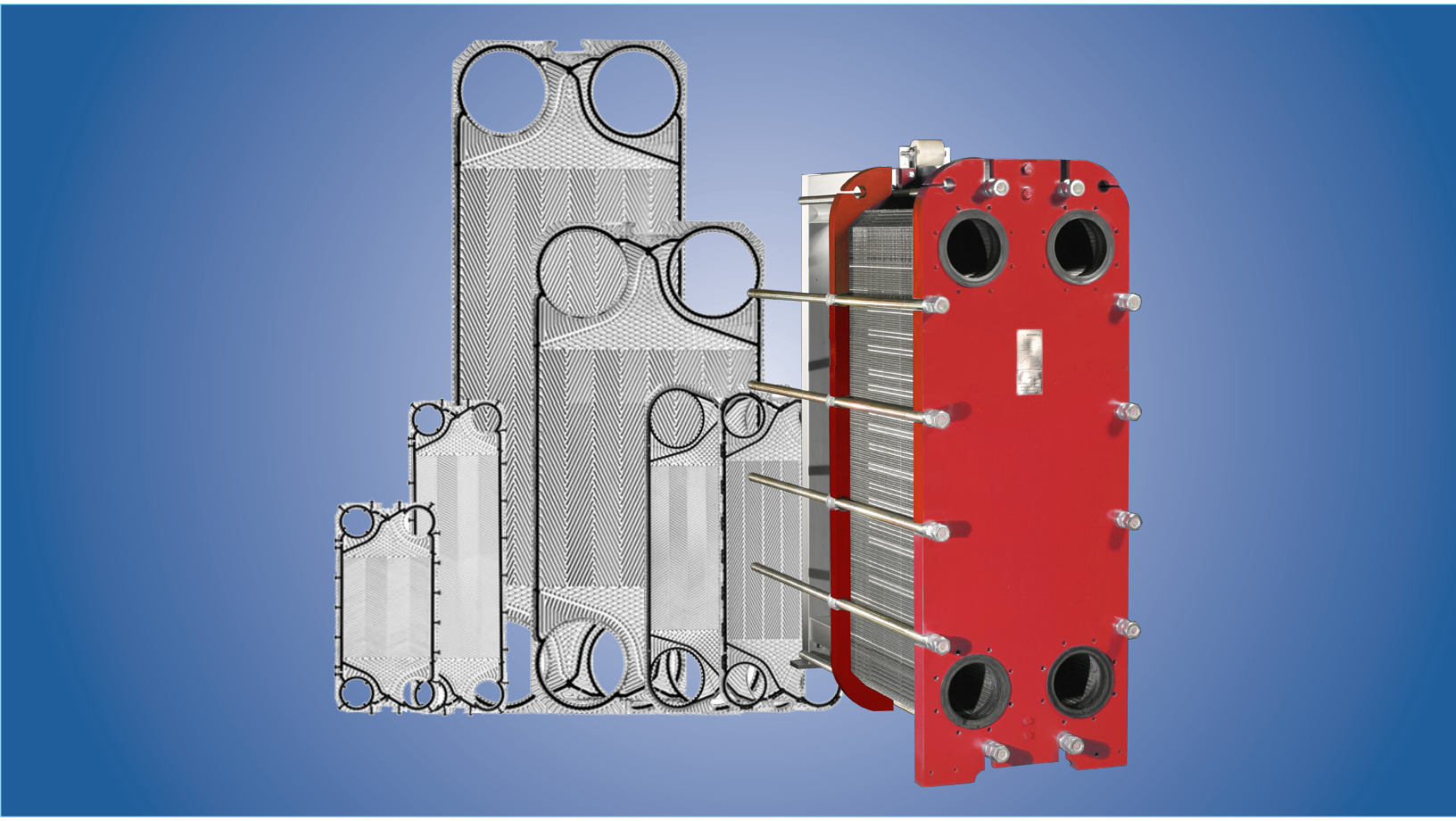
PHE

ARMSTRONG



# Plate Heat Exchangers

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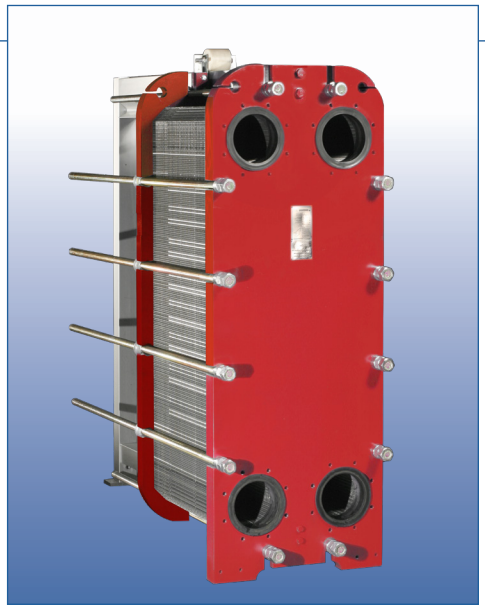
# Efficient Heat Transfer in a Compact Design

