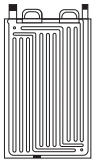
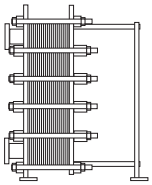
BULLETIN NO. TIS-110A

PLATECOIL®
PRIME SURFACE
HEAT EXCHANGERS

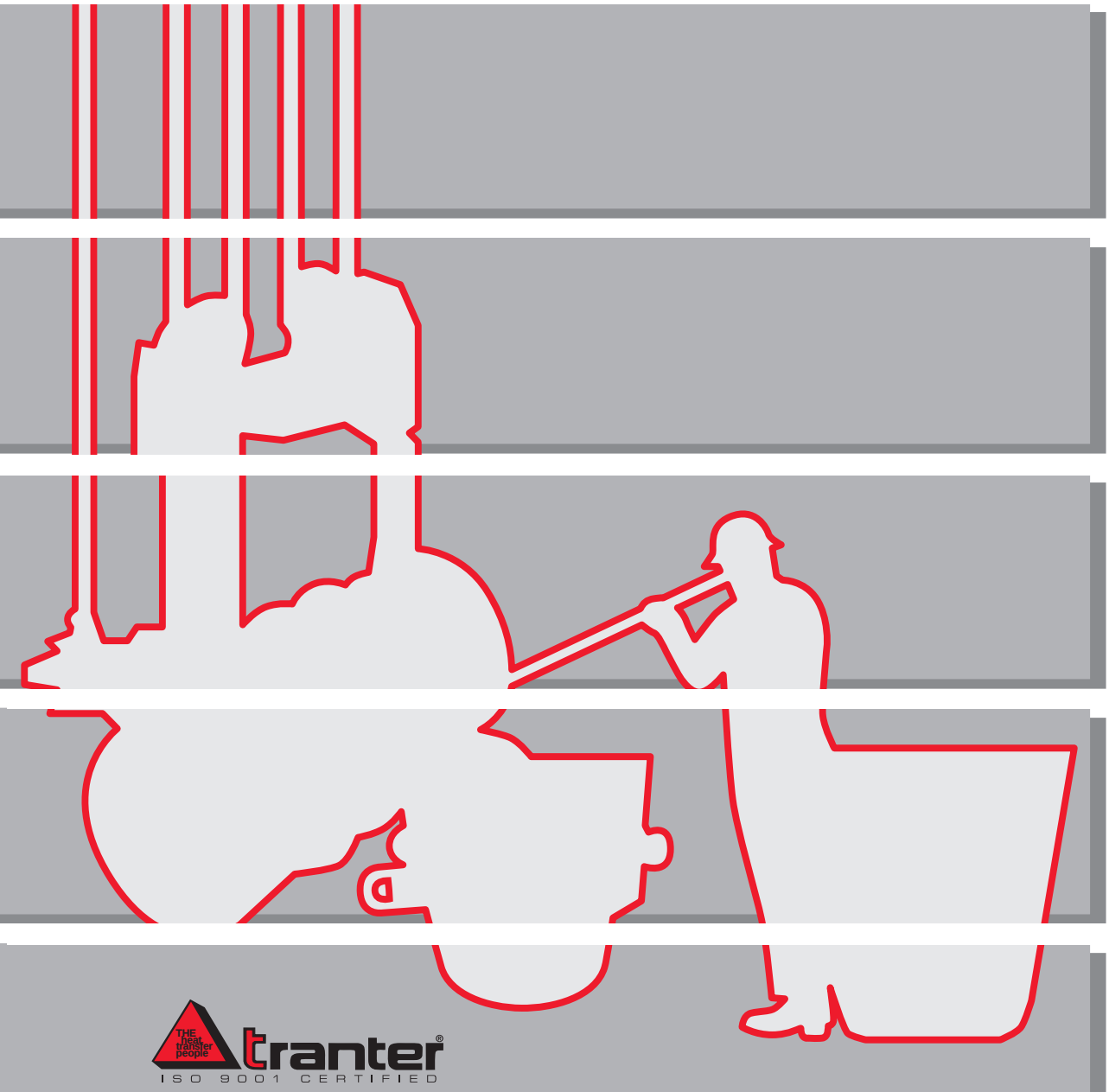


SUPERCHANGER®
PLATE & FRAME
HEAT EXCHANGERS



MAXCHANGER®
ALL-WELDED PLATE
HEAT EXCHANGERS

IN THE BASIC METALS INDUSTRY



THE heat transfer people
Tranter®
ISO 9001 CERTIFIED

TRANTER BRINGS EFFICIENCY AND RELIABILITY TO THE BASIC METALS INDUSTRY

Excellent efficiency and flexibility...optimum heat transfer... minimal maintenance...these are critical needs today in the basic metals industries. Tranter provides these benefits and more, with PLATECOIL, SUPERCHANGER and MAX-CHANGER heat exchangers that are industry standards.

PLATECOIL® PRIME SURFACE HEAT EXCHANGERS

A multitude of design configurations and over 300 different sizes make PLATECOIL units ideally suited for a variety of applications in the basic metals industries. They offer versatility in providing the heating and/or cooling required for various industry applications.

PLATECOIL units are perhaps best known as immersion-type, in-tank or as clamp-on heaters for maintaining product temperatures in tanks. Their use goes far beyond these applications, however, and includes designs for custom-engineered processing equipment.

PLATECOIL units can be fabricated from most weldable metals including carbon steel, stainless steel, titanium, Monel, nickel and various special corrosion-resistant alloys. Surface finishes are available in great variety to minimize fouling and reduce maintenance.

SUPERCHANGER® PLATE & FRAME HEAT EXCHANGERS

Plate and frame heat exchangers provide a more efficient and cost effective means of heat transfer than old, traditional shell-and-tube exchangers. This is particularly true in the basic metals industries.

SUPERCHANGER plate and frame units are the best choice because they give you: (1) higher “U” values typically 3 to 5 times greater than shell-and-tube; (2) a unique turbulent flow design resulting in lower fouling; (3) closer temperature approach capability of less than 2°F, compared to the typical 10°F or higher with shell-and-tube; (4) space savings of 50% to 90% over shell-and-tube; (5) expandability and easy servicing, and (6) immediate availability, since they are made in the U.S.

