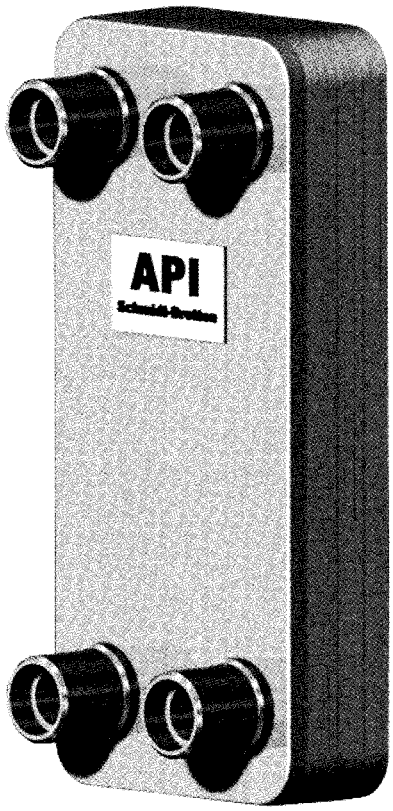
API Heat Transfer



Schmidt

SB Series Brazed Plate
Heat Exchanger
Installation Manual

Exploded view of Schmidt SB Brazed Plate Heat Exchanger.

WARNING

Before proceeding with installation and operation read entire manual carefully. Failure to do so can cause injury or property damage.

Table of Contents

Product Information

Description

API Schmidt-Bretten SB brazed plate heat exchangers are designed with up to 150 plates - embossed plates of corrosion resistant stainless steel. The plates are brazed together, with every other plate inverted to create contact points between all of the plates. When these points are vacuum brazed together a compact and pressure resistant heat exchanger is formed in which virtually all the material is utilized for heat transfer.

Thermal Efficiency

The flow pattern produces very high fluid turbulence to increase the effective heat transfer rate. The fluids are in true counter-current flow, resulting in the largest possible temperature difference between the fluids and superior heat transfer rates across the stainless steel plates. Counter-current flow also allows very close approach temperatures between the two circuits. A fluid can be cooled or heated to within just a few degrees of the other fluid. There is no outer shell, as in traditional shell and tube equipment, so virtually the entire heat exchanger is heat transfer surface. This results in extraordinary thermal and economic efficiency.

Corrosion Free Duty

The plates and nozzles are made of stainless steel, known for very high corrosion resistance. It is the same material used in sanitary, food processing and medical applications. The plates are high vacuum induction brazed with 99.9% pure copper. This produces high strength and very low corrosion potential.

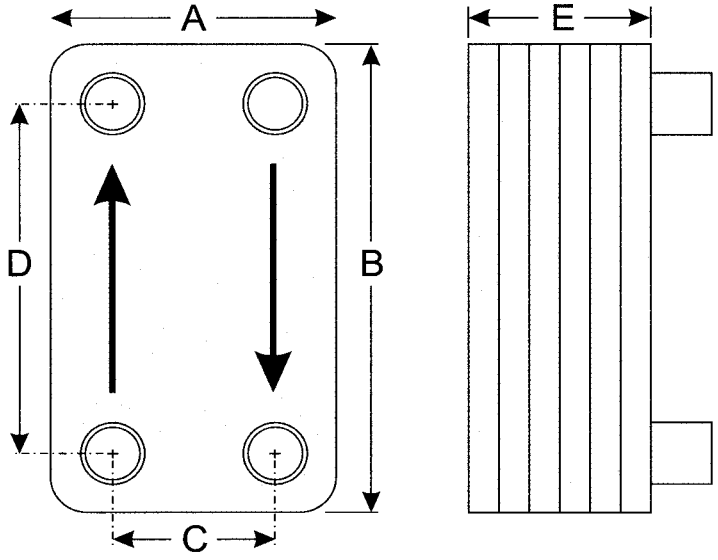
Low Fouling

The SB brazed plate heat exchanger operates with high fluid turbulence which exhibits a scouring action as it impinges against the heat transfer plates. Turbulence inhibits the production of scale from minerals precipitating out of solution.

