

# Heat Transfer That Exceeds Expectations

A person wearing a blue work shirt and jeans is holding a white hard hat. The background is a blurred industrial facility with complex piping, tanks, and machinery, suggesting a manufacturing or processing plant.

ACCU-THERM® PLATE HEAT EXCHANGERS

MUELLER

# Performance Guaranteed

Heating and cooling processes can be difficult tasks that require time and money. Whether you are looking to conserve energy, save floor space, or make your operation more efficient, Mueller Accu-Therm® has helped improve operations in a number of different industries. Paul Mueller Company's Accu-Therm plate heat exchangers are designed to provide you worry-free, highly efficient heat transfer performance - whether you are processing simple fluids, viscous solutions, or particulates.

Every Mueller Accu-Therm unit receives rigorous quality inspections for leaks and pressure capabilities. We factor in safety, precision, maintenance and the needs of the application being performed. Combining these aspects into the design will be evident in your final product and for years to come. If your plate heat exchanger does not operate according to your exact specifications, our service technicians will make the necessary adjustments immediately.



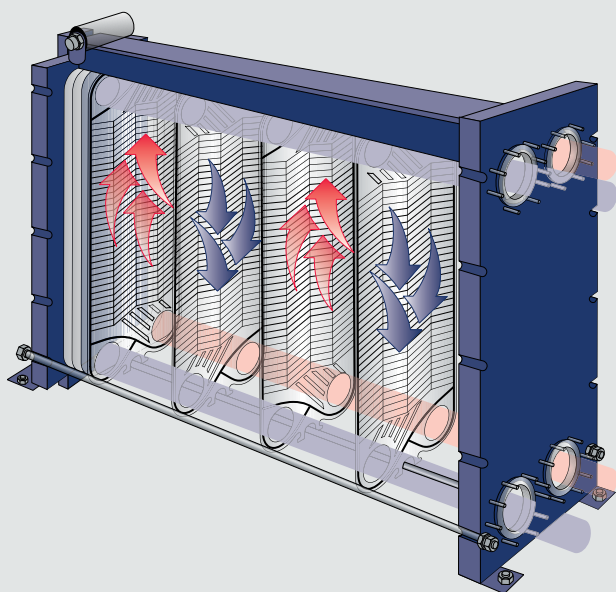


## TABLE OF CONTENTS

Performance Guaranteed . . . . .	1
Heat Exchange Process . . . . .	3
Plate Patterns . . . . .	4
Gaskets and Replacement Parts . . . . .	5
Configurations . . . . .	6
Types of Plate Heat Exchangers . . . . .	7
Applications . . . . .	9
Features and Benefits . . . . .	11
Academy Articles:	
How a Heat Transfer Consultation Saved a Brewery Money . . . . .	13
How to Troubleshoot Your Plate Heat Exchanger . . . . .	15
Custom Designing your Plate Heat Exchanger . . . . .	17
Delivery . . . . .	18
Services . . . . .	19
Contact . . . . .	21
Notes . . . . .	22

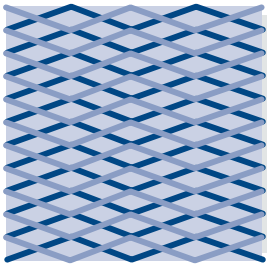
# How Does Mueller Accu-Therm<sup>®</sup> Work?

An Accu-Therm Plate Heat Exchanger (PHE) consists of a series of embossed heat transfer plates with gaskets around the perimeter of every plate to contain pressure and control the flow of each medium. They can be designed for multiple fluids or thermal requirements in a single frame. Gasketed plates are assembled in a pack, mounted on upper and lower guide rails, and compressed between two end-frames with compression bolts.



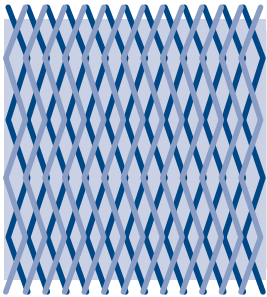
1. Fluids enter the PHE through end-frame connections and are distributed to the plates through portholes in the plates.
2. Directed by the gaskets, the fluid to be heated or cooled flows down one side of each plate, while the heating or cooling medium flows in the opposite direction on the other side of the plate.
3. The temperature difference created by these opposite flows results in the closest possible approach temperature for maximum heat transfer efficiency.
4. The heated or cooled fluid exits the PHE through end-frame connections.