MAXCHANGER® ALL-WELDED PLATE HEAT EXCHANGERS

Where space is at a premium, or gasket limitations prevent the use of a SUPERCHANGER unit, the compact all-welded MAXCHANGER unit may be the best solution to many basic metal applications.

NOTE: THE DIAGRAMS SHOWN ARE PURPOSELY BRIEF: NO ATTEMPT HAS BEEN MADE TO SHOW ALL THE VALVES, PUMPS, CONTROLS, ETC., THAT MAY BE REQUIRED. IN MOST SYSTEMS, ALL PIPING ACTUALLY IS FROM THE SUPERCHANGER FIXED FRAME. THIS FACILITATES OPENING THE UNITS, WHEN REQUIRED, WITHOUT DISASSEMBLING PIPING.

TYPICAL STEEL MILL INDUSTRY APPLICATIONS

HEATING AND COOLING ELECTROGALVANIZING SOLUTIONS

SUPERCHANGER plate and frame heat exchangers are used very effectively for temperature control of various cleaner, rinse and plating solutions for electrogalvanizing systems. Some solutions require heating with steam for start-up and then cooling with water during operation. The SUPERCHANGER unit handles both of these requirements. For cooling, close temperature approach is readily obtained as needed.

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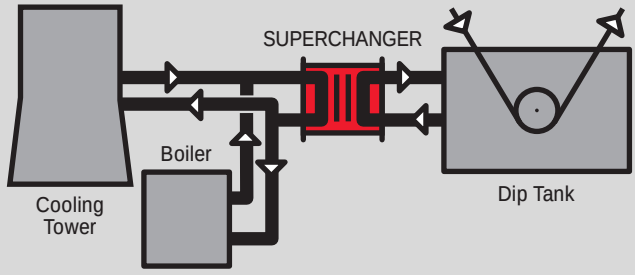

COOLING WATER FOR CONTINUOUS CASTERS

It is quite customary to use intercoolers for continuous caster cooling requirements. SUPERCHANGER units are ideal for these water-to-water duties. This method utilizes a closed loop water circuit through the equipment jackets to avoid plugging and corrosion by the usual cooling waters. Typical cooling requirements are for mold water, spray water, bearing water, bending roll water and electromagnetic stirrer induction coil water. When seawater or brackish water is the preferred coolant, titanium plates provide long, trouble-free service life. With titanium there is no fear of erosion problems due to high coolant velocities, as is the case with cupro nickel tubes in shell-and-tube exchangers.