Common Applications

- Steam heating of process liquids
- Steam to water heating for district heating and other HVAC applications
- Heat recovery, due to the close-approach capability between the fluids
- Industrial process cooling or heating of fluids and gases
- Refrigerant gas evaporating or condensing
- Hydraulic oil cooling (can be designed to use less cooling water)
- Lube oil cooling of machinery

Technical Data, Dimensions



API Model Type			Dimensions					Max Number of Plates	Surface per Plate (sq. ft.)	Max Flow (gpm)	Weight Empty (lbs)
			A	B	C	D	E				
SB1	SBN1		2.87	8.00	1.57	6.69	0.3+0.09N	40	0.15	20	1.54+0.11N
SB2	SBN2		3.50	9.06	1.69	7.19	0.47+0.09N	50	0.193	50	2.42+0.13N
SB22	SBN22		3.50	12.80	1.69	10.98	0.47+0.09N	100	0.274	50	3.14+0.18N
SB24	SBN24		3.50	18.15	1.69	16.34	0.47+0.09N	60	0.366	50	4.20+0.31N
SB3	SBN3		4.88	6.73	2.88	4.72	0.51+0.09N	100	0.193	75	2.64+0.13N
SB4	SBN4	SBE4	4.88	13.07	2.88	11.06	0.51+0.09N	110	0.377	75	3.52+0.29N
SBD4			4.88	13.07	2.88	11.06	0.51+0.094N	110	0.377	75	3.52+0.37N
SB5	SBN5	SBE5	4.88	20.83	2.88	18.81	0.51+0.094N	130	0.634	75	4.41+0.53N
SBD5			4.88	20.83	2.88	18.81	0.51+0.094N	130	0.634	75	4.41+0.59N
SB7	SBN7	SBE7	10.59	20.83	7.88	18.11	0.53+0.095N	200	1.453	175	21.2+1.2N
SB8	SBE8		10.59	20.83	6.34	16.57	0.53+0.095N	200	1.4	282	22.1+1.2N
SB9	SBE9		10.59	31.42	6.34	27.17	0.53+0.095N	300	2.15	300	25.4+1.8N
SB10	SBE10		15.08	34.25	9.33	28.46	0.91+0.095N	300	3.23	850	87.1+2.8N

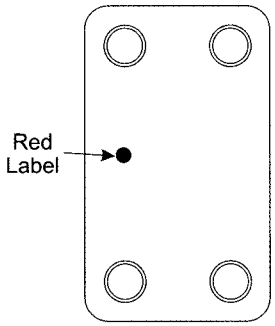
API Model Type			Dimensions					Max Number of Plates	Surface per Plate (sq. m.)	Max Flow (m^3/h)	Weight Empty (Kg)
			A	B	C	D	E				
SB1	SBN1		73	203	40	170	7.0+2.3N	40	0.014	20	0.7+0.05N
SB2	SBN2		89	230	43	182	12.0+2.3N	50	0.018	50	1.1+0.06N
SB22	SBN22		89	325	43	279	12.0+2.3N	100	0.025	50	1.3+0.08N
SB24	SBN24		89	461	43	415	12.0+2.3N	60	0.034	50	2.04+0.14N
SB3	SBN3		124	171	73	120	13.0+2.3N	100	0.018	75	1.2+0.06N
SB4	SBN4	SBE4	124	332	73	281	13.0+2.3N	110	0.035	75	1.6+0.13N
SBD4			124	332	73	281	13.0+2.4N	110	0.035	75	1.6+0.17N
SB5	SBN5	SBE5	124	529	73	478	13.0+2.4N	130	0.059	75	2.0+0.24N
SBD5			124	529	73	478	13.0+2.4N	130	0.059	75	2.0+0.27N
SB7	SBN7	SBE7	269	529	200	460	13.5+2.4N	200	0.135	175	9.6+0.54N
SB8	SBE8		269	529	161	421	13.5+2.4N	200	0.13	282	10.0+0.54N
SB9	SBE9		269	798	161	690	13.5+2.4N	300	0.2	300	11.5+0.8N
SB10	SBE10		383	870	237	723	23+2.4N	300	0.3	850	39.5+1.25N

Installation Guide

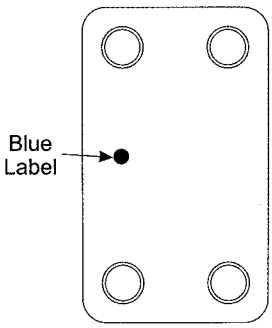
API Schmidt-Bretten Heat Exchangers should be installed so that there is sufficient space around each unit to perform maintenance.

