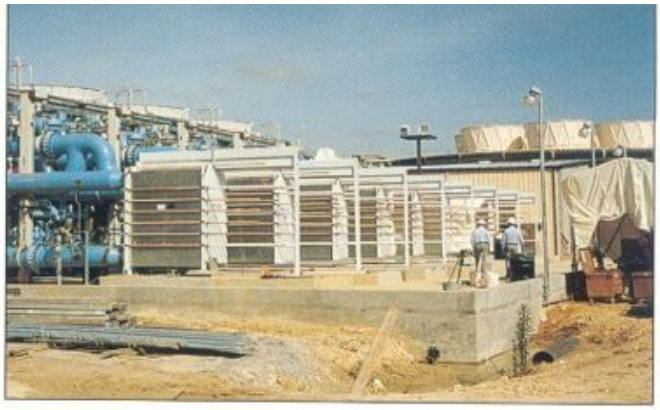
Alfa Laval

Alfa Laval Thermal

HIGH PERFORMANCE

Plate Heat Exchangers

Alfa Laval Thermal: The World Leader In Heat Exchanger Technology



Eight plate heat exchangers and strainers cool service water at Gulf States River Bend nuclear station.

The Plate heat exchanger consists of a series of thin, corrugated alloy plates, which are gasketed and compressed together in a carbon steel frame to create an arrangement of parallel flow channels. Ports at each corner of the plates act as the headers and the gaskets direct the fluid flow as well as provide the primary seal for the system. One fluid travels in the odd numbered channels and the second in the even.

A Superior Alternative To Shell And Tube

Alfa Laval plate heat exchangers are ideal for applications up to 350°F and 400 Psig. Economically priced at a fraction of other exchanger types, they also offer: smaller footprint, lighter weight, lower fouling, and easier access for cleaning—all important considerations.

Mechanical problems associated with shell and tube exchangers such as vibration and cracked tubes are eliminated with Alfa Laval plate heat exchangers.

Also, when your production needs change, instead of adding new shells, plate heat exchangers can be reconfigured. It's flexibility saves time and money.

Alfa Laval Thermal: A Century Of Technology Leadership

With over a century of experience, Alfa Laval Thermal is a world leader in heat exchanger technology. Headquartered in Richmond, Virginia, Alfa Laval is part of the Tetra Laval Group.

Continuous innovation by Alfa Laval in areas of sealing, pressing, strength and efficiency, have allowed our exchangers to be used in over 50,000 applications worldwide.

Alfa Laval Thermal holds more than 130 patents in heat exchanger design. Innovations include the first graphite plate and the first double-wall plate heat exchanger. With five plate pressing facilities, numerous service and support centers, and the industry's most extensive R&D program, Alfa Laval is the largest and most service oriented manufacturer of plate heat exchangers.

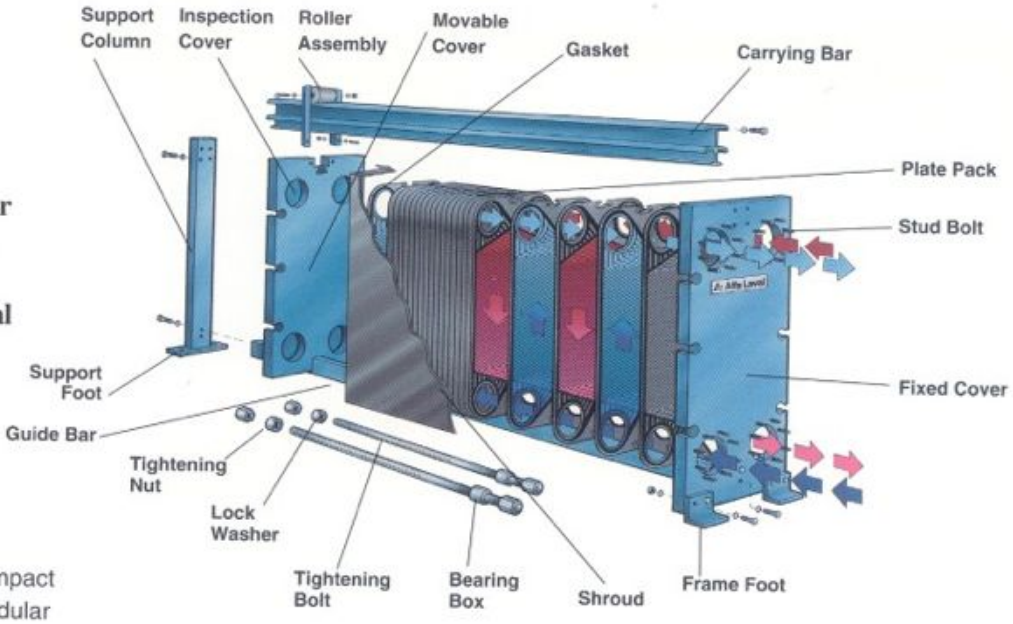
Alfa Laval introduced plate heat exchangers in the 1930's. Today, Alfa Laval offers the most advanced and highest performance plate heat exchangers by continually refining the design with new patented technological improvements.

