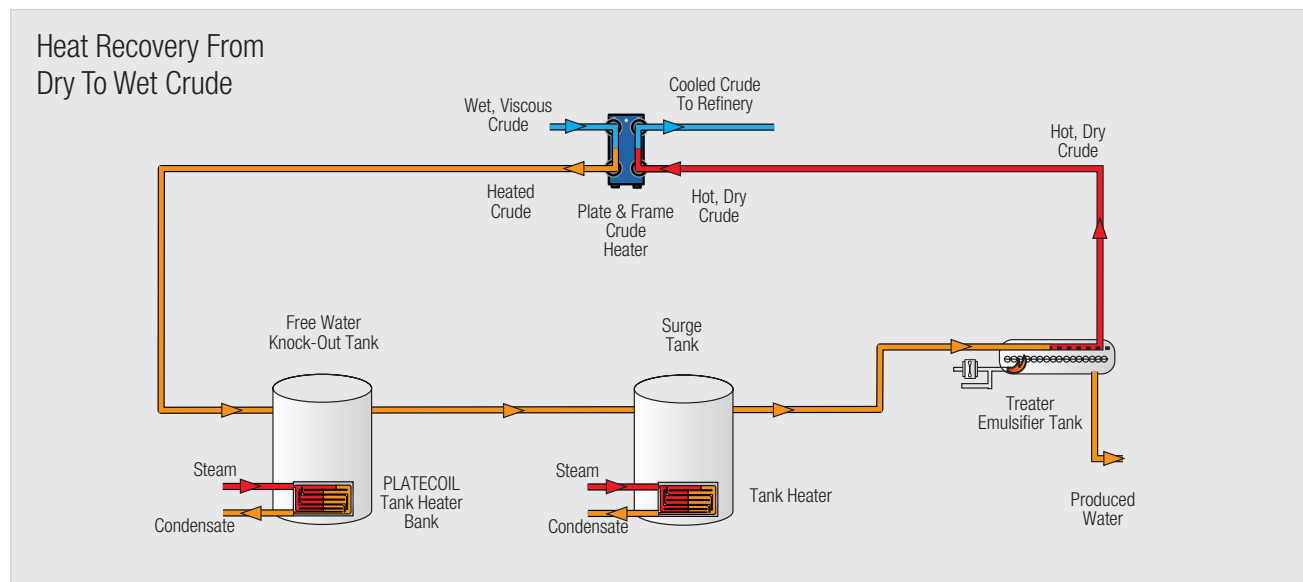
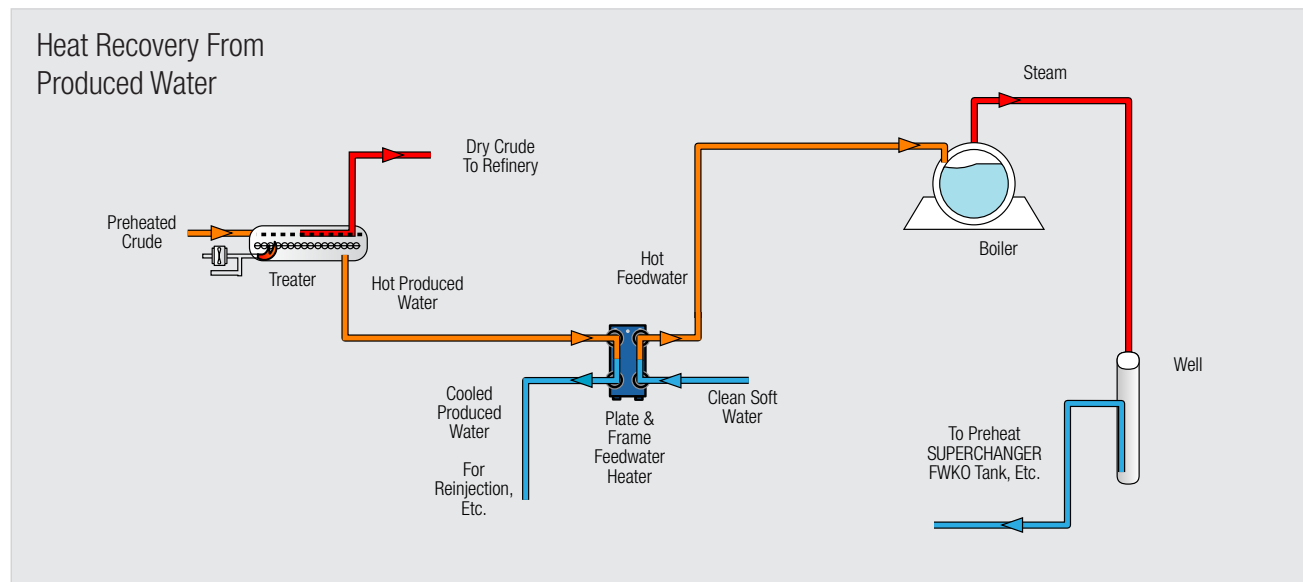
**Heating Crude Oil To Remove Sand And Water.** Emulsions of viscous crude, water and sand are heated with steam or glycol using SUPERCHANGER or PLATECOIL heat exchangers in treater tanks to remove the sand and separate produced water.



### Production

**Heat Recovery From Produced Water.** With its high U value, a SUPERCHANGER unit recovers a large percentage of the available BTUs in hot water from treater tanks, usable for preheating boiler feedwater. The produced water alternatively can be further heated through a steam-driven SUPERCHANGER unit and reinjected into the wells to increase production rates.

**Heat Recovery From Dry Crude To Preheat Wet Crude.** Hot, dry crude from the treater must be cooled; the resulting hot stream can be looped back to the crude emulsion heaters. SUPERCHANGER and PLATECOIL units are ideal for this purpose.