# Plate Patterns



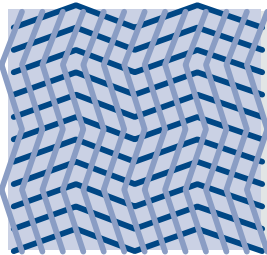
## Horizontal (H)

Horizontal herringbone embossing. Highest heat transfer coefficients and pressure drop.



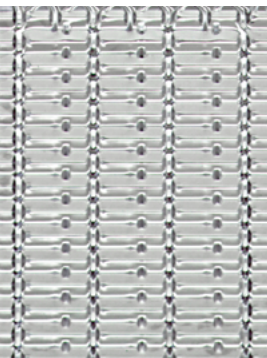
## Vertical (V)

Vertical herringbone embossing. Slightly lower heat transfer coefficients and pressure drops.



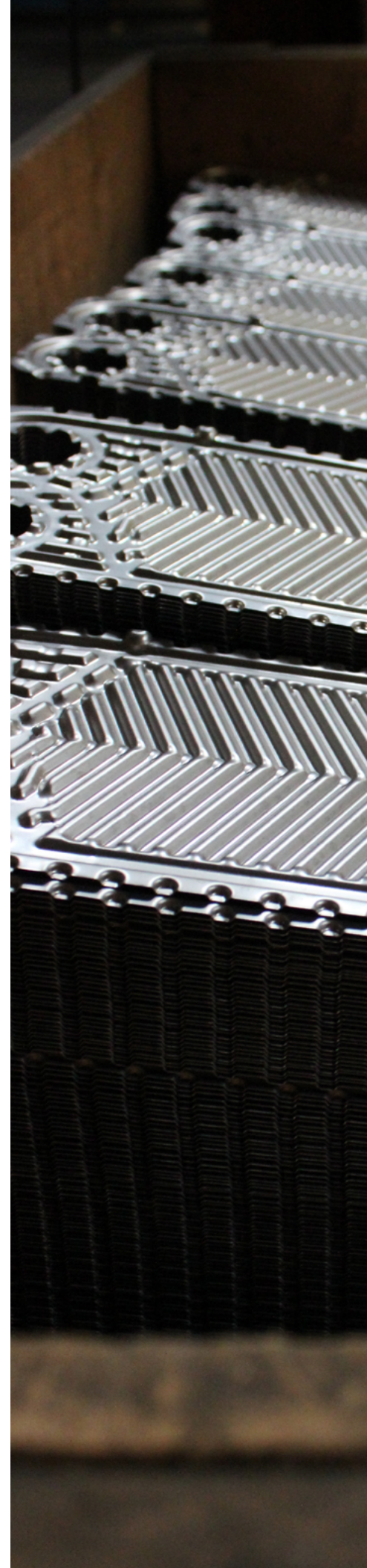
## Combination (H/V)

A combination of H and V plates for an intermediate range of heat transfer coefficients and pressure drop.



## Free-Flow

Open fluid-flow channel, ideal for viscous products, slurries, and effluent streams that contain particles and fibers which can block the flow channels and plug up conventional heat exchangers.



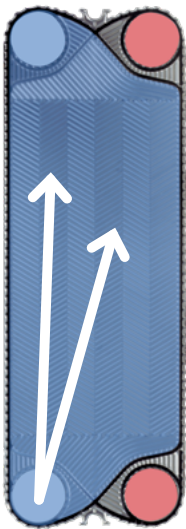
# Gaskets

Mueller Accu-Therm plate heat exchangers provide efficient heat transfer by design. They can be designed for multiple fluids or thermal requirements in a single frame. The flow to individual passages between plates is controlled by alternate placement of port gaskets. Within the heat exchanger, the fluid to be heated (or cooled) flows down one side of each plate, while the heating (or cooling) medium flows in the opposite direction on the other side of the plate without cross contamination.