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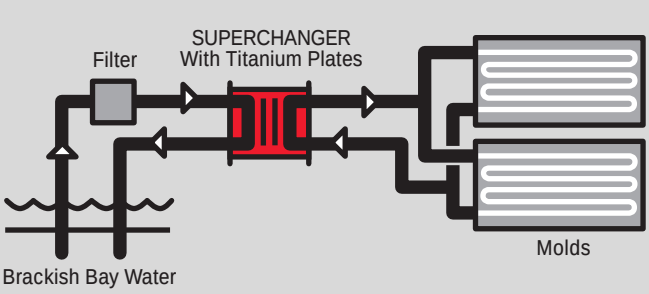

COOLING AMMONIA LIQUOR AT COKE PLANTS

The flow chart describes the process whereby a liquor is recirculated to remove ammonia, tars, naphthalene and other impurities from coke oven gas. The liquor requires cooling and SUPERCHANGER plate and frame heat exchangers perform admirably in this service. Titanium plates are used for brackish or salt water; otherwise, stainless plates are customary.

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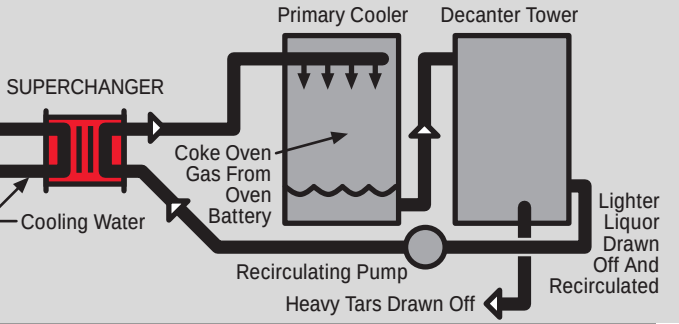

ADDITIONAL STEEL MILL APPLICATIONS

a. Cooling soluble oils for rolling mill use.
b. Heating various fuel oil, tar, etc., storage tanks.
c. Heating water and water storage tanks with steam.
d. Interchangers in dirty cooling water streams so that clean, closed loop water can be circulated through BOF hoods, lances, blast furnace bosch and tuyere coolers, etc.
e. Cooling or regenerative cooling of wash oil at coke plants.
f. Cooling or regenerative cooling of MEA (amines).
g. Cooling quench oil.
h. Heating shower water, etc., with steam.
i. Heating lube oil with steam for cold starts.
j. Cooling water for submerged ash removal applications.

TYPICAL ALUMINUM MILL APPLICATIONS

COOLING WATER BASE ROLLING MILL COOLANTS

The reduction of aluminum by rolling develops friction which heats the rolls and the work. Soluble oil, water base coolants are sprayed on the rolls to maintain proper temperatures. SUPERCHANGER plate and frame heat exchangers are widely used for cooling these various recirculated coolants. This is a major application with excellent heat transfer rates. The intermixing which frequently occurs with shell-and-tube heat exchangers is eliminated by the SUPERCHANGER plate and frame design. The compact size of the units also makes them ideal for these applications.

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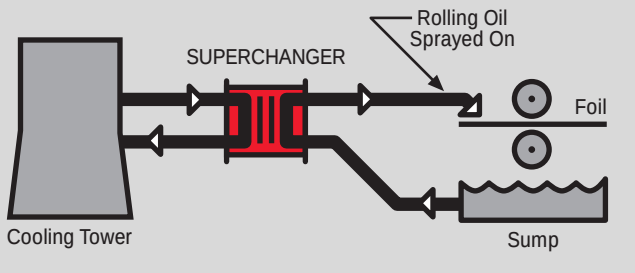

HEAT RECOVERY FROM COMPRESSOR OIL

More and more SUPERCHANGER heat exchangers are used for heat recovery while also performing a necessary cooling function. In this case, the heat from the compressor oil pre-heats water. This, in turn, reduces the load on the boiler and reduces energy costs. There are numerous variations to this approach which result in a payback situation, rather than an operating expense.