Thicker frame covers and fewer tightening bolts are characteristic of today's Alfa Laval plate heat exchanger.

Reinforcements or "dog bones" are indicative of obsolete plate heat exchanger designs.

7 Important Reasons...

Why You Should Consider Specifying An Alfa Laval Plate Heat Exchanger Instead Of A Conventional Shell And Tube Unit



■ Lower Capital Cost

- Up to 90% less cost
- Less heat transfer surface, more efficient
- Less support/foundation, compact
- Less complicated piping, modular
- Higher heat transfer rates

■ Lower Maintenance Cost

- Less labor, and service time
- No extra equipment is required
- Easy access for inspection and repairs
- Low fouling

■ Reduced Costs For Cooling Fluid

- Less cooling water required
- Can handle poor quality water
- Reduced piping and valve costs
- Reduced pumping costs

■ Modular Design

- Easy duty adjustment/ add or remove plates
- Increased flexibility/ no welds to cut
- Can handle a variety of processes
- Can be assembled or dissassembled on site

■ Compact Size

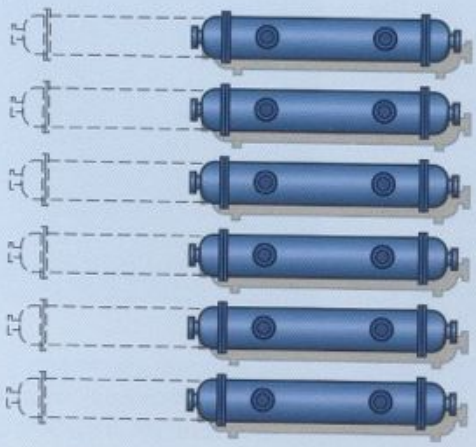
- Less weight
- Less floor space
- Ideal for debottlenecking
- Ideal for skid mounting

■ Lower Hold-Up Volume

- 80-90% less hold-up volume
- More precise process control
- Lower weight
- Easier drainage

■ Closer Temperature Approach

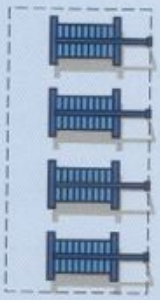
- Up to 2°F economical approach
- Process improvements
- Maximize heat recovery



Space And Weight Comparison: PHE's vs. S&T's For Identical Duties

Space and weight required for plate heat exchangers vs. shell and tube units for identical duties in an offshore platform application:

	PHE	S&T
Total weight, drained, tons	16	96
Total weight, operating, tons	19	136
Floor area, installation, ft.²	150	1130
Floor area, installation and maintenance, ft.²	225	2045
Heat load per unit, million BTU/hr.	45	30
Number of units	4	6



Advanced Frame Technology

Advanced Sealing Techniques
feature glued, glue-free, or welded systems.

Bolted Construction
no welded parts. Easy onsite assembly and future expansion capability.

Roller Assembly
to facilitate opening and avoid wear on carrying bar.

Studded Port Connection
allows increased pipe loading. Flanges upon request. Alloy liner available.

5-Point Metal-To-Metal Alignment System
keeps plates securely in the frame with a tolerance of ±.04" even during opening and closing. It guarantees an optimum seal. This means improved reliability against gasket blow-out and extended gasket life.

ASME Coded
all frames. Max. design pressure up to 400 Psig. Design temperature up to 350°F.

Protective Shroud
meets OSHA requirements. A fire shroud is available with security up to 1500°F.

Thicker Frame Covers
apply uniform plate pressure, thus extending your gasket life. They also eliminate the need for reinforcements and reduce the amount of bolts required. Opening and closing is faster and easier.