## MATERIALS OF CONSTRUCTION:

- Nitrile (NBR)
- Ethylene Propylene Rubber
- Silicone
- Viton®/FKM
- Butyl (resin cured)

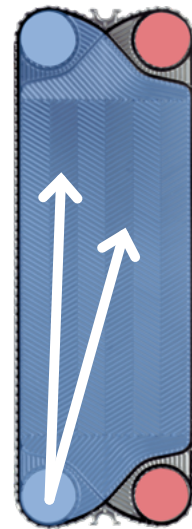
FIRST FLOW PLATE



SECOND FLOW PLATE



THIRD FLOW PLATE



## Replacement Parts

When replacement parts are needed for your plate heat exchanger, contact our responsive team to get your equipment operating at maximum efficiency. Visit [paulmueller.com/heat-transfer-parts](http://paulmueller.com/heat-transfer-parts) and fill out the form to receive a quote or more information about replacement parts including:

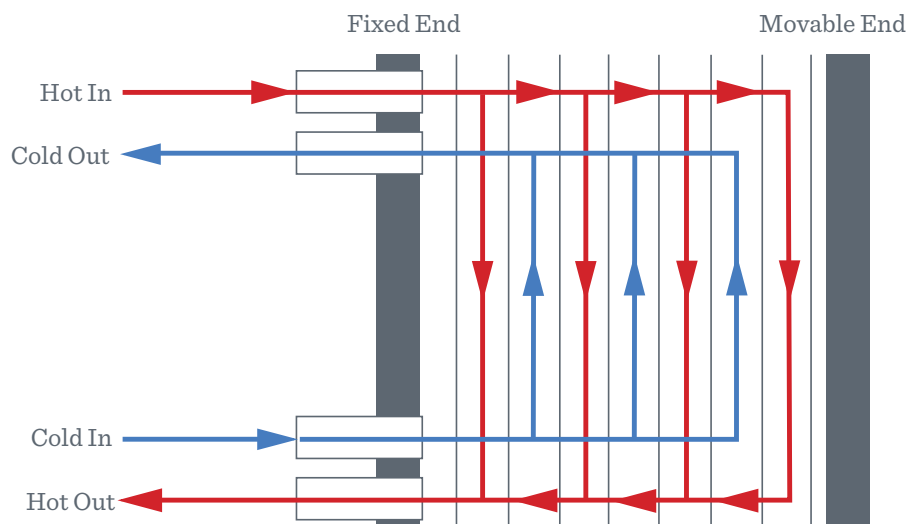
- Plate and gasket pack
- Loose gaskets
- Plate assemblies
- Port rings
- Boot liners
- Compression bolts
- Upper and lower guide bars
- Fixable and movable frames

# Configurations

While hot and cold fluids flow in opposite directions across a single plate, the flow pattern between plates can vary. Plate heat exchanger flow patterns can be single or multi-pass.

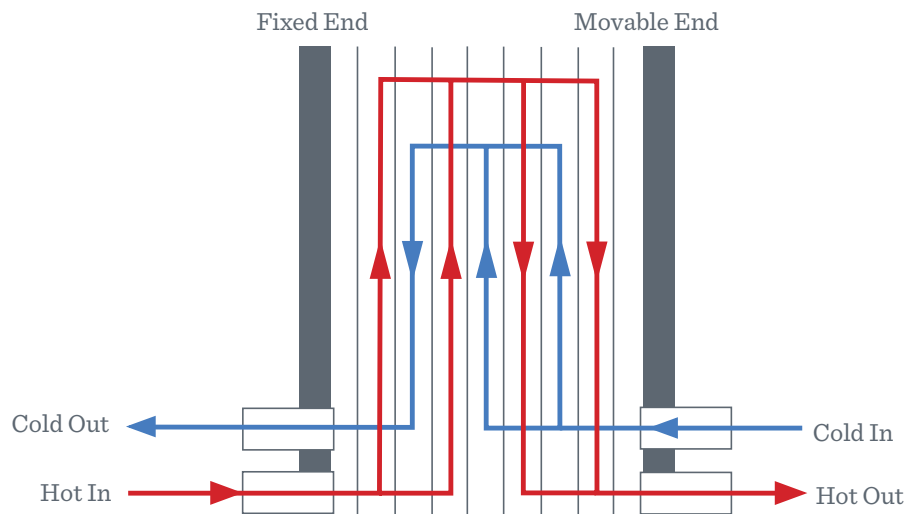
## Single Pass

A single pass arrangement means each fluid flows in the same respective direction across all the plates in the unit. Single pass units are suitable for most applications.



