March 2021

Benefits of routine service and maintenance

PLATE HEAT EXCHANGERS

What is the purpose of a Plate Heat Exchanger?

A plate heat exchanger is a type of heat exchanger that uses metal plates to efficiently transfer heat between two fluids. This has a major advantage over a conventional heat exchanger in that the fluids are exposed to a much larger surface area because the fluid is spread out over the plates allowing maximum heat transfer efficiency.

Having plate heat exchangers regularly maintained and serviced allows for more efficient operation and prevents production downtime and expensive repairs.

Blocked or poorly maintained plate heat exchangers cost more to operate, slow production and compromise safe operation.

This report outlines the importance of regular and effective maintenance of plate heat exchangers.

Operational cost savings can be guaranteed, and downtime minimised with the effective maintenance of your plate heat exchangers. Heat Exchange Group Services Ltd can give expert maintenance support across the heat exchange sector.

Running to fail with critical equipment does not allow for cost effective operation of any plant. Utilising our dedicated team of engineers Heat Exchange Group Services can maintain, service and repair your plate heat exchangers ensuring a cost effective, strategic, and professional approach.

How a gasket Plate Heat Exchanger works

Plate Heat Exchangers (PHE) were first produced in the 1920's and have since been widely used in a great number of sectors.

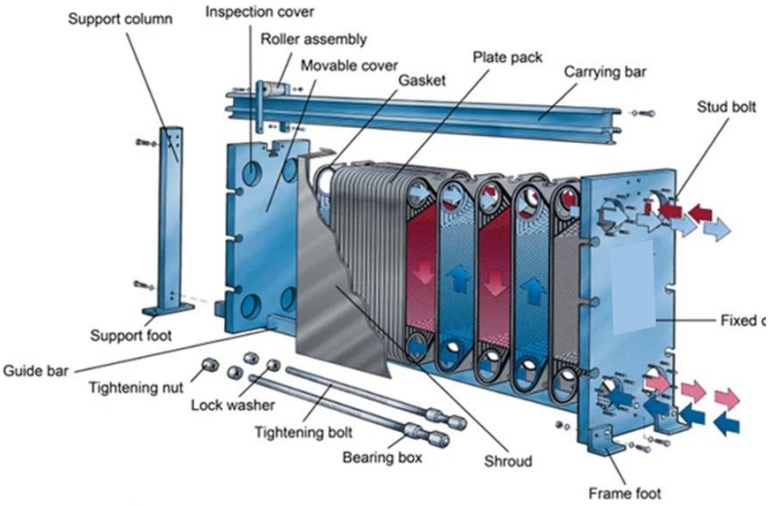
A PHE consists of a series of parallel plates that are placed one above the other, so it allows the formation of a series of channels for fluids to flow between them.

The space between the two adjacent plates forms the channel in which the fluid will then flow.

Inlet and outlet ports are at the corners of the plates and allow hot and cold fluids through alternating the channels of the heat exchanger so that a plate is always in contact on one side with the hot fluid and the other with the cold.

Plates are usually corrugated to enable a turbulent flow of fluids giving a rise to very high heat exchange rates. The corrugations also give many thousands of contact points on each plate making each complete unit rigid when tie roads are tightened. Gaskets manufactured from several different components to suit the process separate to the plates.

The size of a plate ranges from a few square centimetres up to two or three square metres. The number of plates in a single exchanger can be as little as ten growing to several hundred.



Running to failure is a no go!

Many businesses operate their PHEs until they fail, thinking that this will allow for minimum operating costs. This strategy can lead to expensive repairs and unexpected and expensive downtime.

Consider some of the below:

Budget control - Heat Exchange Group Services can provide a regular maintenance package at agreed intervals with costed, plant-specific recommendations.

We have qualified and experienced engineers that are able to maintain units in our engineering workshops or in situ at your site. Our full overhaul service includes chemical cleaning of plates, NDT crack detection, rebuild with new gaskets (oven-baked for glue type units) and pressure testing.

Heat Exchange Group Services understands how unexpected breakdowns result in downtime and expensive callouts. Often repairs carried out in these situations can be a 'quick fix' and lead to bigger and more expensive failures in the future.

Production downtime – a reduction in performance and unit efficiency are one of the main reasons for callouts to our service centre. Spares on older PHE units sometimes need to be manufactured to order and this can lead to further delays. Identifying potential problems early (at a planned service visit) can ensure parts are available when needed or replaced at the next service visit.

Design - Heat Exchange group offer a full consultation and design service. We can diagnose underperforming units and redesign a suitable alternative or upgrade.

Inspections and surveys- our team of engineers are available to attend site to carry out a full survey of your heat exchange equipment and provide a detailed report that identifies any issues together with solutions to ensure you are operating at optimum efficiency.

Spares - we hold stock of plates and gaskets for all modern plate heat exchangers. We also have access to suppliers who stock plates and gaskets for older and less common units.

Maintenance engineers - most of our engineers are time served with many years operational experience. Some have qualifications that are site specific to customers who need to know their site regimes and health and safety have been accounted for.

Installation and repair - our service teams offer a fast response, and it is a 24/7 service!

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Challenges and failures:

Fouling - The fouling of heat exchangers may be defined as the accumulation of unwanted deposits on heat transfer surfaces. This layer imposes an additional resistance to heat transfer and the narrowing of the flow area. This is due to the presence of deposits resulting in an increased velocity for a given flow rate. The deposit usually extremely rough so that there is an increased resistance to the flow of the fluid across the plate surface. The consequences of fouling are a reduction in exchanger efficiency and excessive pressure drop across the whole unit.

Corrosion, Cracks and Pitting - Corrosion failures in plate heat exchangers are often related to equipment design, service conditions and materials of construction.