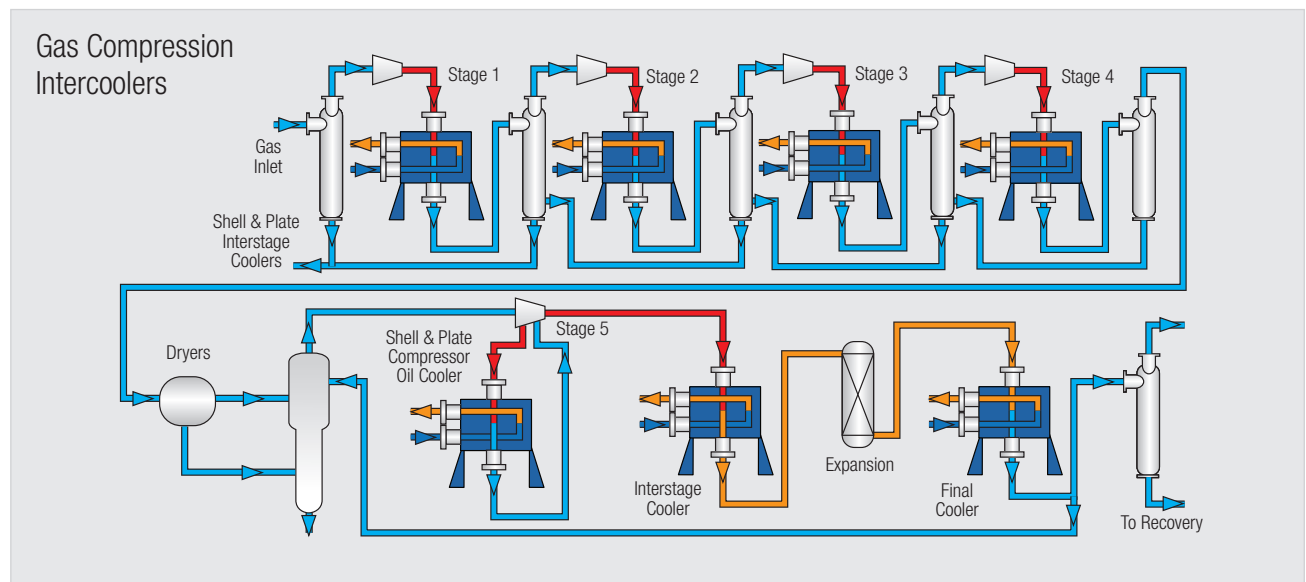
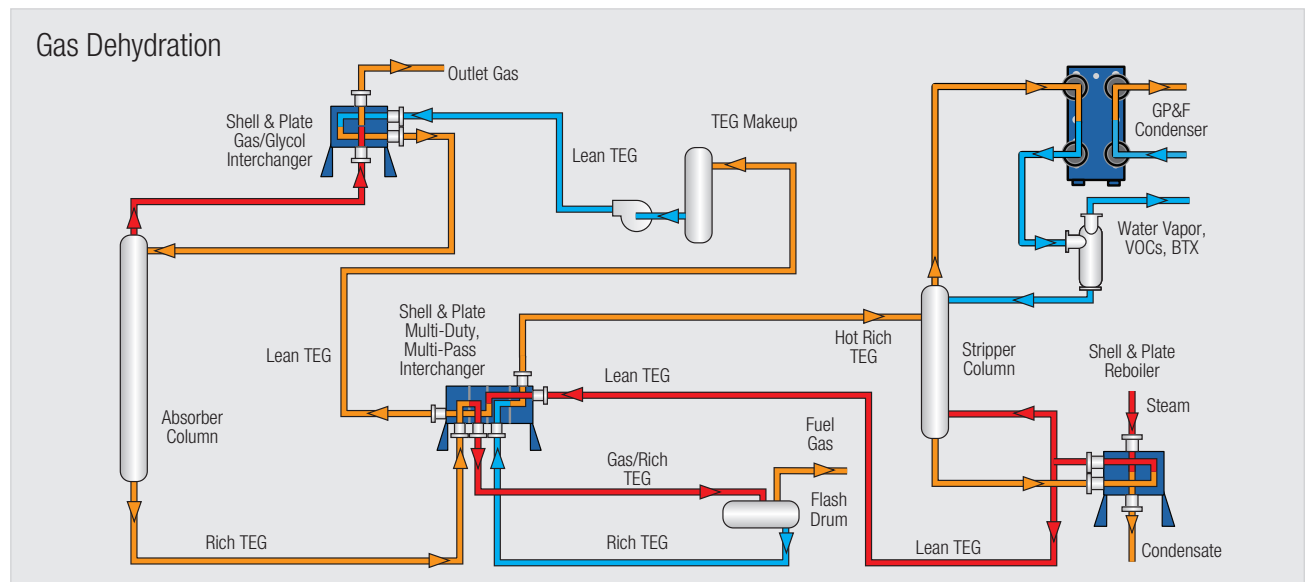


### Midstream Processing

**Compact Gas Dehydration Skid.** A SUPERMAX unit with a three-pass/two-pass, countercurrent arrangement heats two cold-side, rich TEG streams in one unit. The SUPERMAX exchanger provides better energy recovery and reduces the size of the reboilers used in the skids. The welded unit has also resulted in a more compact skid structure and no tube bundle pulling deadspace.



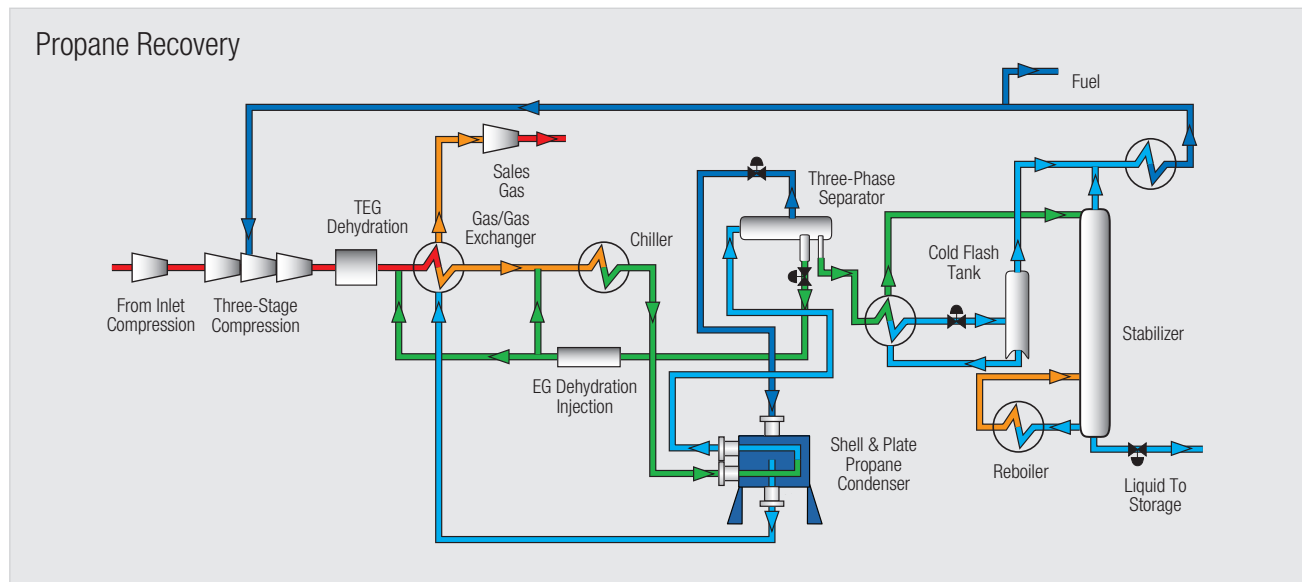
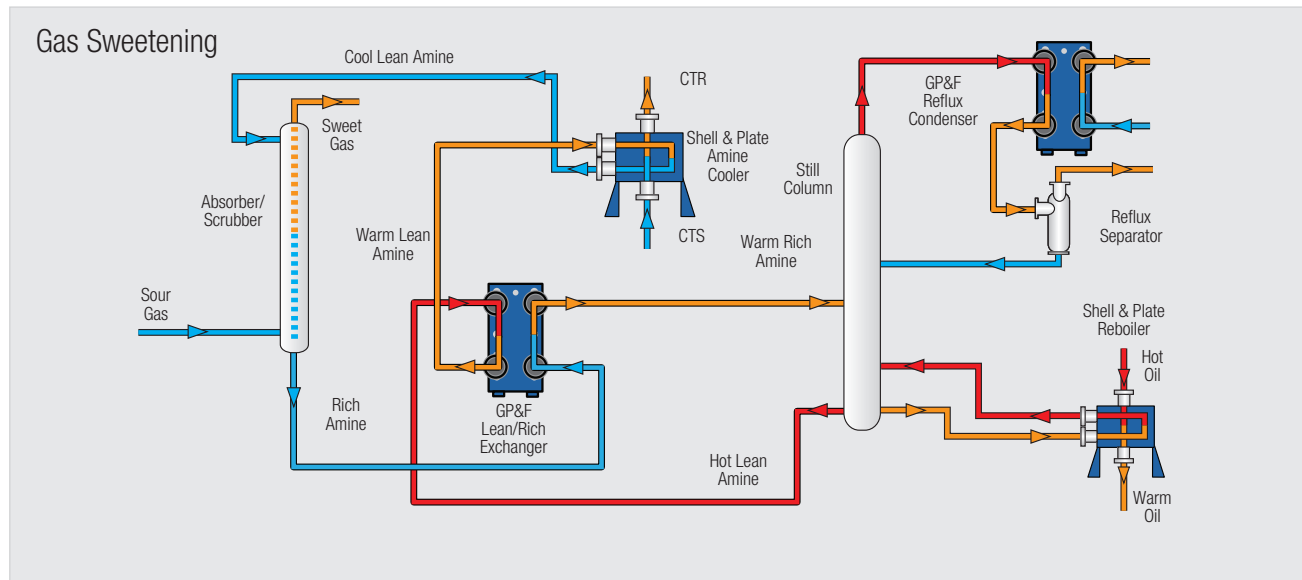
**Compression Intercoolers And Lube Oil Coolers.** SUPERMAX Coolers provide precise control of compressor suction temperature and increases in overall compression efficiency; gasket-free compressor SUPERMAX Lube Oil Coolers (Stage 5) withstand pressure spikes and reduce volume of expensive lubricants.