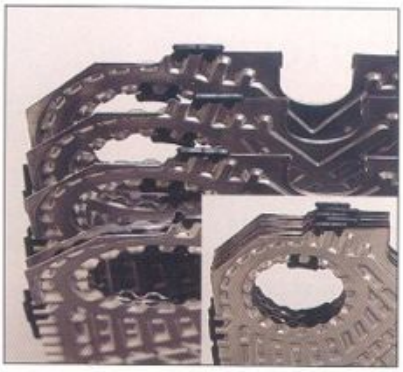
Unique Tightening Bolt System
with bearing box and lock washers allow easy opening and closing. Front assembly provides easy access. One person takes less time, —reducing costs. Special tools are not required. Rolled threads eliminate galling.

Only Alfa Laval Plate Heat Exchangers Give You These Advantages:

5-Point Metal-to-Metal Alignment System For Plates With 6"Ports And Larger, Assures An Optimum Seal.

Optimum seals extend gasket life and ensure high reliability.

Corner-to-Corner Alignment System Provides Precision Fitting For Plates With 4" Portholes And Smaller.

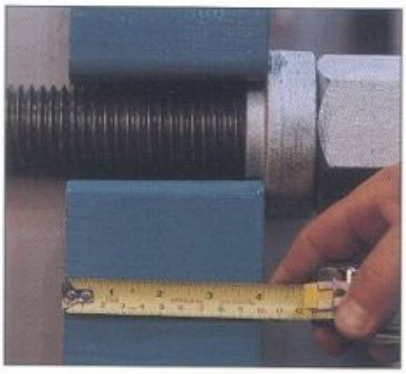


One step plate pressing allows exact plate alignment that eliminates shifting in the plate pack.

Thicker Frame Covers Extend Gasket Life

The Alfa Laval plate heat exchanger features extra-thick frame covers.

Thicker frame covers apply even pressure over the entire surface of the plate. This pressure eliminates flexing or bending of plates, creating a superior seal and extending gasket life.



Thicker frame covers eliminate the need for cover reinforcements that can trap process fluids and cause corrosion. A sturdier frame cover also reduces the number of tightening bolts. With fewer bolts, opening and closing the unit is faster and easier.

Tightening Bolt System Reduces Maintenance Cost

The unique system of bearing boxes and lock washers allows the frame to be opened and closed by a single person using standard tools. This results in reduced maintenance time and cost.

Tightening bolts are fabricated by staking not welding the nut to the tightening bolt. This eliminates possible damage to the bolt that welding can promote.

Tightening bolt threads are rolled, not cut. Rolling, eliminates galling, common to other manufacturers plate exchangers.

ASME "U" And "UM" Stamp Are Standard:

R Stamp Upon Request. Registered with The National Board of Boiler and Pressure Vessels Inspectors.

Advanced Plate Technology Enhances Heat Exchanger Performance

Innovations in plate technology applying CAD/CAM and Finite Element Modeling, have resulted in more efficient and reliable equipment. The new generation of Alfa Laval plate heat exchangers demonstrate several technical improvements.

Less Floor Space

Smaller, more efficient units mean less floor space is required for installation.

Improved Heat Transfer

Advanced plate designs using modeling techniques increase fluid distribution by using the entire plate for heat transfer. These new corrugation designs press more uniformly, allowing thinner plate material to be used—and increases heat transfer.

Higher Operating Pressures

The weakest mechanical point of a plate has always been the distribution area. Using sophisticated techniques, Alfa Laval has greatly improved the strength of the area, allowing design pressures as high as 400 Psig./600 Psig. test, independently on either side.

Lower Equipment Costs

Because more of the plate area is used, fewer plates are required. Thinner, yet stronger plates mean less alloy is necessary. Both reduce costs.

Alfa Laval Offers The Right Sealing System For Your Operation

Glued

Should your operating condition promote gasket swelling, glued gaskets offer increased reliability, especially for repeated openings.

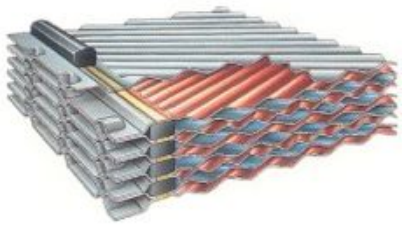
Replacement of glued gaskets is not necessary for servicing. Our two-part, oven-cured epoxy affixes the gasket firmly and will not dissolve. This is in great contrast to the single component glues other manufacturers use.

Glue-Free

Glue-free gaskets offer fast and easy gasket replacement onsite.

Welded

Precise laser welding of the process side provides enhanced reliability for difficult fluids.