Mounting Positions

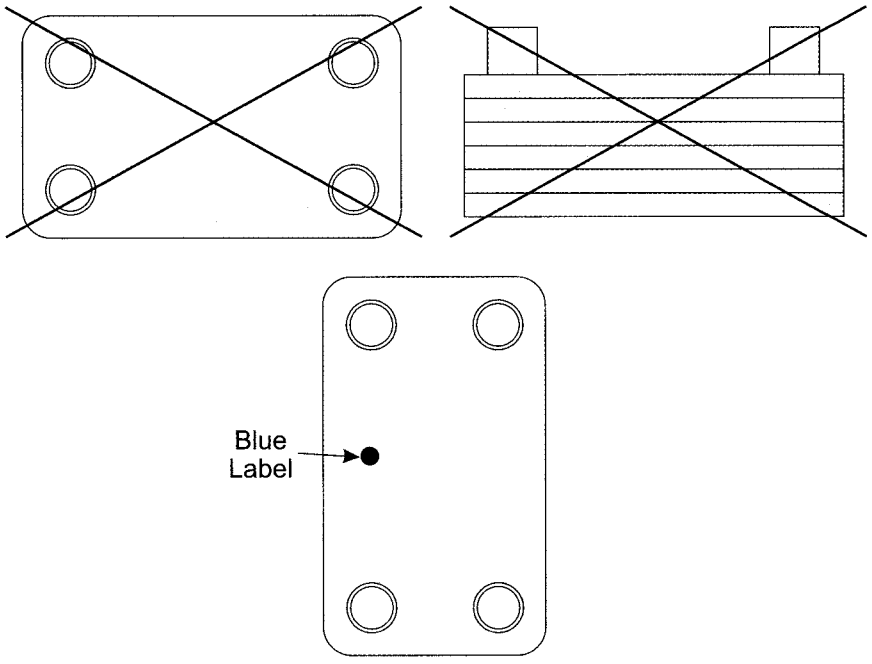
Heating Applications - The primary side is indicated by a RED label. For heating applications, the heat exchanger can be mounted in any position. However, for any position other than vertical, a loss in performance is possible.



Refrigeration Applications - The refrigerant side is indicated by a BLUE label. In evaporating and condensing applications, install the heat exchanger in a vertical position to optimize it's performance.



Recommended Position for Refrigerant Applications



Bracket Mounting and Vibration Isolation

It is preferable for the heat exchanger to be supported by a bracket or mounted onto a console. Do not support the unit by the fittings. All items should be supported independently. Transmitted vibrations and pulsations should be minimized by installing a vibration isolator in the fluid lines and by installing a rubber buffer pad between the heat exchanger and its mounting surface.

WARNING

The heat exchanger may have sharp edges. Exercise caution when handling.

Piping Connections

Connections to the heat exchanger are identified by a color label.

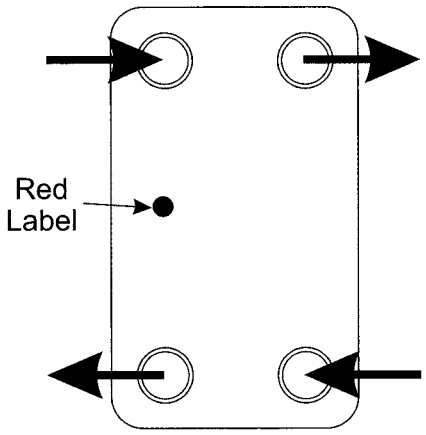
Red Label - primary side in heating systems: hot inlet/outlet
Blue Label - primary side in refrigeration applications: refrigerant inlet/outlet

Counter-Flow Piping

Standard heating connections are NPT threaded.