## Midstream Processing

**Gas Sweetening.** Single-pass SUPERMAX welded units are used as a lean amine cooler and as a lean/rich amine interchanger. The small draw depth facilitates close temperature approach, reducing external energy requirements. The unit can accomplish 90%-plus heat recovery from lean to rich amine, or with sulfinol. A spiral unit provides easy maintenance as an amine reboiler.

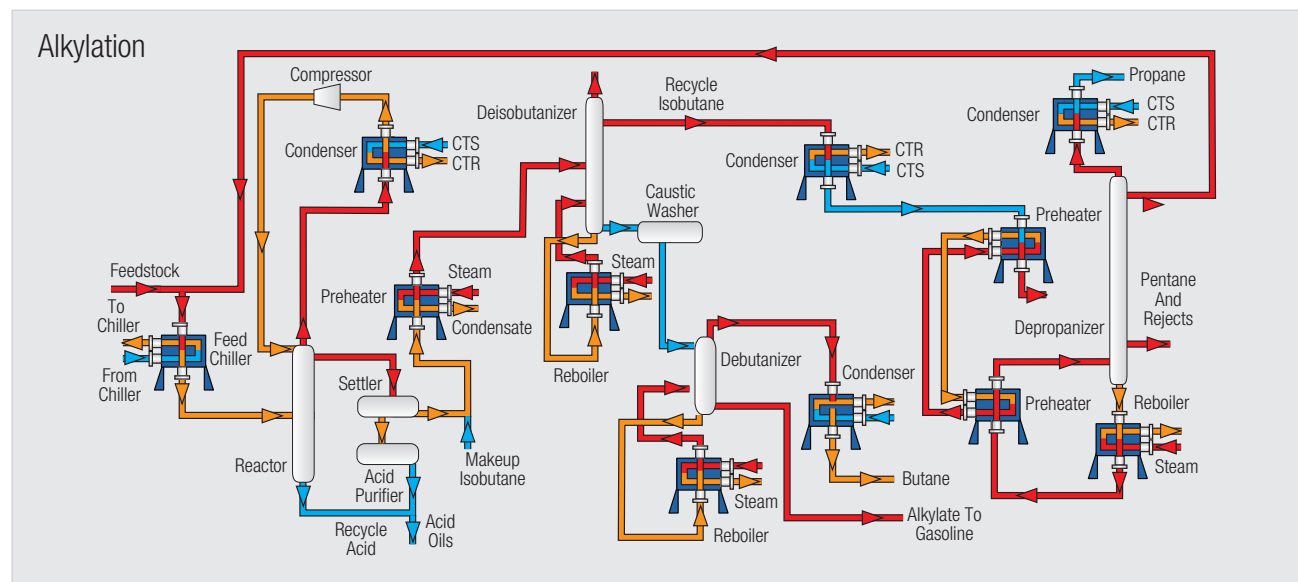
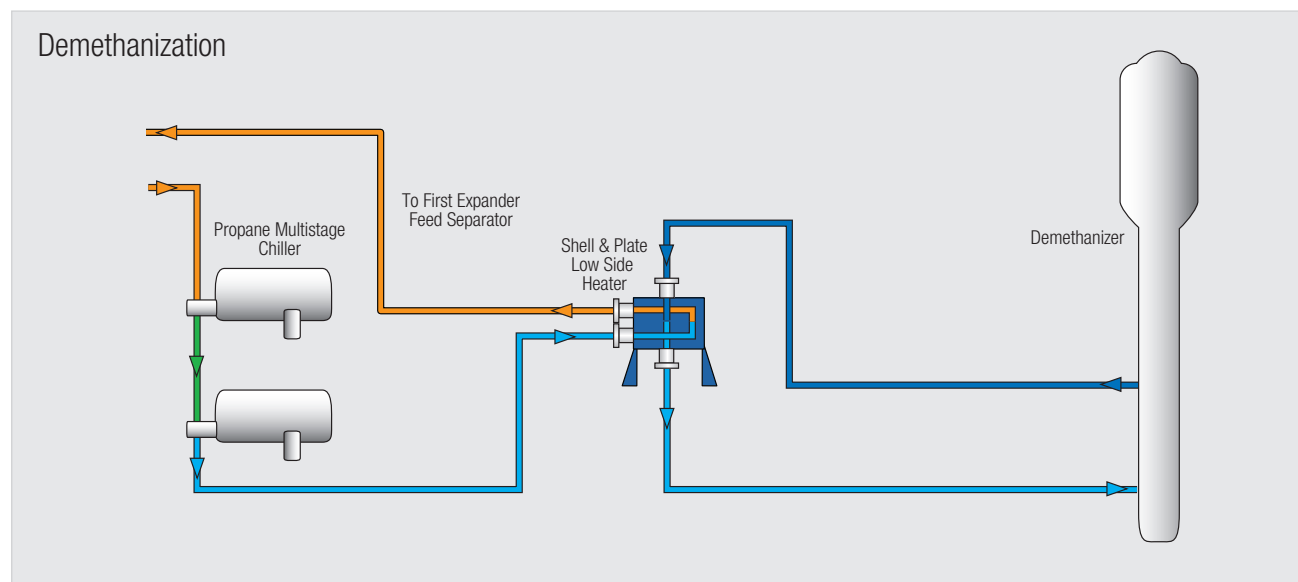
**Propane Recovery.** A SUPERMAX reduces temperature to condense more propane and heavier components and attain target gross heating value. Installed downstream of the chiller, the unit improves propane recovery significantly without additional refrigeration. The compact unit can fit on existing skids without additional support structures.