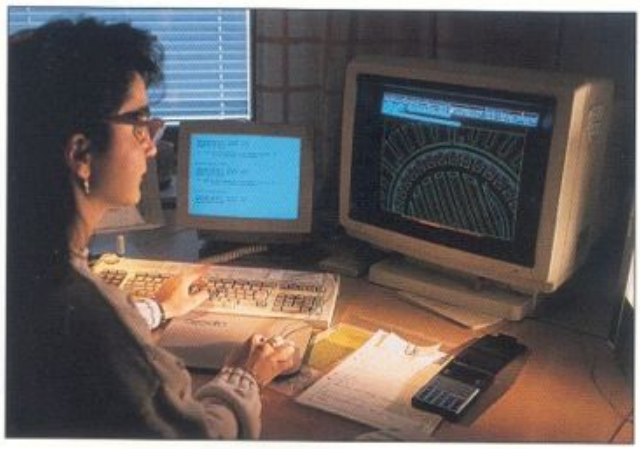


Brazed

Units which eliminate gaskets entirely are available in copper or nickel brazing.

Plate Design... The Alfa Laval High Performance Advantage

The most critical area to effective plate heat exchanger transfer is plate and channel design. Alfa Laval leads in technical advances in mechanical and thermal exchanger engineering by using techniques such as miniaturized sensors and scanning electron microscopes. Alfa Laval R & D has devoted years developing and improving heat exchanger designs. Using CAD/CAM and mathematical modeling, many plate designs are tried before the best combination is found. Channel depth, channel shape, plate thickness, and strength are only some of the variables involved.



An Alfa Laval design engineer uses CAD/CAM to examine the plate port pattern for the new MX25B plate design.

Distribution Area

Located at the top and bottom of the plate, this area is responsible for ensuring fluid is distributed uniformly across the entire width of the plate, eliminating dead spots. This is more complex on modern units where inlet and outlet are aligned vertically for easier piping. Alfa Laval's designs provide complete fluid distribution across even our widest plate.

Main Heat Transfer Zone

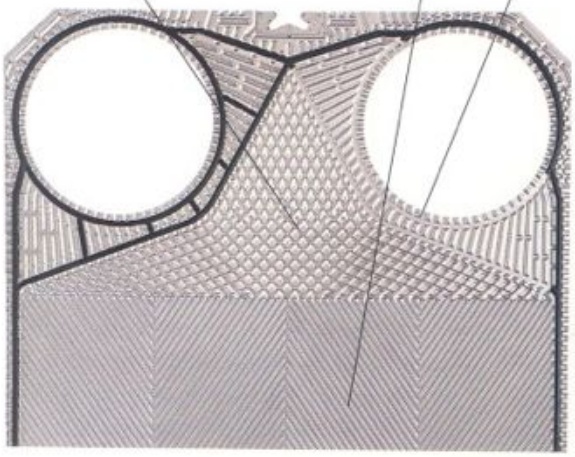
Critical for creating the highest turbulence consistent with desired pressure drop.

Entrance Neck

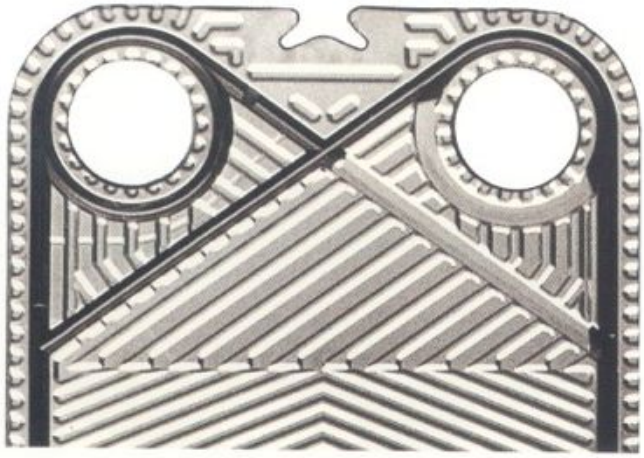
Designed for low pressure drop as well as low velocities for reliable erosion prevention.

Quality Control

Plates that go into Alfa Laval exchangers are rigorously tested to ensure quality and high performance. Testing includes light-box and penetrant testing and a hydrotest in both balanced and unbalanced conditions.



New designs provide improved uniform distribution and higher design pressure capabilities.