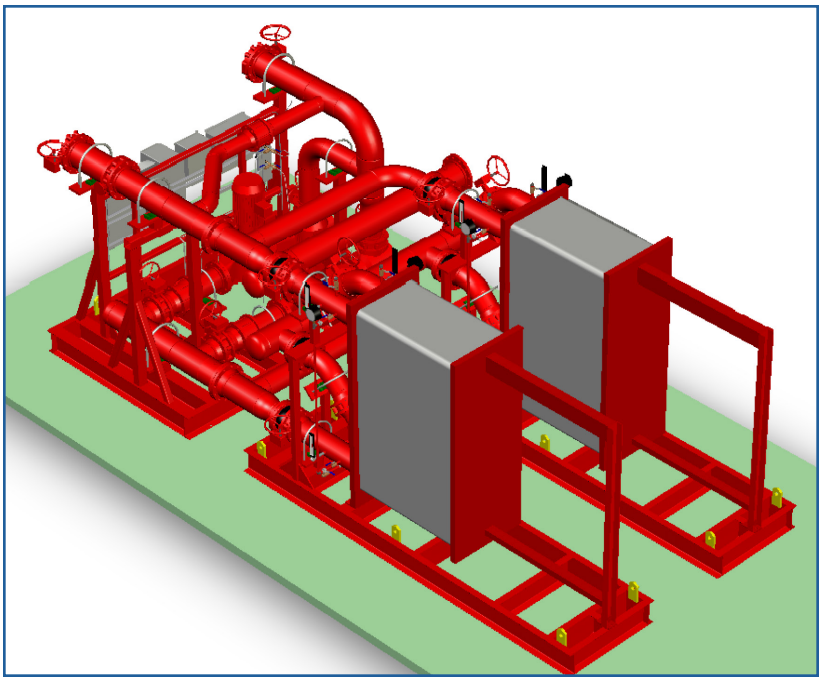


**Armstrong's gasketed Plate Heat Exchanger (PHE) product line includes a very large selection of models and offers numerous configurations, connections and material options, providing a superior heat transfer solution for any HVAC application.**

## Market Challenges

Rising demand for tenant space in commercial buildings and an ever-increasing focus on reducing energy consumption have created numerous challenges for designers and contractors. These challenges include the requirement for mechanical room optimization and energy recovery or free cooling systems such as water-side economizers, geothermal heating/cooling and deep-lake water cooling. There is now, more than ever, a growing demand for compact heat exchangers capable of transferring heat at low approach temperatures to achieve greater temperature crossing, which saves energy.

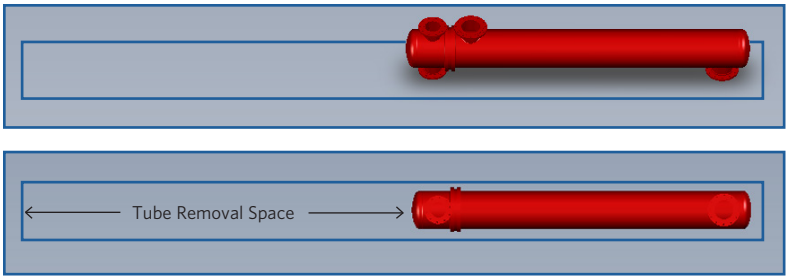
In addition, factors such as global warming, high frequency of building conversions, and smaller mechanical rooms have led to a demand for heat exchangers that can be maintained easily and are flexible with regards to future expansion.



## Adding value to hydronic systems

### Space savings

Due to their high heat transfer capabilities, Armstrong PHE Series heat exchangers are substantially smaller in size than other heat transfer devices, yet provide the same or better performance. Plate heat exchangers save up to 75% of the floor area, and up to 85% of the floor length required for shell and tube heat exchangers (including area to service the heat exchanger).