## Midstream Processing

**Demethanization.** A SUPERMAX Shell & Plate exchanger functions as a low side heater on a demethanizer column, using  $-37^{\circ}\text{C}$  ( $-35^{\circ}\text{F}$ ) propane to raise the methane-rich gas from  $-59^{\circ}\text{C}$  ( $-75^{\circ}\text{F}$ ) to  $-41^{\circ}\text{C}$  ( $-42^{\circ}\text{F}$ ). With its low pressure drop, the SUPERMAX is attractive for use as a partial or total reboiler in cryogenic service, with improvements over brazed aluminum units in withstanding thermal shock.

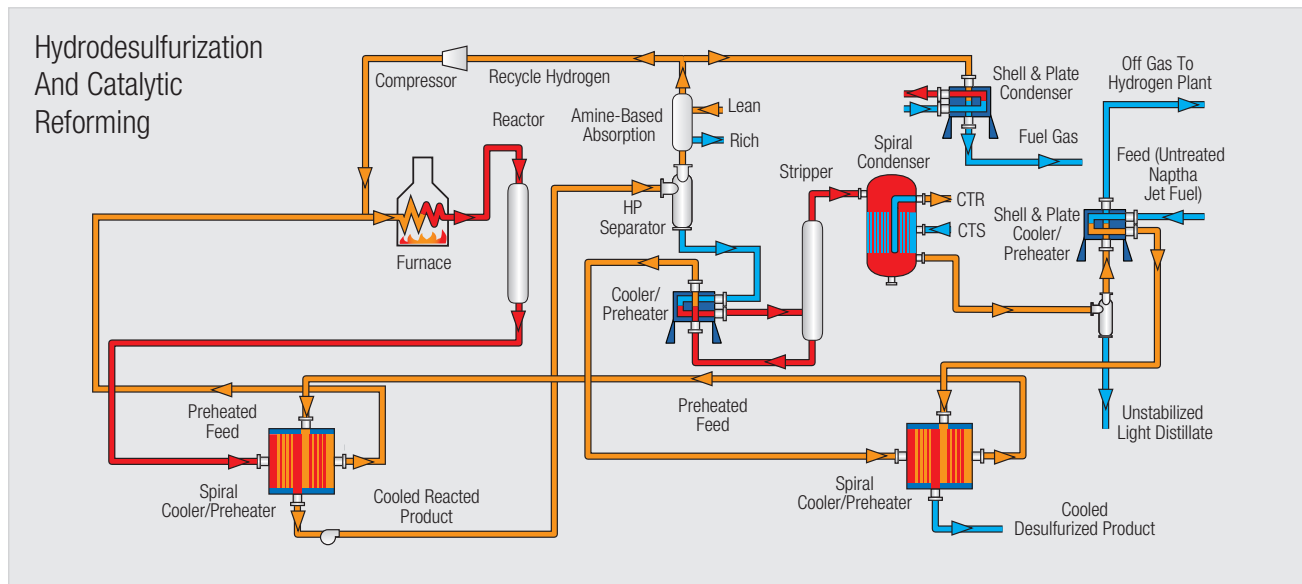
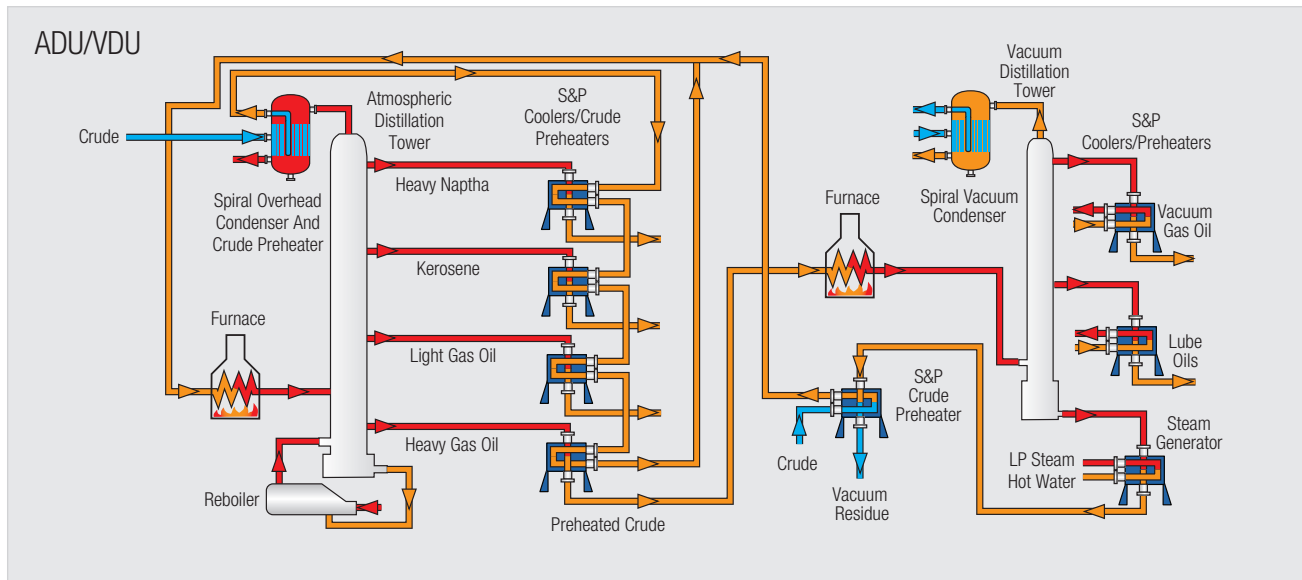
**Alkylation.** SUPERMAX Shell & Plate units offer significant opportunities for improving thermal efficiency and response in the alkylation process. They perform well as condensers on reactor, deisobutanizer, debutanizer and depropanizer columns; as preheaters and reboilers; as steam generators; and as feed chillers.



### Downstream Processing

**Distillation.** Heat from cooling and condensation on distillation columns can be recovered through either SUPERMAX (shown) or Spiral units. A SUPERMAX or Spiral can function as an efficient partial reboiler. The excellent performance to size/weight ratio saves in support structures and maintenance.