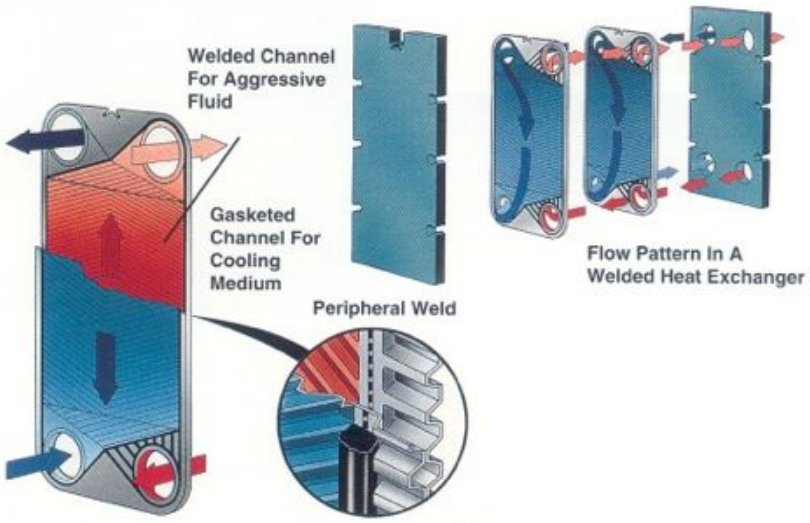


Older, less efficient plate designs are susceptible to dead spots and provide significantly lower design pressures.

Alfa Laval: The Innovator In

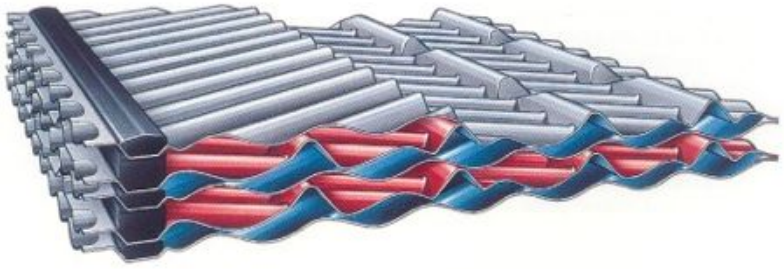
Welded Plate

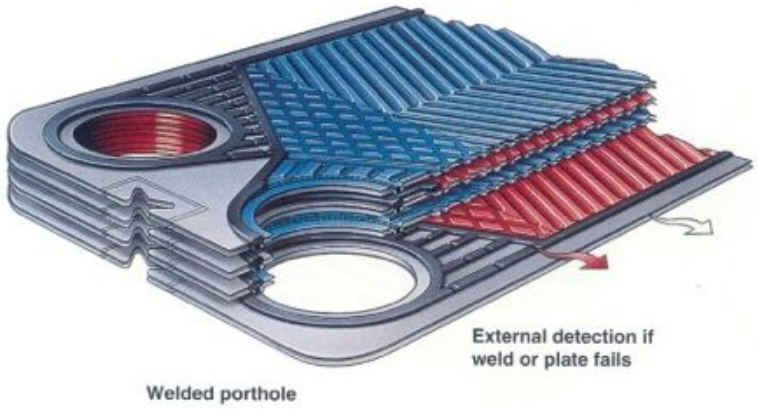
Welded channels for process fluids allow aggressive and difficult fluids to be handled in a plate heat exchanger.



Wide-Gap Plate

With 5/8" channels free of contact points, this plate is ideal for high viscosity fluids or fluids containing fibers or coarse particles. Each channel has been designed to eliminate bridging of solids in the entrance area.