Standard refrigerant connections are ODF solder ports.

All connections are on the front side except for two-circuit refrigerant designs where water connections are on the back side.



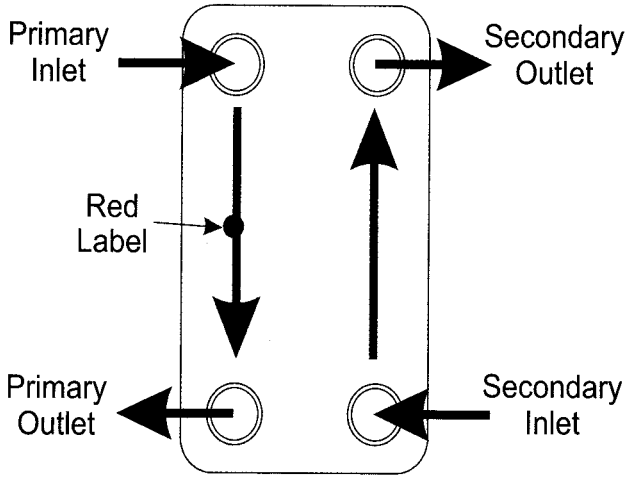
Optional Connections

Brazed plate heat exchangers can be supplied with sets of unions, brass unions with external thread or inner solder, steel unions for welding.

Typical Piping Configurations

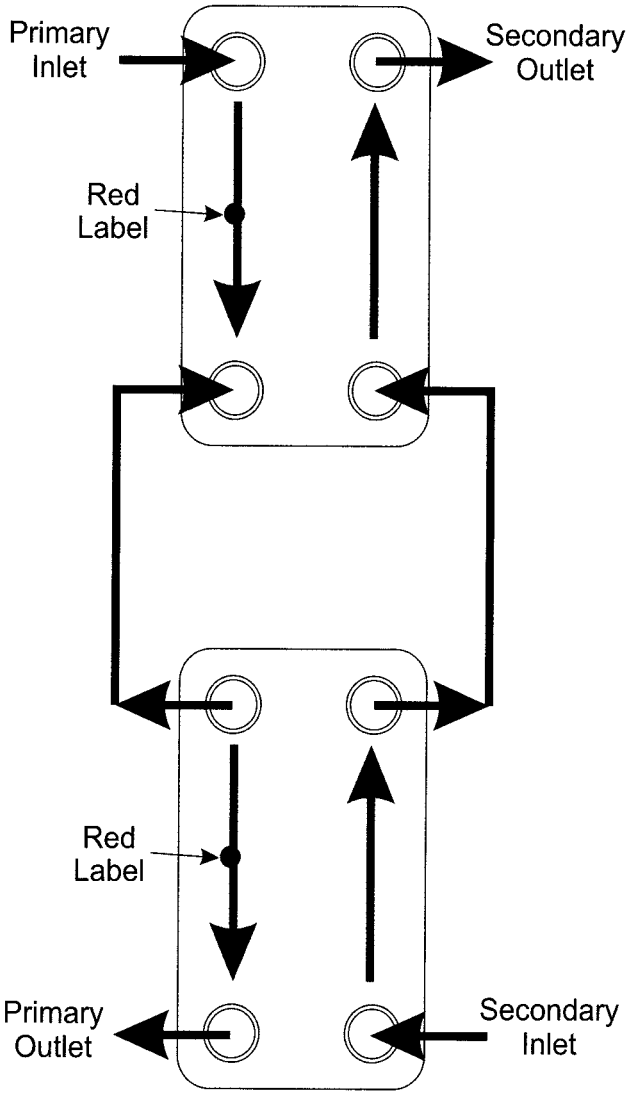
Heating Application

The primary side liquid/gas enters at the top of the left side as indicated by the red label and exits at the bottom. To acheive optimum performance, pipe the secondary circuit in counter-flow with the liquid entering at the bottom and leaving at the top of the heat exchanger.