## Multi-Pass

A multi-pass arrangement is designed so fluids can change their respective flow directions. Extremely close temperatures or large temperature differences may call for a multi-pass configuration.



# Types of Plate Heat Exchangers

## Accu-Therm Plate Heat Exchanger

Accu-Therm Plate Heat Exchangers can be found in a wide variety of industries for a multitude of applications. Compact size, ease of maintenance, and high efficiency make them ideal for nearly any heating or cooling task. Available in an extensive range of sizes, alloys, and frame configurations to meet your needs in industries like HVAC, Chemical, Oil & Gas, and more.



## Sanitary Plate Heat Exchanger

The sanitary Accu-Therm plate heat exchanger is designed to meet a variety of sanitary process applications such as Brewing, Dairy, and Food Processing. It meets or surpasses the most stringent sanitary requirements.



## PHE FRAME TYPES

**B FRAME** - For larger units or for applications where it is desirable to have heat transfer plates hanging from the upper guide bar.

**C FRAME** - These compact, cantilever-type frames are ideal for use where space is limited.

**F FRAME** - Intermediate-size frame.



# Semi-Welded Plate Heat Exchanger

Paul Mueller Company's semi-welded plate heat exchanger is ideal for solution chilling and refrigerant condensing in refrigeration applications.

Semi-Welded applications typically use refrigerant or fluid that is corrosive to gasket materials on the welded side of the heat exchanger. The welded cassettes are designed for optimum gasket sealing. Higher pressures improve the sealing of the gaskets.

The plate pack is built utilizing welding cassettes (two plates welded together). The refrigerant side is contained within the welded portion of the cassette to include welding of the solution port. Gaskets are used to seal the secondary side, which makes the plate pack easy to disassemble and clean.



# Brazed Plate Heat Exchanger

Paul Mueller Company offers an extensive range of brazed plate heat exchangers, large and small, to meet your application and the program is constantly being expanded. Many of these units are available in stock and can be shipped the next day in most cases. There is also a network of stocking distributors which can give you immediate access to things you need right away.



## MATERIALS OF CONSTRUCTION:

- 304 and 316 Stainless Steel
- Hastelloy®
- Titanium
- Avesta SMO 254®
- Nickel
- Incolo

# Applications



## BEVERAGE

- Beer Fermenting
- Distilled Water
- Beverage Processing



## CHEMICAL

- Chemical Storage
- Pilot Plant Scale Up
- Plating and Anodizing



## FOOD

- Egg Processing
- Liquid Food Processing
- Fats and Oils Processing
- Equipment Cleaning
- Post Harvest Chilling
- Bakery Chilling



## HEAT TRANSFER

- Custom Heat Transfer
- Energy Recovery
- Engine Cooling
- OEM
- Carpet Drying
- Industrial Tank Heating



## HVAC

- Cooling Tower Isolation
- Free Cooling
- Steam to Water Heating



## OIL & GAS

- Crude Oil Stabilization
- Gas Dehydration
- Condensing



## PERSONAL CARE

- Hair Care
- Cosmetics
- Shower Gels

# Features & Benefits



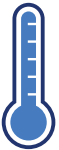
## EFFICIENCY

- “U” values of 1,500 and greater are possible
- Accu-Therm plates promote high turbulence at low fluid velocities
- High turbulence results in very high heat transfer coefficients
- **Multiple Duties with a Single Unit:** Heat or cool two or more fluids within the same unit by installing intermediate divider sections
- **More Heat Transfer surface:** Up to 25,000 sq. ft. of heat transfer surface in a single exchanger



## LOWER COSTS

- More economical than other types of heat exchangers due to the higher thermal efficiency and lower manufacturing costs



## CLOSER APPROACH TEMPERATURES

- Approach temperatures of 2 to 3°F are possible because of the true counterflow and high heat transfer efficiency of the plates



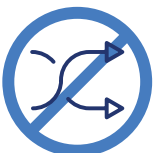
## EASE OF CLEANING AND MAINTENANCE

- Simply remove the compression bolts and slide away the moveable end frame to inspect 100% of the Accu-Therm heat transfer surface
- Easy and economical to clean-in-place (CIP)



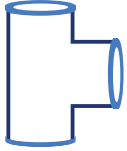
## EXPANDABLE

- Adjust the unit’s thermal performance by adding or removing plates



## CROSS CONTAMINATION ELIMINATED

- Each medium is individually gasketed
- The space between gaskets is vented to atmosphere