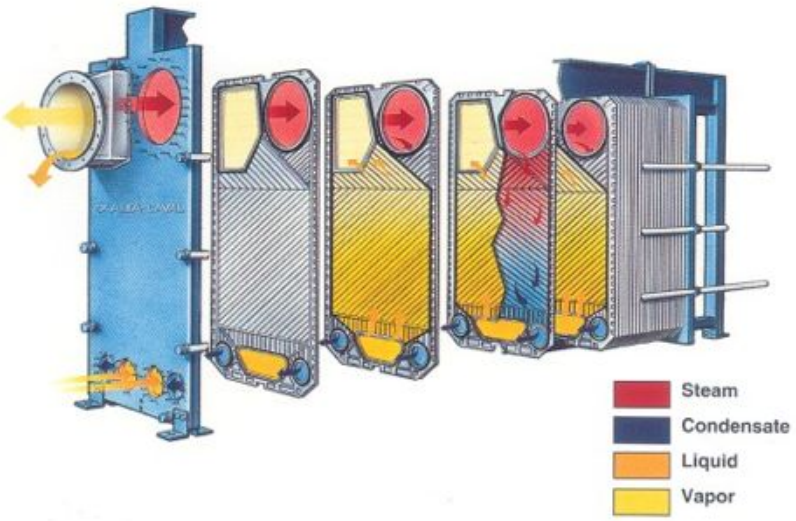
Double-Wall Plate

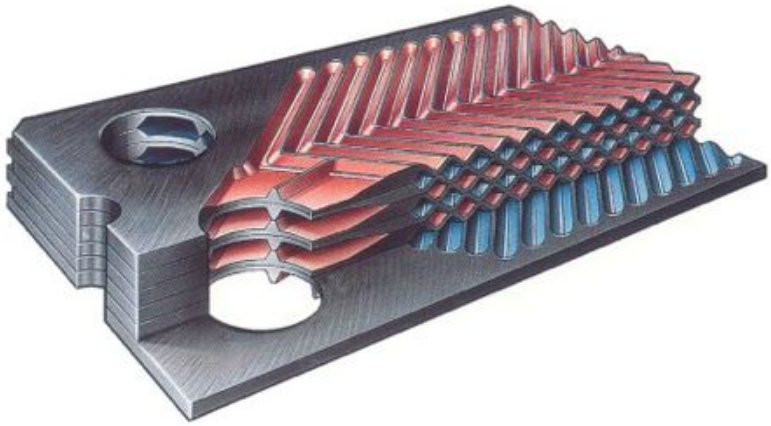
Composed of plates pressed simultaneously and laser welded at the port, it is designed for applications where additional reliability against intermixing is necessary to prevent catastrophe. Failure of one plate results in a external detection without interleakage. The second wall provides a double barrier between fluids, satisfying local health codes.

Plate Heat Exchanger Technology

Plate Evaporator/Condenser

Compact and economically efficient, the plate evaporator/condenser replaces conventional large and expensive falling film units. Its deep channels, large ports and laser welding allows vacuum and low pressure evaporation and condensing for both aqueous and organic systems.





Diabon F® Nonmetallic

A composite of fused graphite and fluoroplastic, this unit offers excellent resistance for hydrochloric acid, $AlCl_3$, and other corrosive materials. Unlike traditional graphite, Diabon F® has no porosity or permeability. It resists cracking and breakage during handling and use.

Brazed Units

Using copper or nickel brazing to eliminate gaskets, these compact heat exchangers are perfect for small or packaged applications up to 435 Psig and 435°F.

Alfa Laval Offers You The Industry's Most Complete

Unit Type	Maximum Flowrate (GPM)	Maximum Surface Area (Sq. Ft.)	Height	Width	Maximum Length	Maximum Dry Weight (Lbs.)	Conn. Size
Gasketed Plate Heat Exchangers							
A45	19,000	17,000	10' 7"	4' 7"	20'10"	40,000	18"
AX35	12,000	20,000	10' 7"	4' 7"	20'10"	40,000	14"
M30	12,000	15,000	10' 5"	3'10"	17' 6"	31,000	14"
MX25B	6,000	11,000	10' 5"	3' 1"	13' 5"	27,000	10"
A20B	4,000	7,000	7' 6"	2'10"	13' 5"	17,000	8"
M20M	4,000	5,500	7' 4"	2' 6"	16' 2"	14,000	8"
AM20	4,000	5,000	7' 2"	2' 9"	20' 6"	17,000	8"
AM20B	4,000	6,000	7' 2"	2' 9"	16' 2"	12,000	8"
AM20S	4,000	2,500	7' 2"	2' 9"	20' 6"	10,000	8"
AK20	4,000	2,500	4'11"	2' 6"	9'10"	6,000	8"
T200	4,000	2,500	4'11"	2' 6"	9'10"	6,000	8"
M15B	2,000	4,500	6' 7"	2' 2"	11' 6"	10,000	6"
M15F	2,000	2,500	6' 7"	2' 2"	11' 6"	10,000	6"
A15B	2,000	5,000	6'10"	2' 4"	15' 8"	10,000	6"
M10B	1,000	1,000	3' 6"	1' 6"	7' 9"	2,000	4"
M10M	1,000	750	3' 6"	1' 6"	7' 9"	2,000	4"
M6	250	400	3' 1"	1' 1"	3' 8"	1,000	2"
M6M	250	400	3' 1"	1' 1"	3' 8"	1,000	2"
P2	250	250	2' 6"	1' 1"	2' 3"	1,000	2"
P01	50	40	1' 9"	0' 8"	2' 0"	200	1"

Frame designs and operating pressures for the above products.