Shell & Tube heat exchanger footprint
Space required in feet (metres) = 2.5 (0.76) × 32.3 (9.85) = 80.8 ft² (7.5 m²)
Based on Model w2214

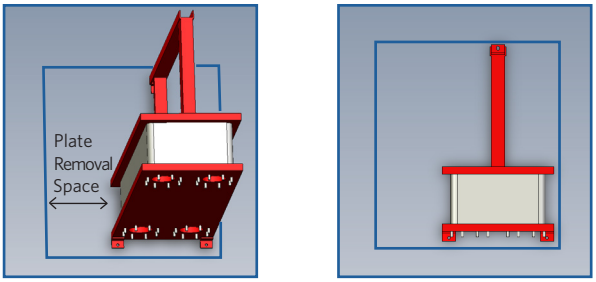



Plate heat exchanger footprint
Space required in feet (metres) = 5.3 (1.60) × 4.7 (1.43) = 24.9 ft² (2.29m²)
Based on Model s106-1250

# Plate Heat Exchangers

## Project risk minimization

All units are certified for safety by the appropriate agency (i.e. ASME, PED, AHRI, etc). Heat transfer plates can be added, replaced or removed easily to maintain or increase the system performance. Gaskets are vented between passages, so there is no cross contamination from a gasket failure. Every unit is provided with a safety shield that surrounds the plates and gaskets. Double-wall heat transfer plates are available for domestic water applications. Select models are available with a design pressure up to 435 psi (30 bar).

## Maintenance

Single-pass PHE units are designed with all four system connections on the fixed head. This ensures the unit can be easily maintained without having to break the connecting piping. In addition, plate heat exchangers can be installed in a corner of a mechanical room to optimize the space. When maintenance is required, gaskets are easy to replace and plates can be removed and installed from one side of the unit.

## Installation advantage

Connections are typically on the same plane for easy piping. Studded flanged connections reduce piping loads on the plate heat exchanger. Units can be certified at the factory and then shipped disassembled for delivery and installation in tight quarters. The vertical piping arrangement (inlet on top and outlet on bottom) of PHE Series units makes them ideal for condensing steam service.

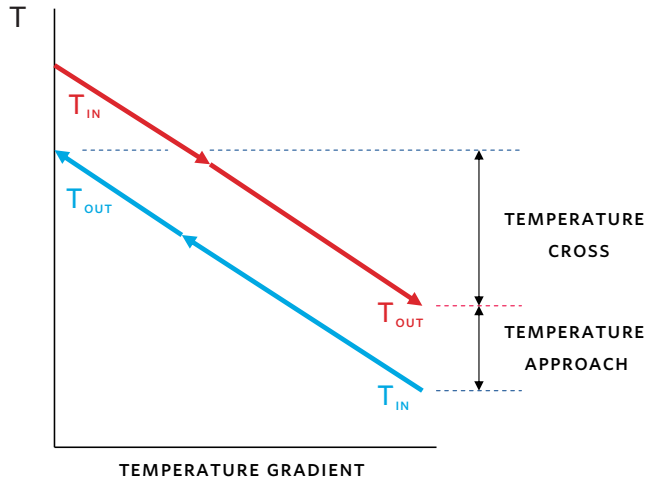
## Energy efficiency

The Armstrong PHE series achieves the highest efficiency and heat transfer rates by flowing the two media in opposite directions (counter-current) in a highly turbulent fashion. The temperature gain or loss between the hot fluid and the cold fluid at a given flow rate is the regeneration rate. With counter-current flows, high turbulence and optimized corrugation, Armstrong Series PHE units provide regeneration rates of up to 90%.

% Regeneration = $(T_{in\ [hot\ fluid]}-T_{out\ [hot\ fluid]})/(T_{in\ [hot\ fluid]}-T_{in\ [cold\ fluid]}) \times 100$

Armstrong PHE series heat exchangers offer multiple plate geometries to provide the optimum heat transfer solution for a given application.

Counter Current Flow & Temperature




## Occupant Comfort

Armstrong PHE series heat exchangers react quickly to system demand changes, and provide reduced down-time and longer life span due to corrosion resistant materials, anti-scaling effect (due to turbulent flow) and ease of maintenance.

## Technical data

| | | |
|---|---|---|
| FLOW RANGE | | Up to 32,000 gpm (2000 L/s) |
| DUTY | | Up to 57,000,000 btu/hr (16,700 kW) |
| MAX. FLUID TEMPERATURE | NITRILE GASKETS | 284 °F (140 °C) |
| | EPDM GASKETS | 302 °F (150 °C) for standard applications<br>356 °F (180 °C) for steam applications |
| MAX. WORKING PRESSURE | | 435 psi (2999 kPa, 30 bar) |

## Materials of construction

| | |
|---|---|
| PLATES | 304 and 316 stainless steel, titanium |
| GASKETS | Nitrile, EPDM, Viton |

Other materials are available on request.