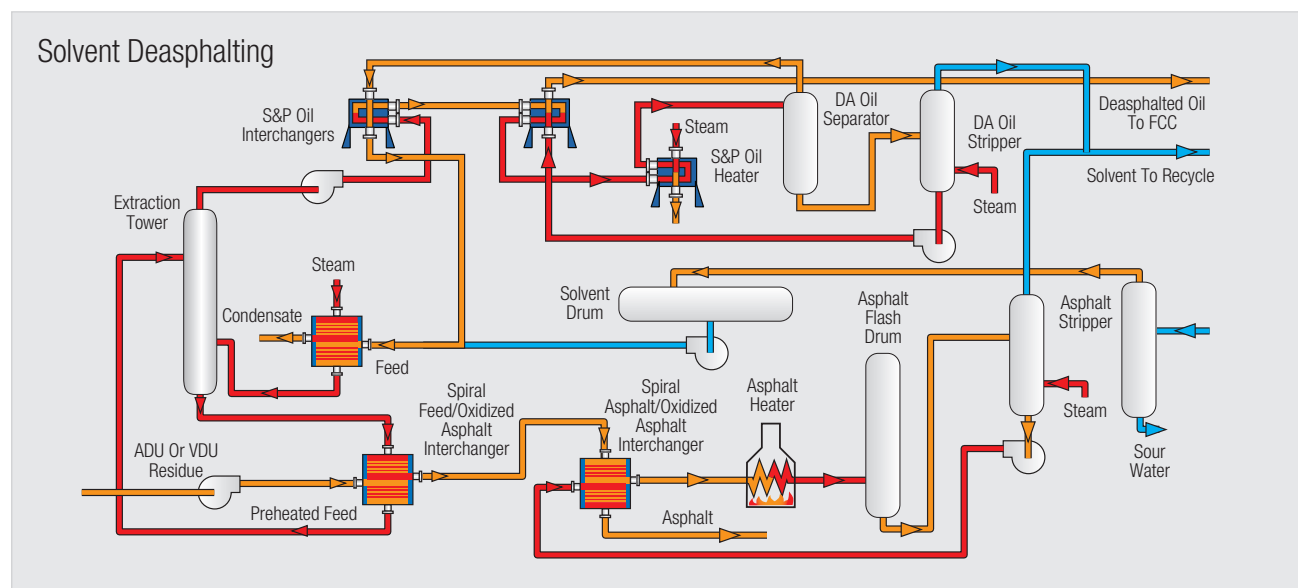
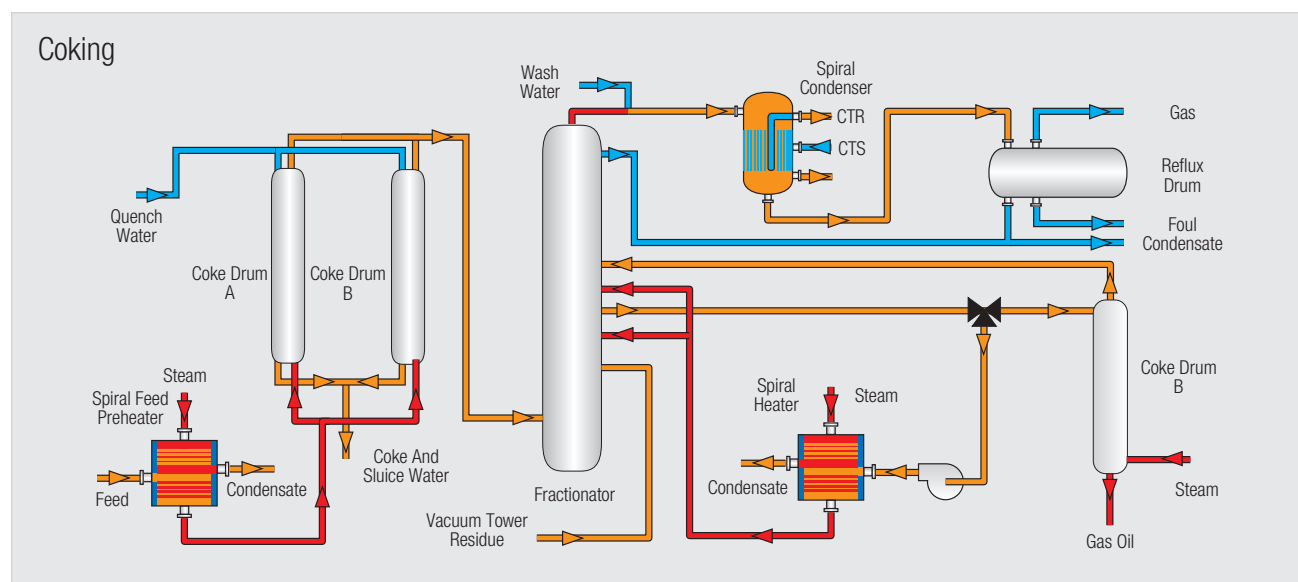
**Hydrodesulfurization And Catalytic Reforming.** Untreated naphtha/jet fuel is preheated using surplus heat from off gas, desulfurized product and raw reacted product. A Spiral preheats reacted product for the stripper column using stripped desulfurized product as a heat source. Finally, Spiral or SUPERMAX units condense the lighter distillates. Thermal efficiency is higher than with S&T units.



## Downstream Processing

**Coking.** Spiral units serve as a coke drum feed preheater and as a fractionator reheater. Additional spiral units handle duties as a fractionator condenser and in heat recovery. Other welded units can serve as a gas oil fraction cooler.

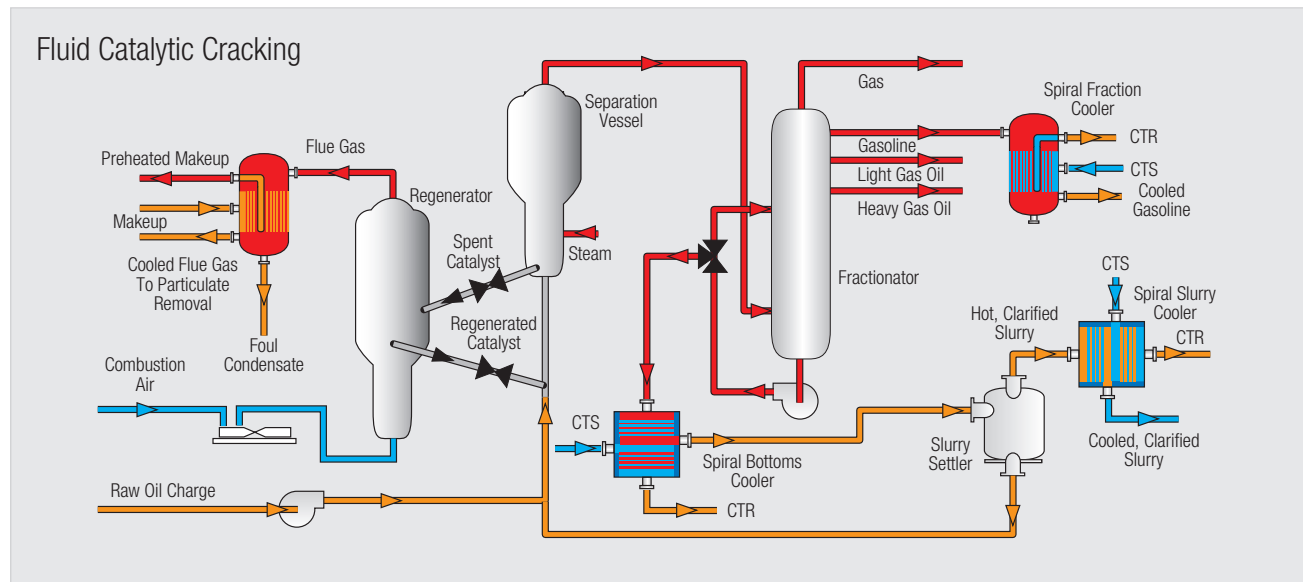
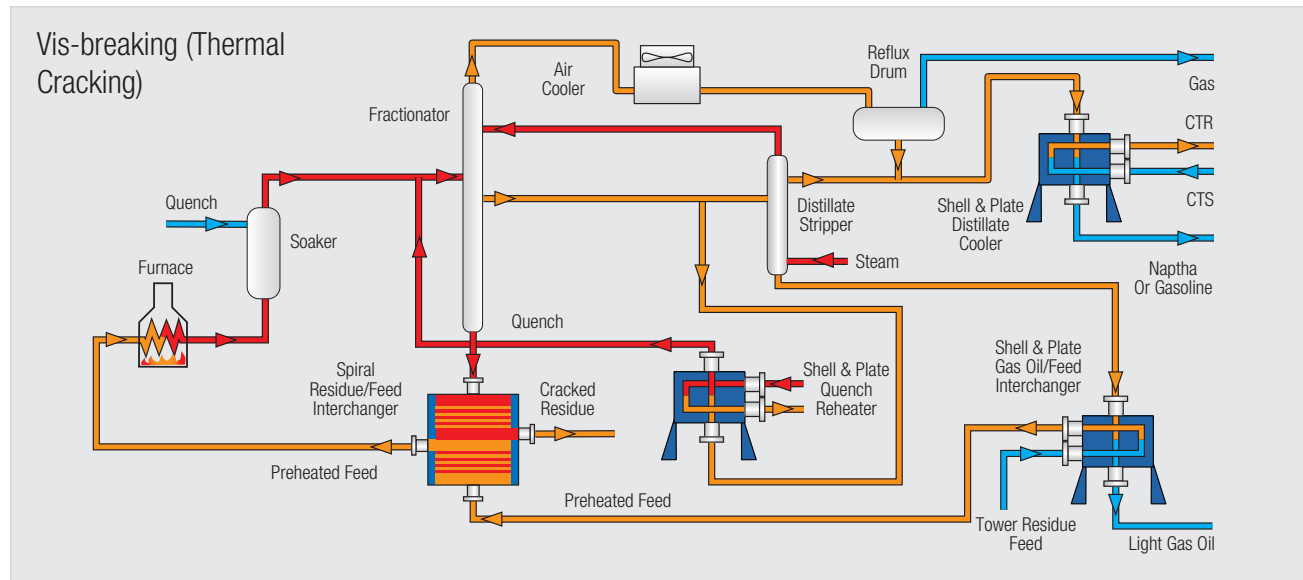
**Solvent Deasphalting.** Spiral units function as low-maintenance interchangers for feed/oxidized bitumen and asphalt/oxidized asphalt. They also heat solubilized stripped asphalt for reinjection into the extraction tower. SUPERMAX exchangers function well in the vapor-phase processing of deasphalted oil, as interchangers and heaters.