FM 100 PSI	FD 300 PSI
FG 150 PSI	FS 400 PSI

Materials

Plates

304 SS
316 SS
Titanium
Incoloy® 825
254 SMO® & SLX®
Hastelloy® B, C, D-205
Pd Stabilized Ti

Other Plate and Gasket Materials are Available Upon Request.

Gaskets

Viton A,B & G

Nitrile

- Standard
- High Temperature
- High Performance

EPDM

- Standard
- High Temperature
- High Performance

Line Of High-Performance Plate Heat Exchangers

Unit Type	Maximum Flowrate (GPM)	Maximum Surface Area (Sq. Ft.)	Height	Width	Maximum Length	Maximum Dry Weight (Lbs.)	Conn. Size
Welded Plates - (D) Double Wall, (W) Welded Cassette							
AX30BW	9,000	10,000	8'10"	3' 6"	21' 5"	30,000	12"
AM20W	4,000	5,000	7' 2"	2' 9"	20' 6"	17,000	8"
A15BW	2,200	5,000	6'10"	2' 4"	15' 8"	11,000	6"
M10BW	1,000	1,000	3' 6"	1' 6"	7' 9"	2,500	4"
AM20D	4,000	2,500	7' 2"	2' 9"	20' 6"	16,000	8"
M10BD	1,000	1,000	3' 6"	1' 6"	7' 9"	3,000	4"
M6MD	250	300	3' 1"	1' 1"	3' 8"	1,000	2"
Evaporator/Condenser Plate - Welded Cassette							
EC500	Up to 30,000 lb./hr. @ Atmospheric Pressure	10,000	9' 3"	3'10"	21' 6"	13,000	16"
Diabon F™ Plates							
S10	1,000	400	4' 9"	1' 9"	5' 0"	4,000	4"
M10G	1,000	300	3' 9"	1' 7"	5' 0"	2,500	4"
S1	60	30	2' 1"	0' 8"	3' 2"	500	1"
Brazed Plates - (CB) Copper Brazed, (NB) Nickel Brazed							
CB 14	1	4.5	0' 9"	0' 3"	0' 2"	3	3/4"
CB 26	40	32.4	1' 1"	0' 5"	0' 7"	25	1"
CB 50	40	32.4	1'11"	0' 5"	0' 5"	40	1"
CB 76	150	120.0	2' 1"	0' 8"	1' 5"	140	2"
CB 300	600	450.0	3' 5"	1' 3"	2' 0"	525	4" & 2 1/2"
NB 14	16	4.5	0' 8"	0' 3"	0' 2"	3	3/4"
NB 26	40	13.5	1' 2"	1' 0"	0' 9"	25	1"
NB 76	150	50.0	1' 9"	0' 6"	0' 9"	40	2"

Alfa Laval's Complete Manufacturing Process In Richmond, Virginia

Plate pressing

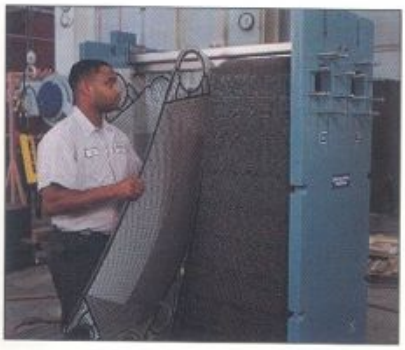
Light box inspects plates for imperfections

Clip-on, glue free gaskets are applied

Gluing procedures include oven curing for maximum bonding

Machining frame covers

Painting applied according to customer specification



Assembly

Hydrotest. Using pressurized water at one and a half the design limits, finished units are tested before shipment

Completed plate heat exchanger

Quality Throughout Alfa Laval Thermal

Our mission,
At Alfa Laval Thermal is:
To always be the recognized leader of reliable heat transfer solutions through dedication to our customers needs.