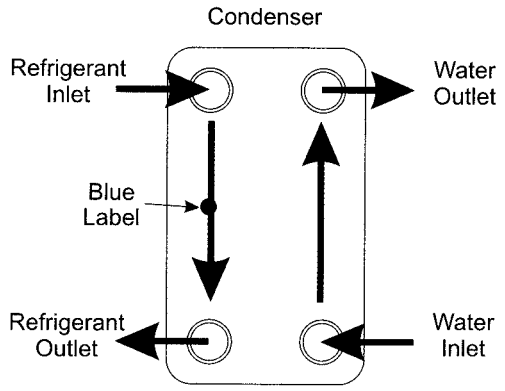
Series Connections

Thermal length is a term that refers to the addition of heat transfer surface while preserving the internal fluid velocity to maximize the effective heat transfer rate.



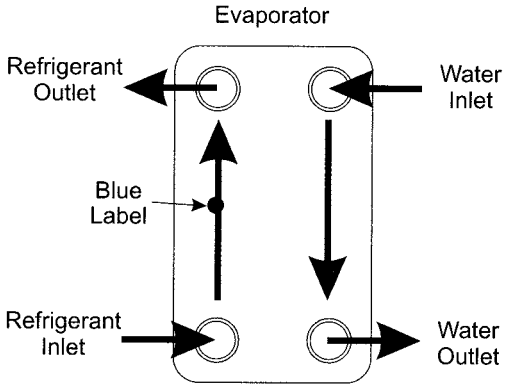
Refrigerant Condenser

The refrigerant gas enters at the top and the condensate (liquid) exits at the bottom. To acheive optimum performance, pipe the water circuit in counter-flow with the water entering at the bottom and leaving at the top of the heat exchanger.



Refrigerant Evaporator

The refrigerant liquid/gas mixture enters at the bottom on the left side as indicated by the blue label and exits at the top as a vapor.



Soldering and Welding Connections

Soldering

The temperature of the brazing or welding process must not exceed the melting point of the internal brazing material. Use a wet towel around the connection and the plate pack to reduce the amount of heat transmitted to the pack during installation.

1. Clean the soldering assembly surface at the copper tube and heat exchanger connections.
    - Remove oil or other buildup with a degreasing agent.
    - Polish the surfaces to remove oxide.
2. Apply the flux to the surface with a brush to remove and prevent oxidation.
3. For refrigerant applications, use dry nitrogen gas on the refrigerant side.
4. Heat the soldering area to the soldering temperature, about 1,200°F. Temperatures above this can melt the SB brazing materials and result in damage.
5. Keep the tube in a fixed position and apply the filler material.

Welding

1. Prepare the edge of the tube for welding with a 30° angle.
2. Place the piping into the connection.
3. TIG or MIG weld the tube into the connection, filling the groove formed by the two edges. This method minimizes the heat zone.

Maintenance

Start-Up and Shut-Down Procedures

- **Start-Up Venting** - During the filling process, the unit must be vented to eliminate any trapped air. This will assure proper performance and longevity of the unit.
- **Shut Down** - The two sides should be shut down slowly and simultaneously. If this is not possible the hot side should be shut down first. If the unit is shut down for an extended period of time, it must be drained and cleaned. This is especially true if there is a risk of frost or if there is the presence of any aggressive media inside the heat exchanger.

Fouling and Cleaning

Different factors may effect fouling such as fluid velocity, turbulence, flow distribution, surface finish and water quality. Proper maintenance and adequate water treatment can help reduce fouling. Properly sized strainers should be installed where particles are known to exist. Strainers with a mesh size of 16-20 will retain any particles over 0.04" in size.