### Downstream Processing

**Vis-breaking (Thermal Cracking).** Cracked residue contains considerable heat energy that can be recovered for preheating by Spiral exchangers. SUPERMAX units can undertake preheating duties using the gas oil fraction. SUPERMAX units are also effective as coolers of the light distillate vapor.

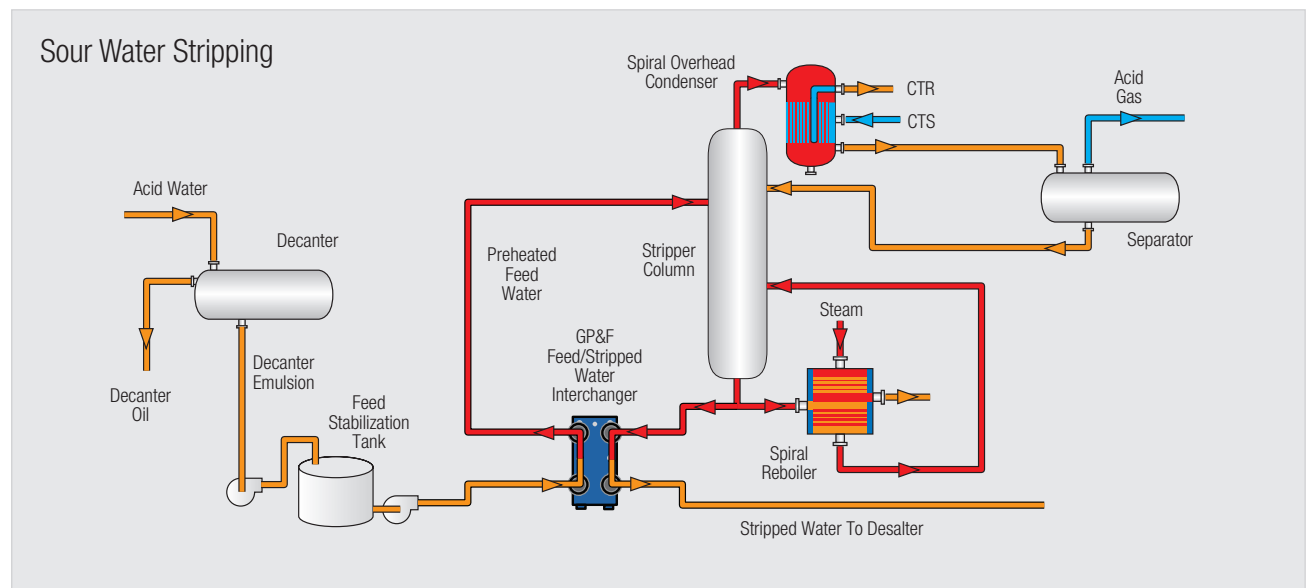
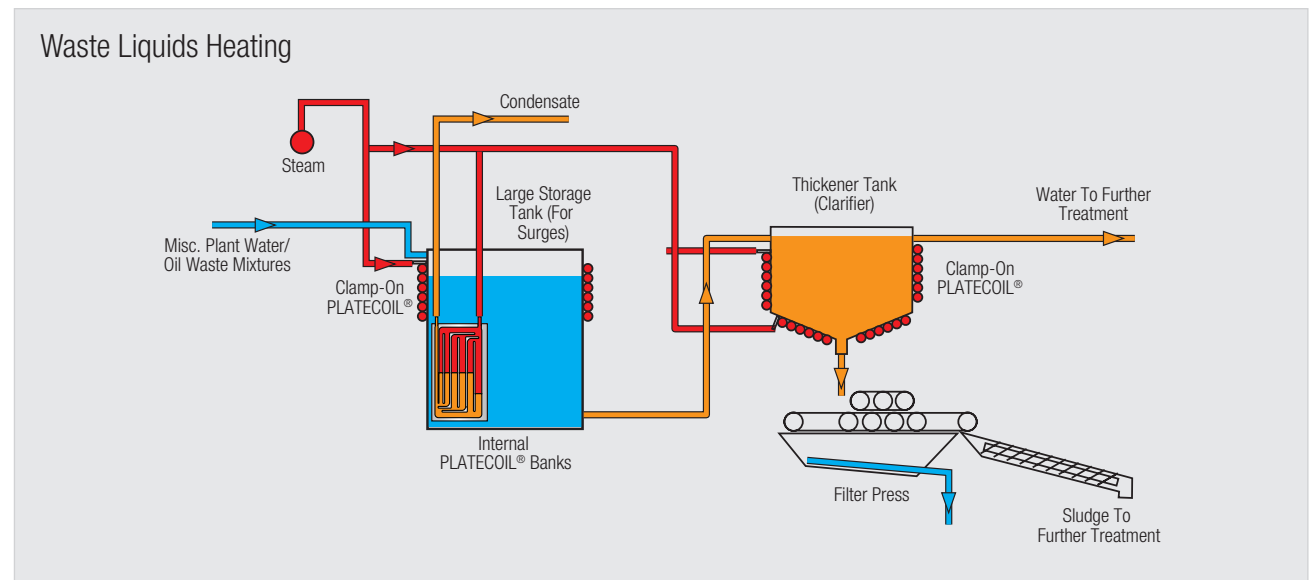
**Fluid Catalytic Cracking.** Spiral units improve response and efficiency as an overhead condenser/makeup water heater, as a bottom fraction cooler, as a clarified slurry oil cooler and as fraction coolers for several products.