ADDITIONAL ALUMINUM MILL APPLICATIONS

a. Cooling wire-drawing oil with water.
b. Heating and/or cooling various water base coolants alternately as needed in a single exchanger.

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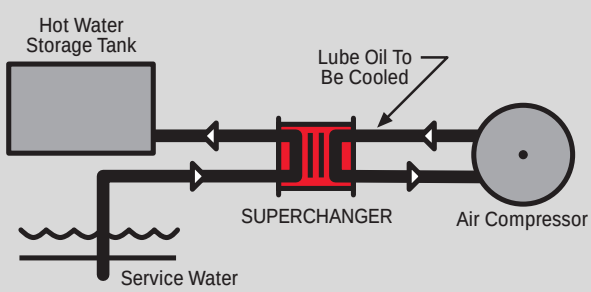

TYPICAL COPPER MILL APPLICATIONS

REGENERATIVE HEATING OF ELECTROLYTE

The system shown uses a SUPERCHANGER heat exchanger to heat incoming cold electrolyte for the electrowinning process. This is an extremely efficient system. The SUPER-CHANGER design has optimum performance characteristics for watery solution-to-watery solution streams. This system previously used a shell-and-tube exchanger with steam to heat the electrolyte. That exchanger was not efficiently adaptable to liquid-to-liquid service.

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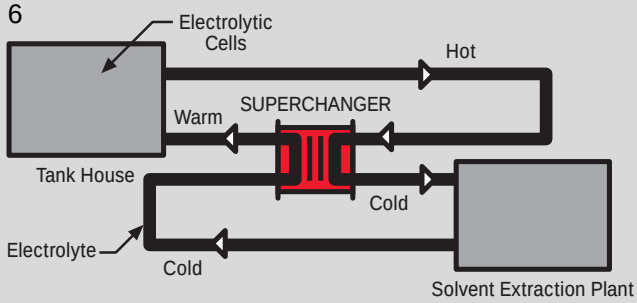

COOLING SOLUBLE OIL FOR ROD MILLS

Water coolant, with approximately 3% soluble oil, is sprayed onto the copper bars being rolled, cleaning the rod surface as well as cooling it. The SUPERCHANGER plate and frame heat exchanger is fast replacing shell-and-tube exchangers in these applications because intermixing is eliminated. A similar application involves 3-5% solution of alcohol and water. This acts as a pickling solution and is sprayed onto the hot finished rod to remove scale.

ADDITIONAL COPPER MILL APPLICATIONS

a. Heating electrolyte with steam.
b. Cooling condensate by heating make-up water.
c. Cooling closed loop water for cooling converter doors, etc.

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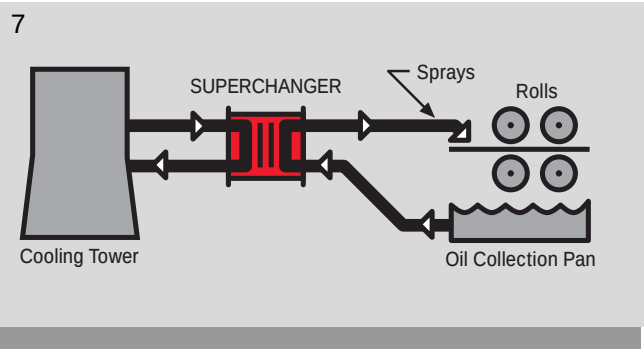

UNIVERSAL APPLICATIONS

LUBE OIL COOLERS

SUPERCHANGER plate and frame heat exchangers are ideal for cooling applications; thousands are in use for many such duties. Typical examples include Morg oil cooling, compressor lube oil cooling, turbo oil cooling, gear box oil cooling, etc. The SUPERCHANGER design is favored because it requires less maintenance and no intermixing of fluids.