## Certifications

**Safety:** ASME, PED, CRN, NSF 61
**Performance:** AHRI

AHRI CERTIFIED® www.ahridirectory.org

NSF Certified to NSF/ANSI 61

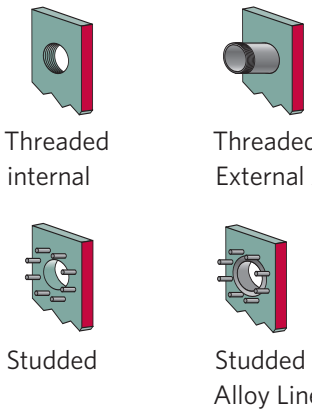
## How it works

The Armstrong PHE series uses robust stainless steel and titanium plates (standard construction) as the primary medium for heat transfer. Each plate is stamped with an optimized corrugated design. The series of plates create alternating independent channels for both the process and service fluids. The two medium circuits are configured to induce true counter-current flow, enabling the heat exchanger to perform at extremely low temperature approaches. This is further improved by using Armstrong plates. As each fluid passes through its individual channel, it flows over the 'chevrons' (the corrugated pattern), which increases fluid turbulence, and increases heat transfer through the plates. Heat is transferred from one medium to the other. The Armstrong PHE series uses a gasketed seal to separate the service side from the process side.

## Design features

1. All connections are threaded or studded to the cover in order to eliminate nozzle loads caused by the piping.
2. Gaskets are double-vented at the port area to eliminate cross contamination of the fluids. Gaskets are attached mechanically to the plate. They attach to the plate only one way, eliminating assembly errors and wasted time during servicing. The gaskets are visible from outside the unit so proper installation is guaranteed.
3. Tightening bolts are designed so that all tightening is done from the fixed end (nuts at the moveable end are locked). Bolts are coated for corrosion resistance. This makes servicing the heat exchanger quicker and easier.
4. The bars that hold the plates are corrosion resistant for ease of maintenance.
5. Heavy duty pressure-retaining headers are designed using the latest stress calculation data, as per ASME and PED, to ensure lengthy and safe service.
6. Heat transfer plates are stamped using multiple plate patterns and selected according to the application requirements.
7. An galvanized safety shield covers the top and sides of the plate pack.

## Standard connection types

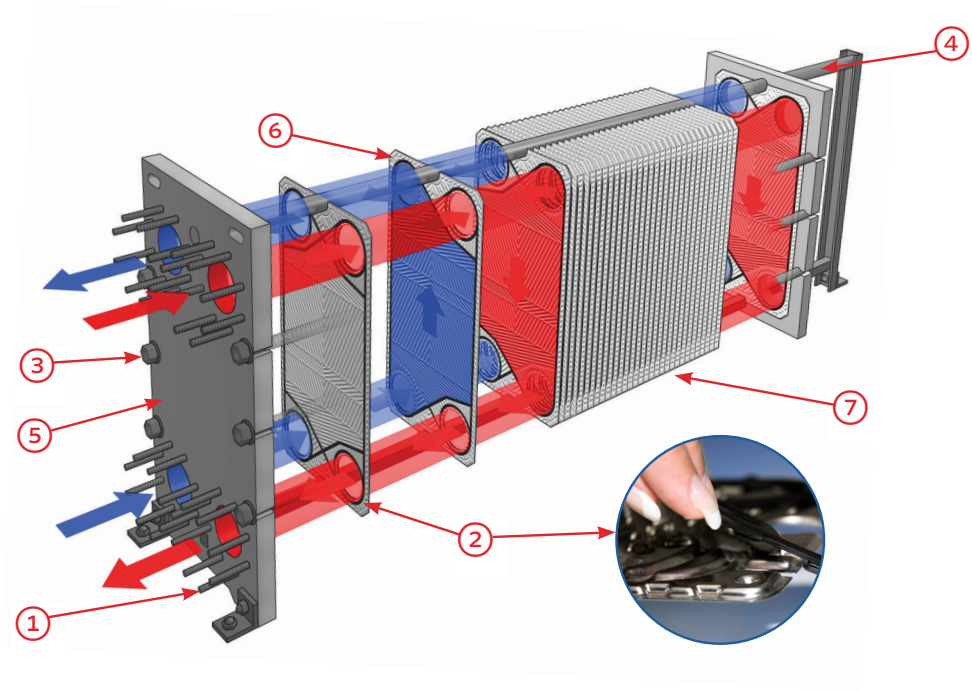


Threaded internal

Threaded External Alloy

Studded

Studded Alloy Liner

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