## Downstream Processing

**Waste Liquids Heating.** The treatment of waste products for pollution control purposes at refineries requires heated tanks. PLATECOIL exchangers are versatile products for these requirements. Steam heats the waste mixture, reducing its viscosity to facilitate the settling out of solids. Large surface areas, as required, can be provided by a combination of internal and external PLATECOIL units. This also permits easy zoning of the heating surface.

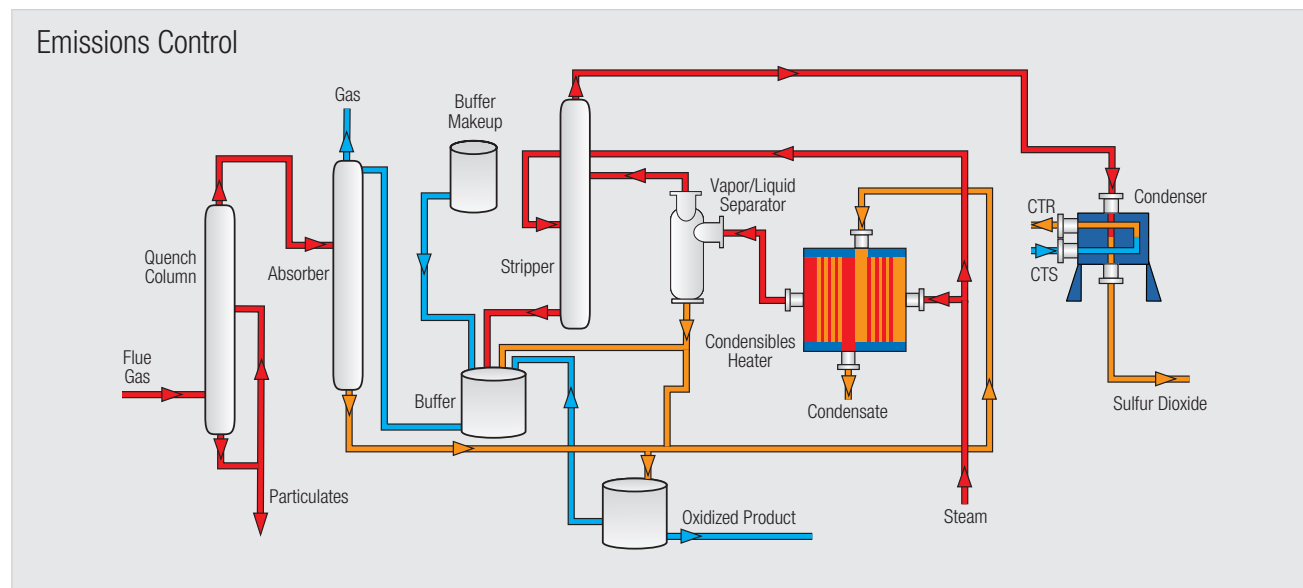
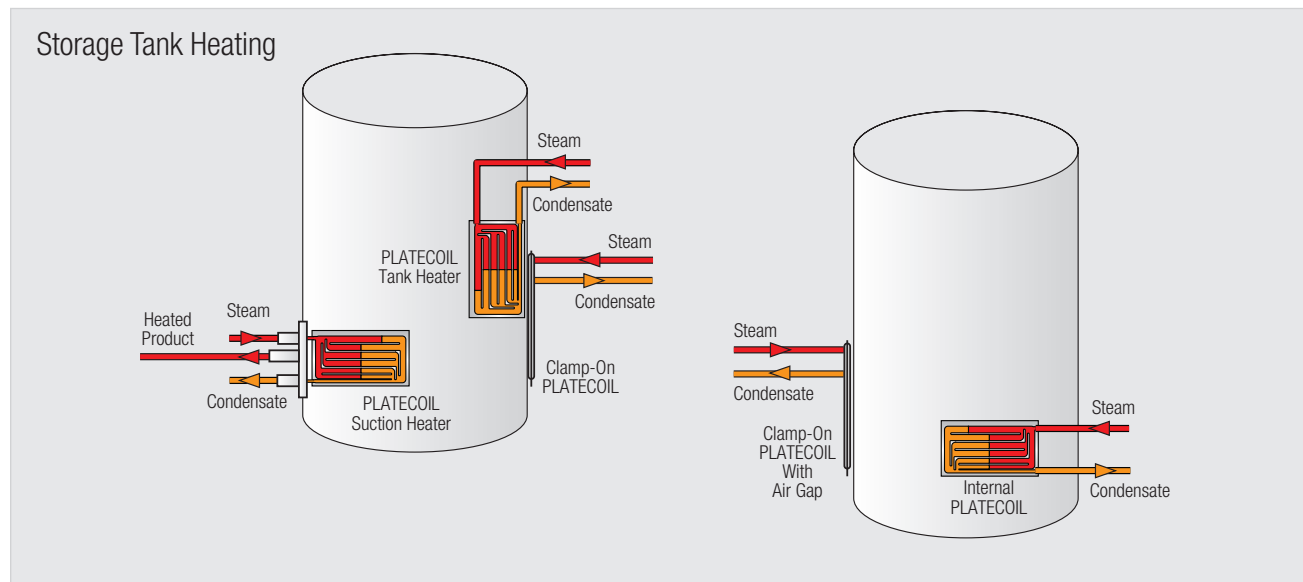
**Sour Water Stripping.** Spiral units function well as a stripped water/feed emulsion interchanger, as a stripper reboiler and as an overhead stripper column condenser.



### Downstream Processing

**Storage Tank Heating.** PLATECOIL units configured as suction heaters warm viscous products prior to pumping to speed unloading and save energy. PLATECOIL heaters are also clamped on externally, allowing total accessibility. When heating sensitive lube oil, an air gap is provided to prevent overheating.

**Emissions Control.** Hot condensibles from the absorber column are steam-heated in a Spiral unit for oxidation and stripping. A SUPERMAX unit cools the sulfur dioxide, removing heat that can be used to preheat other streams in the plant.







## For Optimized Efficiency And Maintenance...Think PHEs

### Desalting

Desalter produced water/fresh water interchanger  
Treated crude oil cooler  
Treated/untreated crude interchanger

### Atmospheric/Vacuum Distillation Units (ADU/VDU)

Crude/AR preheaters  
Fraction cooler (ADU/VDU)  
Top condenser and vacuum condenser

### Catalytic Cracking (FCC, RFCC, RDD)

Bottom fraction cooler  
Clarified slurry oil cooler  
Fraction cooler  
Overhead condenser

### Catalytic Reforming & Hydrotreating

Feed/effluent interchanger  
Fractionator condenser  
Fractionator feed preheater  
Fractionator fraction cooler  
Fractionator reboiler

### Vis-breaker

Feed preheater  
Feed/effluent interchanger

### Coker

Feed preheater  
Fraction cooler  
Fractionator condenser  
Heat recovery  
Reboiler/refluxer

### Asphalt/Bitumen

Feed/oxidized bitumen interchanger

### Lube Oil Production

Condenser  
Heat recovery  
Oil additive clarification  
Reboiler

### Gas Processing

Multi-stage compression interstage cooling  
Compressor lube oil cooling  
Gas dehydration and sweetening  
Demethanizer low side heater  
Oil sands froth treatment  
Refrigeration