## CONNECTIONS

- Studded ports are standard and can be fully lined to protect against erosion and corrosion of the frame
- Lap-joint, weld-neck, ferrule, and victaulic connections are also available
- Connections can be mixed and matched to suit individual needs



## COMPACT AND LIGHTWEIGHT

- In comparison to shell and tube heat exchangers, PHE's of similar capacity require only  $\frac{1}{5}$  to  $\frac{1}{2}$  the floor space
- Lighter in total weight than equivalent heat exchangers because of reduced liquid volume and more efficient surface area for a given application



## HIGH FLOW RATES

- Flows up to 24,000 gpm
- Port diameters up to 16"



## INSPECTION AND TESTING

- Rigorous quality assurance inspections
- Each circuit independently tested at full design pressure
- ASME registration available



## REDUCED FOULING

- High turbulence, uniform fluid distribution, smooth plate surface, and high shear stresses reduce fouling



## SHROUDS

- Optional OSHA-approved plate pack shrouds are available in attractive and durable embossed aluminum or 2B stainless steel to protect personnel

# How a Heat Transfer Consultation Saved a Brewery Money

Whether you are installing heat transfer in your end product or using it in your direct operations it can be a real energy saver. However getting the right specifications is crucial and understanding the detailed spec sheet can be daunting. There are always challenges - what if you don't get it right? What if the resulting product is not what you need? Sometimes it helps to double check the infinite details affecting flow rates, pressure drops, and heat loads. A quick phone consultation might even help you make beer better.

When Tanner Beers (yes, that's his real name) was head brewer at Anthem Brewery in Oklahoma City, Oklahoma, he found the value of a Paul Mueller Company heat transfer consultation after he found contamination in his beer. Tanner had purchased a used Paul Mueller Company plate heat exchanger on the open market. Because the used PHE came from an unknown source, there was no way to know if the heat exchanger was configured for a brewery, what kind of parts had been replaced on it or what the previous owners used to clean the plates.



Tanner called up Paul Mueller Company and the heat transfer group was able to help Tanner track down the origin of the unit. It was a dairy farm equipment plate heat exchanger from 2001!

## Using City Water to Cool Wort

Mueller process engineer Victor Shafer consulted with Tanner on the contaminated beer and was able to determine Tanner had a leaky plate in his heat exchanger, but as he delved into Tanner's brewing process, he realized the brewery's chiller compressor was running constantly. It was taking too much energy to cool the wort.

Victor talked to Tanner about using city water to cool the wort down as a first step in decreasing the chiller compressor runtime. Paul Mueller Company also recommended a heat exchanger plate pack that worked more effectively in the brewery's operation.

"I was appreciative he called and talked me through some energy efficiency options that I wasn't even aware of." Said Tanner. "Everything worked the way Mueller said it would and I was able to knock out my brewing process 20% faster than before all while keeping the glycol cooler and the hot water hotter"

## Continued Energy Savings in the Brewery

The energy savings will continue to add up over the lifetime usage of the upgraded cooling system, thanks to the consultation and a new plate pack!

You want to get the most efficient and cost savings solution you can too. We can offer you the same problem-solving guidance Tanner received, when you sign up for our free heat transfer consultation. Our experts have 75-years of experience guiding us and we want to support you by:

- Advising on how we have seen certain fluids affect certain materials
- Explaining how even slight temperature differences can change your process
- Calculating the right amount of heat and cold exchange needed for optimal efficiency
- Consulting on the best frame options for your needs today, with room for growth tomorrow



**Academy**

**Get the most out of your Plate Heat Exchanger.**

Find articles, guides, and other resources dedicated to PHE maintenance, applications, and more at [ACADEMY.PAULMUELLER.COM](http://ACADEMY.PAULMUELLER.COM)

# How to Troubleshoot a Plate Heat Exchanger

Plate Heat Exchangers are an integral part of your system, so when issues arise, it's important to determine whether the problem is a one-time complication or an inherent flaw in your system. Resolving any issue begins with identifying the symptoms of your under-performing heat exchanger. The most common of these symptoms are:

- Increased pressure drop from inlet to outlet
- Loss of heat transfer efficiency
- Loss of flow and performance
- Process fluid leakage