In installations where high calcium hardness or fluid contamination is expected, the heat exchanger should be cleaned periodically by flushing, back-flushing and cleaning the strainers. Following are descriptions for two types of fouling:

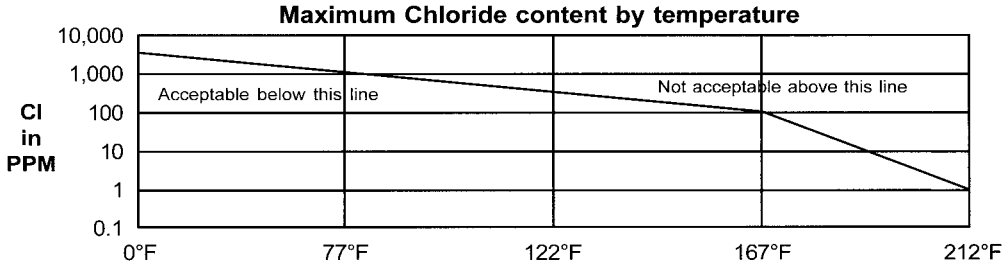
Scaling Deposits of calcium on the heat transfer surface. This effect increases with temperatures higher than 140°F, concentration, and pH level. Assuring a turbulent flow and lower temperature can help reduce this effect.

Particulate Solids in suspension in the heat transfer media. Particulate fouling can be influenced by velocity and media flow, roughness of the surface and physical size of the particles.

Corrosion Resistance

Corrosion is a complex process influenced by a number of factors. The chart and table below show the resistance of AISI 316 Stainless Steel and Copper against the most common chemicals:

Iron < 1.5 ppm
Ammonia < 2ppm
Sulphide < 0 ppm
Free Carbon Acid < 20 ppm
Sulfate < 50 ppm
pH-Value - 6 - 9
Mangan < .05 ppm
Nitrate < 100 ppm
Chlorides - See Below



Application Submittal Form

Job:	*Date:*
Engineer:	*Submitted By:*
Contractor:	*Approved By:*

Product Description

API Schmidt-Bretten brazed plate heat exchangers consist of as many as 150 pattern embossed stainless steel plates. The plates are brazed together with every other plate turned 180° to create flow channels with two mediums in counter-current direction. The design of the plates creates a high fluid turbulence resulting in outstanding heat transfer rates. The result is a highly efficient heat exchanger that utilizes all of the material in the heat transfer process.

Materials of Construction

Plates ..... AISI316L Stainless Steel
Brazing Materials ..... Copper (99.9% pure) or Nickel (optional)
Connections ..... Stainless Steel

Operating Conditions

Max Working Pressure ..... 450 psi for Copper, 380 psi for Nickel
Max Working Temperature ..... 365°F
Minimum Working Temperature ..... -148°F

PRODUCT SELECTION DATA

		Side One	Side Two
Medium	(Water, Glycol, Oil, etc.)	_____	_____
Concentration	(Percent)	_____	_____
State of Fluid	(Vapor or Liquid) (Degrees F)	_____	_____
Inlet Temp	(Degrees F)	_____	_____
Outlet Temp	(Degrees F)	_____	_____
Mass Flow Rate	(gpm)	_____	_____
Max Pressure Drop	(psi)	_____	_____
Total Heat Transfer	(BTUH)	_____	_____

API Heat Transfer

API Heat Transfer Inc.
2777 Walden Avenue
Buffalo, New York 14225
(716) 684-6700
www.apiheattransfer.com

Divisions:

API Airtech *ISO-9001 Certified*
Air Cooled Aluminum Heat Exchangers
91 North Street • P.O. Box 68
Arcade, New York 14009-0068
(585) 496-5755 • Fax: (585) 496-5776

API Basco *ISO-9001 Certified*
Basco®/Whitlock® Shell & Tube Heat Exchangers
2777 Walden Avenue
Buffalo, New York 14225
(716) 684-6700 • Fax: (716) 684-2129

API Schmidt-Bretten Americas
Plate Heat Exchangers and Thermal Systems
2777 Walden Avenue
Buffalo, New York 14225
(716) 684-6700 • Fax: (716) 684-2129

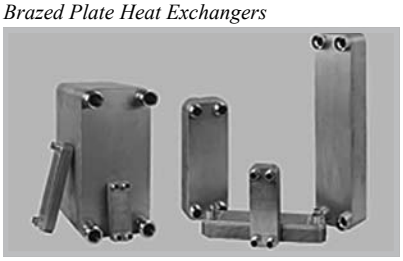
API Schmidt-Bretten GmbH & Co. KG
ISO-9001 Certified
Plate Heat Exchangers and Thermal Systems
Langenmorgen 4
D-75015 Bretten, Germany
(49)725253-0 • Fax: (49)725253-200