### Amine Unit

Amine regenerator reboiler and condenser  
Lean amine cooler  
Lean/rich amine interchanger

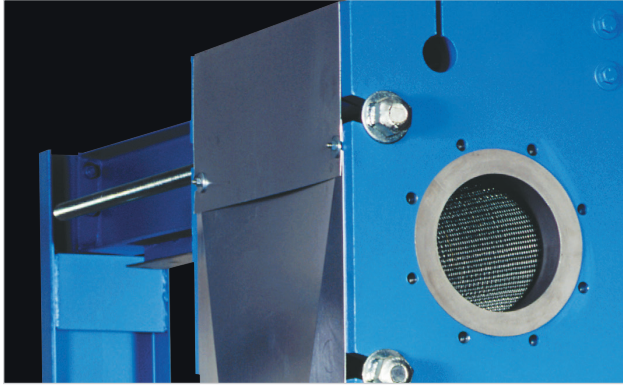
### Sour Water Stripper (SWS)

Stripped/sour water interchanger  
Stripper condenser and reboiler



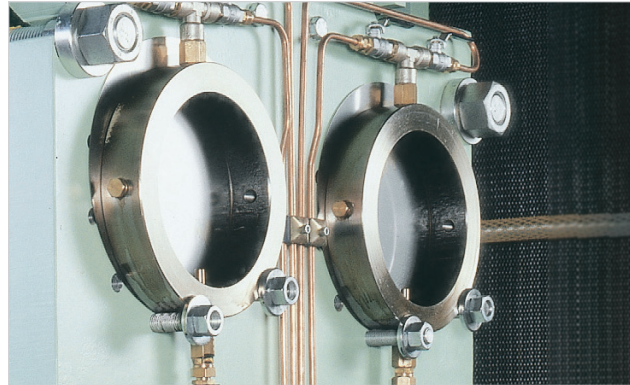


## Accessories That Help Maximize Uptime And Productivity



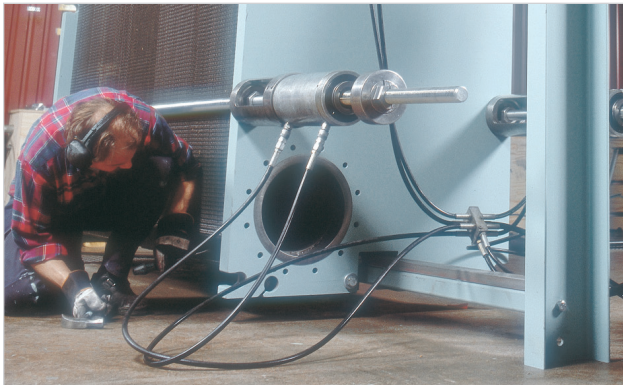
### Shrouds

Shrouds provide insulation and protection in an aggressive environment.



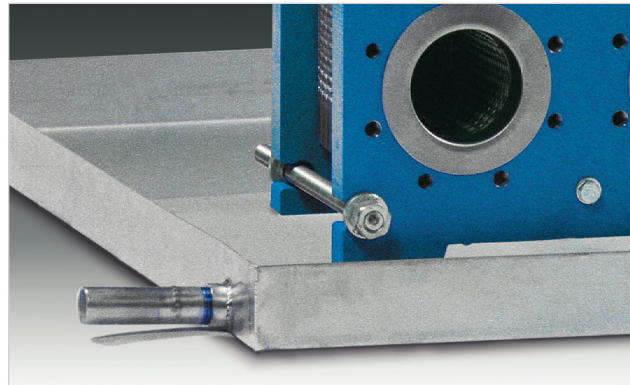
### Instruments And Gauges

Special flanges are available with outlets for drainage and ventilation, pressure gauges and sensors.



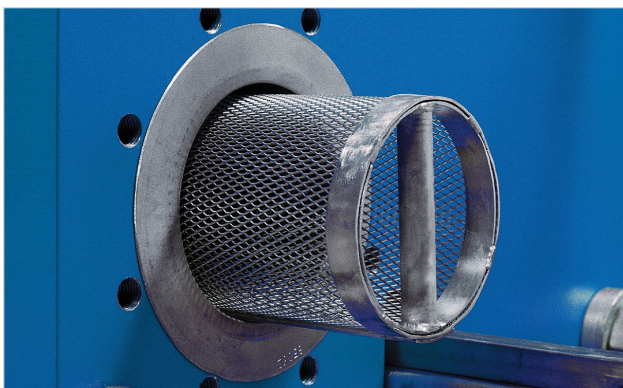
### Hydraulic Tightening Devices

Hydraulic tightening devices facilitate assembly and reassembly of plate & frame heat exchangers fast, easily and securely.



### Drip Pans

Drip pans prevent water and other liquids from flowing onto the floor when dismantling the heat exchanger.



### Port Strainers

A strainer protects the plate pack from large particles that would otherwise foul and clog the channels. The length is adapted to the number of plates.

Other accessories include:

- Portable Clean-In-Place systems
- Backflush valves
- Wrenches
- Grounding lugs
- Molybdenum bolt coatings
- Tie-rod protectors
- HexWrap insulation
- Insulated shrouds

## Service And Maintenance For Plate Heat Exchangers

With manufacturing centers on three continents, Tranter sources systems close to major onshore and offshore production and refining areas, minimizing lead-time and freight for accommodating tight project schedules.

Efficient operation is the key to optimum return of investment. Malfunctions and changes in heat transfer can have severe consequences on operational costs and may affect the product quality. Regular service and maintenance safeguards your exchanger's and your company's performance.

Tranter service only begins when the heat exchanger starts up. The Tranter service concept helps meet application requirements, prolongs the life of the exchangers and makes them top performers at all times.



### Global representation

Service centers located worldwide are ready to assist with OEM plates, gaskets, assembled plate packs, cleaning services and replacement units. At your facility, we can carry out performance diagnostics, pressure washing of plates, plate inspection, checking and replacing gaskets as needed, and closing the unit to refinery specifications. We can work with you to structure a tailored service contract to reduce process downtime and give you known costs for more accurate maintenance budgeting.

In our centers, we do pressure washing and chemical cleaning of plates, die penetrant testing to check plates for defects or pinholes, and regasketing with OEM gaskets matched via the nameplate database. Entire unit refurbishment includes frame repair (sandblasting and repainting), complete plate pack service, reassembly and closing the unit to precise factory specifications. We then carry out hydro testing of the unit, and we can confirm performance on-site to affirm process compatibility under changed conditions.

### Authorized service guarantees the original standards

With Tranter authorized service, you can always be sure that you get the right gaskets, the right plates and our OEM Guarantee. This ensures that the heat exchanger fulfils the

original standards as well as the new common European Pressure Vessel Code, PED (Pressure Equipment Directive) highlighting the use of genuine parts regarding health and safety requirements.

#### **Tranter Service Center (USA)**

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E-mail: [service@tranter.com](mailto:service@tranter.com)

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30241 East Frontage Road  
Farmersville, IL 62533  
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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. Backed by our comprehensive experience and worldwide presence, Tranter offers you exceptional system performance, applications assistance and local service. Tranter is close to its customers, with subsidiary companies, agents, distributors and representatives located worldwide. Contact us for a qualified discussion of your needs.



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