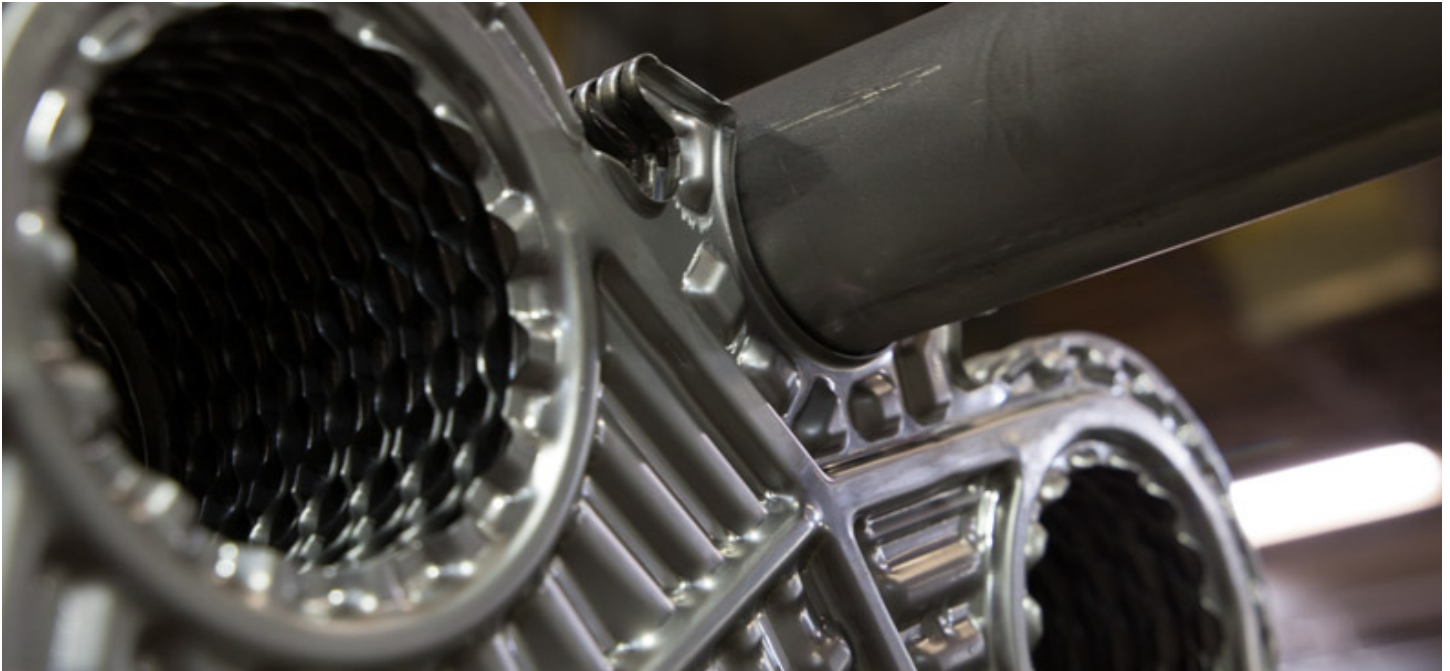
Pressure drop, transfer efficiency, and flow loss typically result from plate fouling while process fluid leakage usually develops from gasket failure. However, gasket failure or the more rare case of plate cracks can lead to any of these symptoms. Taking the simple steps to determine the underlying cause is essential.

## Gasket Failure

When troubleshooting PHEs, the easiest problem to identify is gasket failure. When a gasket fails, pressure forces fluid through the leak and it drips out of the PHE from the offending gasket, making it easy to locate. To resolve this issue, disassemble the PHE and remove both the plate with the failed gasket and an adjacent plate (to keep the flow pattern intact). If spare gaskets are available, simply replace the failed gasket, reassemble, tighten your PHE to specification, and put it back in service. If replacement parts are unavailable and downtime is not an option, the PHE can be closed and put back into service until new gaskets arrive. Operating with two fewer plates will only slightly impact performance. It's important to use caution when tightening a PHE with missing plates. Information on safe reassembly can be found in your manual or provided by the manufacturer.