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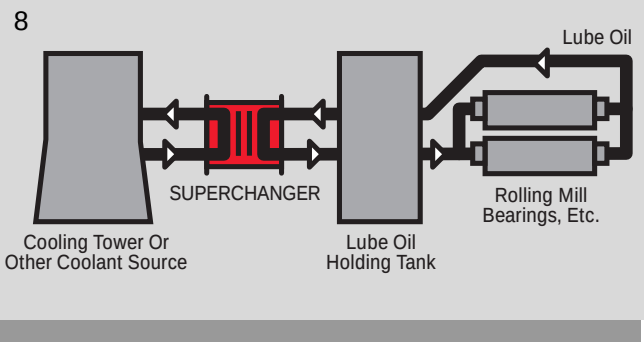

UNIVERSAL APPLICATIONS

HYDRAULIC OIL COOLERS

Various types of machinery in basic metal mills use hydraulic systems and the oil requires cooling during operation. Walking beam furnaces in steel mills are but one example. The high “U” values obtained with SUPERCHANGER units and their relative small space requirements are advantages. Lake water is but one of many coolants that can be used.

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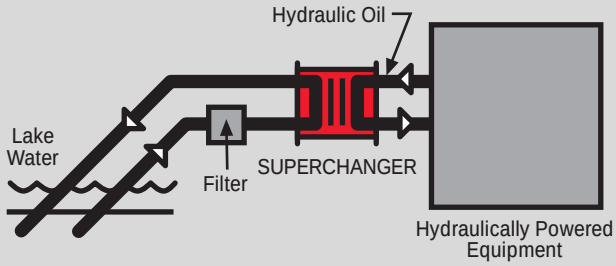

HEAT RECOVERY FROM HOT WASTE LIQUIDS

Various hot waste streams can be passed through SUPERCHANGER units to recover heat and thereby preheat boiler feedwater or process water as needed. Cooling condensate is also a common heat source. Payback for SUPERCHANGER heat exchangers in heat recovery applications is generally less than a year due to the plate and frame design’s high “U” values and close temperature approach. In addition to recovering heat, this method is often helpful in meeting maximum allowable temperature requirements of discharged fluids.

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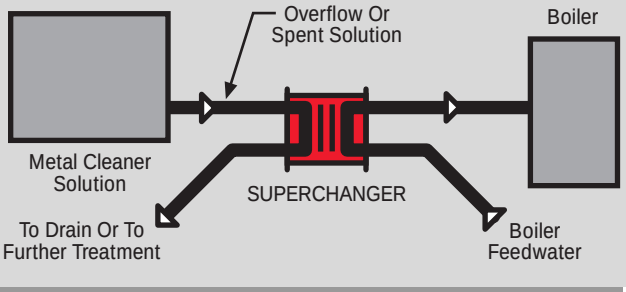

SUPERCHANGER APPLICATIONS FOR OTHER BASIC METALS

GOLD

a. Regenerative heating and cooling of sodium hydroxide, sodium cyanide strip solutions. The hot solution strips the gold out of a carbon bed in a pressure vessel, then the gold is plated out of the cold solution.
b. Cooling strip solutions with water.
c. Cooling 10% sodium hydroxide kiln scrubber solution. The outgases from the kiln contain mercury which is removed by the scrubber solution. The kiln regenerates the carbon used in the stripping process.

MAGNESIUM

a. Cooling a salt brine solution with water.
b. Cooling closed loop water for cooling a furnace head.

MOLYBDENUM

a. Cooling mine water with glycol solution.
b. Cooling sodium solution with water.

NICKEL

a. Intercooler to cool closed loop cooling water with pond water.
b. Cool demineralized water for special processes with cooling water.
c. Heating glycol solutions which are used to avoid winter freeze-ups.
d. Cooling bearing seal water.

ZINC

a. Heat recovery to process water from thickener overflow.

URANIUM

a. Cooling 45% sulfuric acid to remove the heat of dilution when water is added to 94% acid. The diluted acid is used for leaching the uranium from the ore.