API Heat Transfer (Suzhou) Co., Ltd.
Air Cooled Aluminum Heat Exchangers
Shell & Tube Heat Exchangers
Plate Heat Exchangers
156 Qingqiu Street, 3rd District
Suzhou Industrial Park
Suzhou, Jiangsu 215126 China
(86)512-88168000 • Fax: (86)512-88168003

Contact your local API Sales Representative or API Heat Transfer directly
toll-free: 1-877-API-HEAT
e-mail: sales@apiheattransfer.com

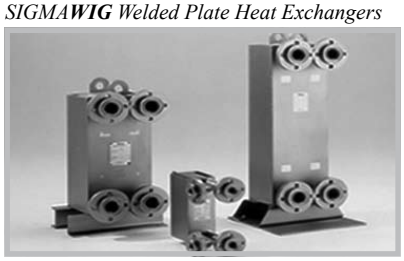
Other Products Available from API Heat Transfer

Brazed Plate Heat Exchangers



Off-the-shelf, standard units reflects the latest in plate heat exchanger technology for maximum performance and low cost. Ideal for OEM or aftermarket applications. Many Models stocked and ready to ship. Models for process or refrigeration applications.

*SIGMA**WIG** Welded Plate Heat Exchangers*



Fully welded and require no gaskets. Available in all 316SS construction, titanium and other higher alloy materials. These units have a design temperature of 750°F and can handle operating pressures as high as 360 psi with an ASME Code stamp.

Hubbed Shell and Tube Heat Exchangers

Straight or U-tube, fixed or removable tubesheet general purpose exchangers designed to cool oil, water, compressed air and other industrial fluids. A variety of port configurations and materials are available. Diameters from 3" (7.62 cm) to 12" (30.48 cm).

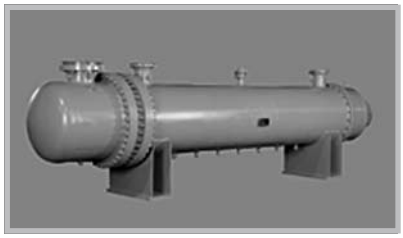
*SIGMA**STAR**® Evaporator Systems*

Utilizing the SIGMA**STAR**® plate, this evaporator system is designed to remove water or other solvents, while concentrating solutions. SIGMA**STAR**® Systems can be pre-assembled and pre-tested prior to shipment for quick and easy start up.

OptiDesign®

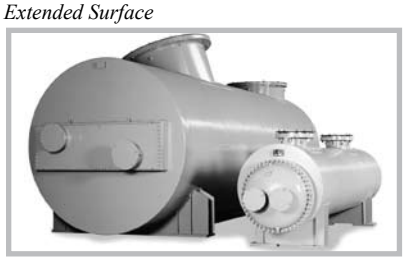
Straight-tube, removable bundle exchangers made from standard components. Floating tube sheet for seal leak detection and easy maintenance. Diameters from 3" (7.62 cm) to 42" (106.68 cm). ASME, API, TEMA, ABS and other codes available.

TEMA Shell and Tube



A wide variety of TEMA types are available using pre-engineered or custom designs in various sizes and materials. Shell diameters from 6" (15.24 cm) to 60" (152.4 cm), ASME, TEMA, API, ABS, TUV, PED and other code constructions available.

Extended Surface



Unique, patented plate-fin design for centrifugal or axial compressor intercooler and aftercooler applications and minimal pressure loss. Design eliminates separators. ASME code design is standard. Diameters from 20" (50.8 cm) to 120" (304.8 cm).

Air-Cooled Heat Exchangers

High efficiency, brazed aluminum coolers for cooling a wide variety of liquids and gases with ambient air. Lightweight, yet rugged. Capable of cooling multiple fluids in single unit. Models can be supplied with cooling fan and a variety of drives.

Form SBCBE 8/07

Printed in USA