The most common causes of a failed gasket are incompatible fluids and/or excessive pressure. Make sure your pressures are within specifications, your system is free of potential water hammers, and the gaskets are rated for your materials. If gaskets develop holes, your fluid is likely too hot or too corrosive and the gaskets should be replaced with those more suited to your process.

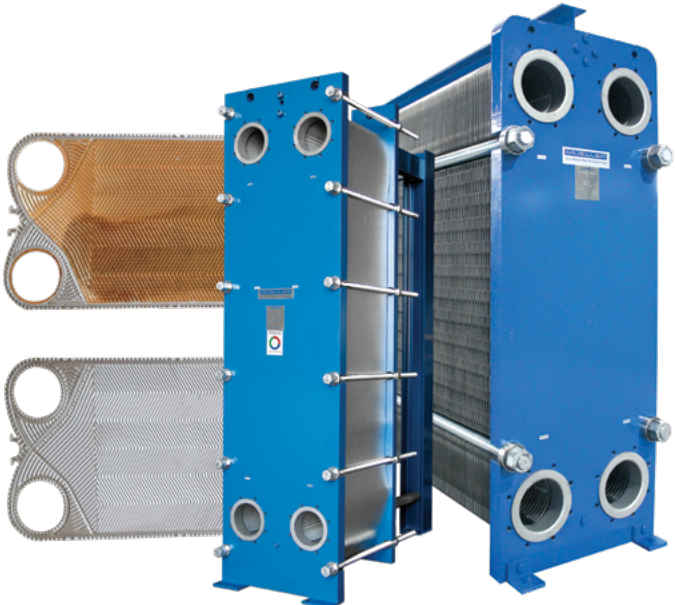




# Plate Fouling and Corrosion

Plate fouling is a common issue with PHEs, but is preventable with a proper maintenance and cleaning schedule. Regular visual examinations are important—make sure the plate pack is tightened to specification, the carrying and guide bars are lubricated, and the gaskets are undamaged. Check the pressure gauges to ensure the pressure drop is within the expected limits. The best option for preventing plate fouling is cleaning your PHE regularly either through a clean-in-place (CIP) process or disassembly and manual cleaning. A CIP process involves draining both sides of the PHE and flushing them with water or a compatible cleaning agent to remove debris or build-up. In some cases, manual cleaning of the PHE may be required. Manual cleaning of plates can be done without removing them from the frame. Cleaning agents, a high pressure washer, and a soft bristle brush are recommended for proper manual cleaning of plates.

Routine cleaning and maintenance of your PHE are excellent preventative practices to avoid plate fouling or other issues that cause equipment to fail. For more information or questions regarding maintenance habits, contact one of our representatives at Paul Mueller Company.



# Custom Designing your PHE

Let our engineers figure out the exact plate size and channel configuration to fit your custom application. The chart below includes the necessary information to report specs. For assistance or to submit your application, contact your Mueller representative or call +1-417-575-9000.

	Hot Side	Cold Side
Fluid Circulated		
Flow Rate, gpm		
Temperature In, °F		
Temperature Out, °F		
Max. Allowable Working Temperature		
Operating Pressure, psig		
Max. Allowable Working Pressure, psig		
Max. Pressure Drop, psi		
Specific Heat		
Specific Gravity		
Density		
Viscosity		
Thermal Conductivity		
Required Gasket Material		
Required Plate Material		
ASME Code		
Requirements		

FOR MORE INFORMATION OR TO SUBMIT YOUR APPLICATION, VISIT

[paulmueller.com](http://paulmueller.com)

# Delivery of your PHE

Mueller Transportation Inc., a subsidiary of Paul Mueller Company, has the capability to deliver equipment by our own fleet of trucks and experienced drivers.

## Seamless Equipment Transportation

Crafting your new equipment is just one piece of the project. Mueller Transportation Inc. provides complete oversight, care, and delivery of your equipment, no matter the shape or size. Safety and on-time delivery are top priorities as we make the transition from our manufacturing floor to your front door.

## Hassle Free

Our team of specialized drivers and installers take full responsibility of your equipment through delivery, installation, and beyond. With more than 100 years of combined service and experience in the industry, Mueller Transportation minimizes risk and keeps your project on track.