SUPERCHANGER OUTPERFORMS SHELL-AND-TUBE

SUPERCHANGER heat exchangers require much less space than shell-and-tube units. They can pack greater than 20,000 sq. ft. of super efficient heat transfer surface in a single unit with flow rates up to 25,400 gpm. They provide greater flexibility; are more easily cleaned; experience much less fouling; have no interleakage; are lighter in weight; and cost less.

Most importantly, however, SUPERCHANGER units do a more efficient job of transferring heat in most applications, due in large measure to the turbulent flow created by the corrugated patterns of their plates.

For a side-by-side comparison between SUPERCHANGER plate and frame heat exchangers and shell-and-tube exchangers, the charts below show the difference in dimensions and comparative performance data for two units in an identical application.

SUPERCHANGER® PLATE AND FRAME HEAT EXCHANGER	SHELL-AND-TUBE HEAT EXCHANGER
■ High efficiency—"U" values 3 to 5 times greater than shell-and-tube; often greater than 1,000 Btu/ft.^{2} hr.°F	■ Low efficiency
■ Uses only 10% to 50% of shell-and-tube space	■ Needs twice as much space to pull tube bundle
■ Easy disassembly—just loosen bolts	■ Complex disassembly—tube bundle must be pulled
■ Lower cost when stainless steel or higher grade of material is required	■ Higher cost except in all carbon steel construction
■ Low fouling due to corrugations and inherent turbulence	■ High fouling due to circular cross-section and channeling—approximately 10 times greater
■ Variable heat transfer surface—plates easily added or removed	■ Fixed surface only
■ Low weight—typically 1/6th of shell-and-tube	■ High weight—up to 6 times that of plate and frame
■ Intermix between fluids impossible due to gasket design	■ Fluids can intermix, both at welds and at tube sheet
■ Inspection—simply disassemble and inspect	■ Inspection difficult—must usually pull tube bundle
■ Excellent chemical cleaning due to corrugations/turbulence	■ Satisfactory chemical cleaning but must be cautious of dead spots
■ Maximum viscosity—30,000 cps Nominal	■ Maximum viscosity—10,000 cps
■ Pressure drop—low to medium	■ Pressure drop—low to medium
■ Practically no heat loss—no insulation required	■ Great amount of heat loss—insulation required
■ Can be designed for less than 2°F temperature approach with more than 90% heat recovery attainable	■ Typically only a 5°F to 10°F minimum temperature approach can be achieved
■ Computer custom-designed sizing per application	■ Computer designed, but must always be oversized to be safe
■ Low internal volume—10% to 20% of shell-and-tube	■ Very high internal volume
■ Multiple duties possible with connecting frames	■ One unit required for each duty

TYPICAL UNITS DESIGNED FOR THE SAME HEAT TRANSFER CONDITIONS

ITEM	SUPERCHANGER	SHELL-AND-TUBE
Surface Area	1,000 sq. ft.	3,000 sq. ft.
Total Length Required	86"	157"
Width	32" Diameter	30" Diameter
Height	84"	42"
Gross Volume	18 ft.^{3}	116 ft.^{3}
Net Weight	1,600 lbs.	6,000 lbs.

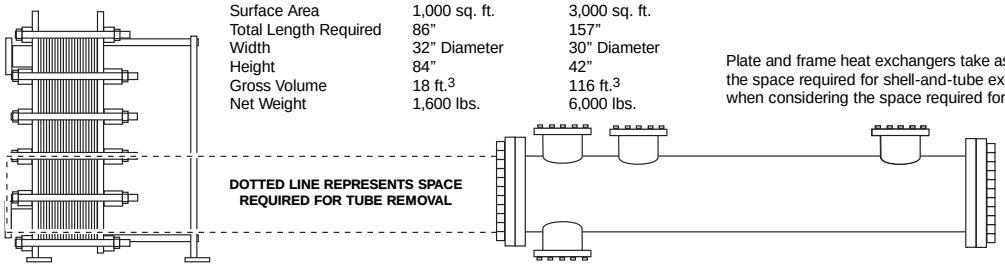

Plate and frame heat exchangers take as little as one-tenth the space required for shell-and-tube exchangers, particularly when considering the space required for tube removal.

REPRESENTED BY:

For further information on PLATECOIL prime surface heat exchangers and SUPERCHANGER plate and frame heat exchangers, contact:
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