Plate heat exchangers are chosen over shell and tube heat exchangers for applications requiring superior heat transfer efficiency, compactness, lower weight, and volume.

Although materials used are often resistant, corrosion will occur over time. Some corrosion, including cracks and pin holes can occur due to chemical reactions or vibration, others due to general wear and tear. Corrosion can be made worse depending on what liquid and temperature the unit works at. Internal leaks produce cross contamination, external leaks can cause contamination and damage to plant.

Gasket Failure - Over a period all gaskets will degrade. This degradation can be exacerbated by the storage and quality of the environment that they have been manufactured and stored in. Life span of gaskets can also be reduced by excessive operating temperature and pressures.

Temperatures and pressure changes can affect the performance and lifetime of gaskets making it vital these are chosen correctly in the first instance and maintained at regular intervals. Exposure to UV light can also affect performance.

Gaskets are designed to operate within a specific temperature and pressure range. Operating outside these design parameters can lead to early gasket and sometimes plate failure. Regular inspection and maintenance will help prevent early plate and gasket failure.

Gasket Material Choice

Rubber Type	**Applications**	**Maximum Temperature**
Nitrile Butadiene Rubber (NBR)	Compatible with oil and fats. Low chemical resistance to acids and bases.	140°C
Hydrogenated Nitrile Butadiene	Better chemical resistance compared to NBR. Compatible with hydrocarbons, oils and fats	160°C
EPDMP	Better chemical resistance to acids and bases.	180°C
FKMG	Strong chemical resistance and compatibility with oils.	150°C
FKMT	Performance grade, especially for high temperatures. slightly lower chemical resistance than FKMG.	180°C
Q (Silicone performance grade)	Medical grade, for applications with ultra-pure water.	100°C
Neoprene	Ammonia applications.	110°C

Our full PHE Service procedure…

1. Book in and examine
   Before any inspection and cleaning takes place, we book in each individual plate separately, determining what material the gasket is and looking for any date stamps to determine the age of the rubber gasket. We can then advise the costs for the service and replacement gaskets. If a full unit has arrived, we inspect all components including NDT of metal liners and offer a full inspection report to bring the unit back to new.

2. Remove gaskets
   Depending on the type of gaskets and length of service, these can be removed by hand safely and without damaging the plate itself. Some may have been exposed to high temperatures which have baked the gasket hard so some chemical immersion or heat may be needed to aid the removal.

3. Pre-wash and chemical cleaning
   Depending if any deposits or fouling are present on the plates, a prewash may be needed first to be sure not to damage the chemical tanks and weaken the mix. Each plate is immersed in chemical baths and closely monitored as to length of time needed depending on plate material and condition.

4. Pressure jet cleaning
   Plates are pressure washed to remove any chemicals remaining on the surface and any deposits not removed by the chemicals. These are then thoroughly dried before inspections begin.

5. Visual examination
   All Plates are inspected for any visual defects i.e. channel deformation, visual holes and parts damaged seen by the naked eye.

6. NDT and crack detection
   Ultraviolet and fluorescent dye penetrant are sprayed across each plate and left to fully immerse into any cracks. These are then examined under UV light to discover cracks and pinholes.

7. Fitting new gaskets
   All plates then have new rubber gaskets attached and if required, specialist glue is used to adhere these to the plates. Clip versions are often used for some duties which removes the need to glue.

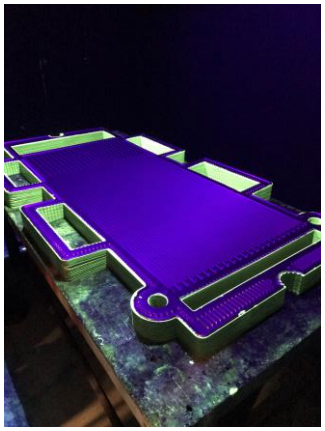
8. Oven Curing
   Glued gaskets are oven cured to ensure a secure bond to the plate.

9. Pressure Testing
   If a complete PHE unit is received, this is reassembled to the same specification as it was received. The unit will be tightened to the correct tightening dimension based on the model, material, and thickness of each plate. The unit will then be pressure tested to the correct operating pressure.

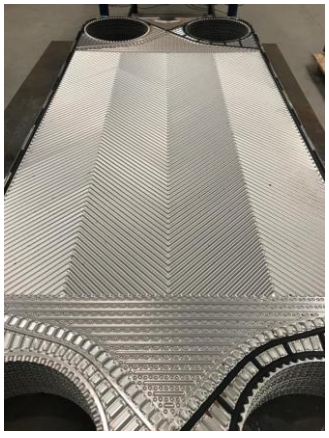
10. Quality Report and Certification
    A final visual inspection of the unit or plates is undertaken, and all necessary documentation is issued. This will include a quality report, certificate of conformity and pressure test certificate.

Booking in the plate pack

Cleaning of plates



Crack detection of plates



Clean plate with new gaskets

Why use Heat Exchange Group Services?

Heat Exchange Group is the leading UK and worldwide supplier of the widest range of heat exchanger and industrial/marine boiler products and services. The group was formed in 2018, following the merger of Thornhill Heat Exchangers and Greens Power.

We have over 30 years of experience in the service and maintenance of plate heat exchangers and associated equipment. Our engineers have experience of working in many different industries.

Blocked and poorly maintained plate heat exchangers cost more to operate and slow production. Our full-service inspection process provides guaranteed, proactive maintenance of your heat exchanger preserving performance and keeps your operations running trouble free. It's worth noting, PHE plates immersed in chemicals too long can actually reduce their life span!

Contact us now for great quality service fast response repairs…

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On-site servicing of PHEs

Reconditioned PHE in our Prudhoe Factory

We hold our clients' spare plates so we can carry out fast turnaround repairs if required.