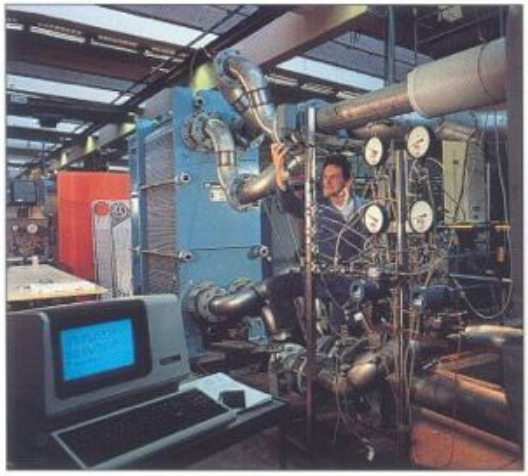
Quality

At Alfa Laval quality begins with equipment design. Alfa Laval sales personnel are degreed engineers, able to understand the nuances of your particular process and offer solutions to help you improve it.

We measure our quality and product performance with your complete customer satisfaction. We continue our quality with our after sales service and spare parts, regasketing centers, and onsite technicians.

Service And Support

Alfa Laval is the only heat exchanger manufacturer to offer a global network of factory service centers. Whether the unit is used in or outside of the United States, you can be sure that factory service personnel and genuine spare parts are quickly available.



We continuously test and redefine our manufacturing procedures.

Alfa Laval Service Centers clean and regasket heat exchangers.

Other Alfa Laval Thermal Products:

Alfa Laval's automatic back flushing strainer protects plate heat exchangers from debris.

For protection on light hydrocarbon services, Alfa Laval's fire shroud withstands temperatures up to 1500°F.

For two-phase, slurries and other difficult applications, Alfa Laval spiral heat exchangers are an effective alternative.

Alfa Laval Thermal Inc.
FAX TO: 804-236-1360

PLATE HEAT EXCHANGER SPECIFICATION SHEET

Alfa Laval

1. Customer	Your Job No.
2. Address	Your Reference No.
	Our Inquiry No.
3. Plant Location	Date
4. Service of Unit	Item No.
5. Type No. of Exch. Req'd.	Connected In
6. Total Surface ft.²	Surface/Exch. ft.²

Guaranteed Performance	Hot Side		Cold Side	
7. Fluid Circulated				
8. Total Fluid Entering				
9. Vapor				
10. Liquid				
11. Steam				
12. Non-Condensables				
13. Fluid Vaporized or Condensed *				
14. Steam Condensed				
15. Physical Property Data Temp. °F				
16. Specific Heat BTU/lb. °F				
17. Specific Gravity				
18. Thermal Conductivity BTU/lb.ft. °F				
19. Viscosity Cp				
20. Latent Heat Vapors BTU/lb.				
21. Non-Newtonian k/n	/	/	/	/
22. Molecular Weight				
23. Temperature In °F				
24. Temperature Out °F				
25. Operating Pressure Psig				
26. Max. Allow. Pressure Drop Psig				
27. Thermal Margin %				

28. Heat Exchanged: BTU/Hr. LMTD: °F

* For two-phase duties, also provide either condensing curve or vapor pressure data.

Construction	
29. Design Pressure Psig	Test Pressure: Psig
30. Design Temperature °F	Connection Material:
31. Material - Gaskets:	Covers Material-- Carbon Steel: SA-
32. Material - Plates:	Tightening Bolt Material:
33. Carrying Bar Material:	Guide Bar Material:
Remarks:	

Shaded areas should be completed to provide design calculations.

TEAR ALONG PERFORATION

Alfa Laval Plate Heat Exchangers Enhance Heat Transfer And Improve Process Efficiency In Every Industry...

20 titanium PHEs are used for service cooling duties at Fertrin, Point Lisas, Trinidad. The system was designed for the ammonia plant by M.W. Kellogg of Houston, Texas.

Two PHEs handle heavy crude oil water at Union Oil, California.

Two PHEs cool dilute sulfuric acid (1-3%) from a scrubbing tower with cooling tower water at Big River Zinc, Sauget, Illinois.

A Wide-Gap PHE recovers heat from white water at Bowater Mersey Paper Company Limited, Liverpool, Nova Scotia, Canada.

A Welded plate heat exchanger cools propylene glycol at Nestle USA, Inc. Modesto, California plant.

A Diabon F® PHE cools a mixture of hydrochloric acid and chlorinated hydrocarbons, Union Camp, Florida.

Alfa Laval Thermal Inc., Richmond, Virginia is one of Alfa Laval's five complete plate manufacturing facilities.

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Fax: 5 25 362 32 46

For the name of your local representative please call Alfa Laval Thermal Inc.

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