# Services

## Heat Transfer Installation

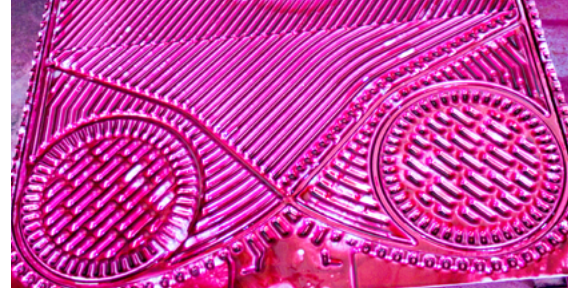
Whether you need a new heat transfer system installed or your existing system modified, our Paul Mueller Company service technicians have the necessary experience to deliver your energy source where you need it most.

Depending on your specific application, we can help you engineer the most efficient heat transfer solution for your equipment and provide installation. With our expertise, we can ensure that your heat transfer system is keeping your process at the right temperatures.



# Dye Penetrant Testing

To ensure the reliability and effectiveness of our plate heat exchangers, we utilize dye penetrant testing. This non-destructive method of testing allows for hygienic and thorough detection of potential defects such as leaks, cracks, and pinholes. By detecting these defects early, you can avoid equipment failure, cross-contamination of your products, and ultimately, loss of production time. We offer this service on any manufacturer's plate heat exchanger.



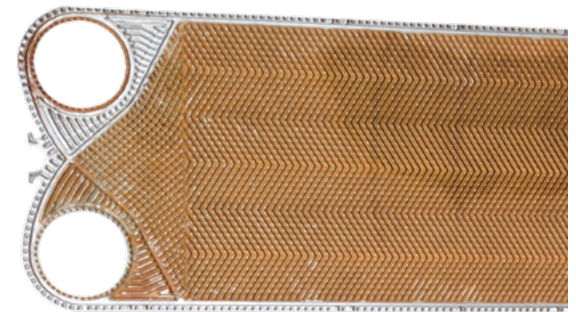
# Modifications

As your processing needs change, it may become necessary for modifications to be made to your plate heat exchangers. No matter what heating or cooling requirements you may have, our field service team is fully equipped to make the transition that you need. With our expertise, we can get any manufacturer's heat exchanger functioning exactly the way your process requires.



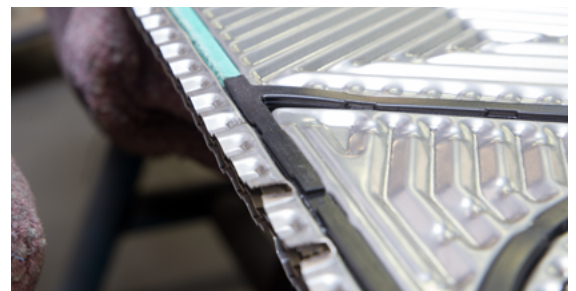
# Fouling Removal

When debris and unwanted substances accumulate on the surfaces of your plate heat exchangers and cause fouling, your operational process can rapidly lose efficiency or even halt altogether. Our field service team is equipped with the expertise to quickly and efficiently remove fouling. With proven techniques, we ensure that your downtime is reduced and that your process gets back on track.



# Leak Repair

Our expert team of technicians can identify and repair leaks in your plate heat exchangers so your process is back up and running at optimal efficiency.



# Consult with Our Experts

## THE AMERICAS

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## Heat Transfer Manufacturing Representative Locator

Nearly 100 Paul Mueller Company representatives across the globe are trained, knowledgeable, and ready to provide a solution to your heat transfer needs.

Our online interactive tool displays our heat transfer representative names, locations, contact information, and directions. To speak to the representative nearest you, visit:

[paulmueller.com/heat-transfer-representatives](http://paulmueller.com/heat-transfer-representatives)





# PAUL MUELLER COMPANY



**PAUL MUELLER, OUR FOUNDER**

At Paul Mueller Company, we are united by a belief that the only quality that matters is quality that works for life. With every piece of processing equipment we build, our goal is to have lasting impact. This collective vision has led us from a small sheet metal shop to a global supplier of heating, cooling, processing, and storage solutions. Our equipment allows engineers, brewers, and food producers to keep operations running as intended. Whether our equipment is used to cool a ship engine or process a refreshing beverage, we are making an impact across the globe.



[contact@paulmueller.com](mailto:contact@paulmueller.com)

**1-800-MUELLER | [WWW.PAULMUELLER.COM](http://WWW.PAULMUELLER.COM)**

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