

UNIGASKET

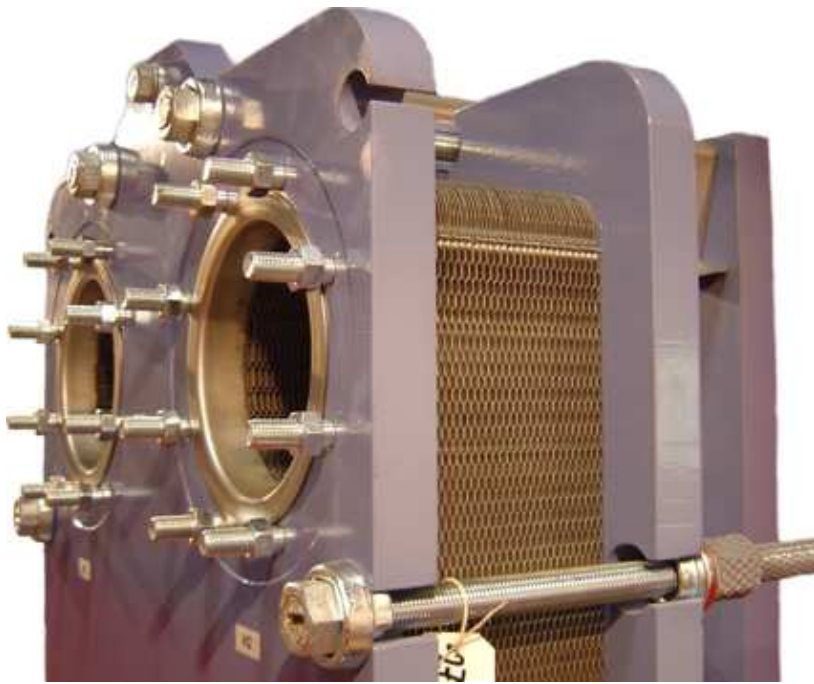


Plate Heat Exchangers **Operating Instructions**



Introduction

These operating instructions are the guide to the installation, operation and maintenance of plate heat exchangers (PHE) supplied by Unex Scambio Termico Srl.

We recommend to read these instructions and to disclose them to the staff installing, operating and maintaining the PHE.

Unex Scambio Termico declines any responsibility for any damages occurred to the installation/plant arising from a wrong use or bad maintenance of the PHE or disregard of these instructions

For further information, please contact Unex Scambio Termico or one of the service centres of Unex Scambio Termico Srl.

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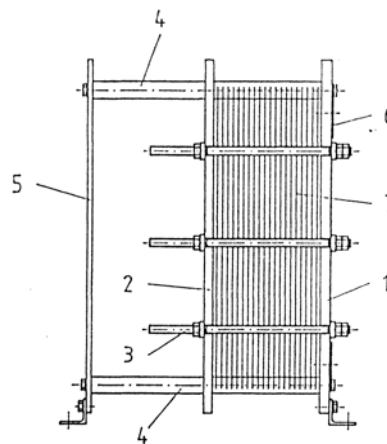
1.0 Working principle

The exchange area is formed by punched plates in stainless steel that are assembled one after the other in order to form channels where the fluids flow.

Each plate is provided with a gasket that avoids leakages and prevent the 2 fluids to mix. The gaskets, as well as the connections, are supplied in materials that are compatible with the design temperature and with the nature of the fluids in the PHE.

The gasketed plate heat exchangers (line of production PGA e PGT) consist of :

- 1 head frame
- 2 follower frame
- 3 tightening bar
- 4 guiding bar
- 5 column
- 6 connections
- 7 plates



2.0 Exchange plates

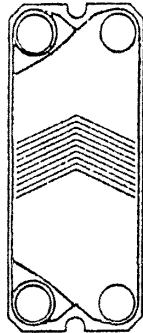
UNEX gasketed PHE can be supplied with 2 different types of plate.

Each plate has a distribution area at its top and at its bottom that makes sure that the fluid is distributed evenly through the whole length of the plate, both in parallel or/and cross flow models,

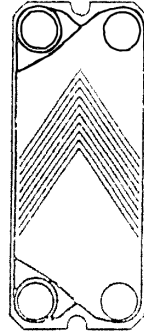
UNEX standard for UniGasket PHEs is with parallel flow – some models can be supplied also with cross flow, upon customer's request.

3.0 Types of plates

The majority of UNEX models feature 2 types of “herring-bone” :



Type H, high pressure drop, high heat transfer coefficients



Type L, low pressure drop, low heat transfer coefficients

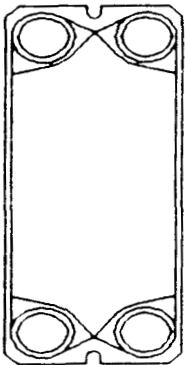
You can assemble the PHE with 3 different channels, for example : only H, only L or a combination of H and L

The plate pack is usually formed by a even number of plates. On request , also uneven number of plates.

The start plate and the middle plates have 4 see-through holes. The end plate is blind.

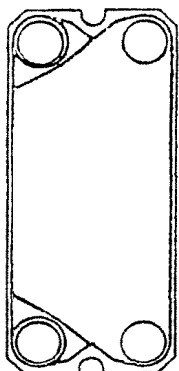
The different gasket distinguishes the start plate from the middle plate

Start



See-through holes are surrounded by the gasket
The fluids flow through the these holes without any contact with the frame, but touching only the gasket and the next middle plate.

Middle



Only 2 holes are surrounded by the gasket.
The fluids flow in the channels formed by 2 middle plates. The number of channels can be even (number of plates = uneven) or uneven (number of plates = even) depending on the assembly standards

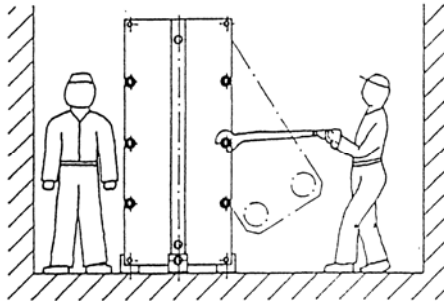
4.0 Reception of the PHE

4.1 unpacking :

Check that all the pieces described in the delivery note are present. Inform us immediately in case of non-conformity

4.2 positioning :

Leave enough space on the sides of the PHE to allow an easy maintenance. For models more than 2 m. high, we suggest to leave at least 2 m. for these operations.



4.3 installation :

PHEs must be installed vertically. The connections are to be connected to the piping following the diagram indicated by the inlet/outlet labels or following the instructions on the offer. Check valves are to be installed before the PHE connections. To clean the PHE (CIP), ball valves with faucets are recommended, in order to avoid the disassembly of the PHE.

For multi-pass PHEs (connections on the head and on the follower frame) the connections to the follower frame must be provided with 90° elbows to allow the removal of the follower

IMPORTANT

- **Do not apply weight or pressures to the PHE connections.**
- **The follower frame must not have connection to fix points.**
- **Quick changes of the temperature can cause leakages.**
- **If the initial design data (temperatures, type of fluid, pressure) of the PHE have changed, the compatibility of the originally chosen materials are to be reconsidered**

5.0 Start-up

Check that the installation data (temperature and pressure) are in conformity with the data on the PHE label. The start-up of the PHE must be done with the utmost care. Close all the valves to the PHE. Start all the supply pumps and slowly open the inlet valves to the PHE and then the outlet valves.

The opening of the valves must be slow in order to avoid pressure shocks. Potential pressure shocks can dislocate the gaskets and cause leakages. The installation and the PHE must be air vented prior to the start-up. It is possible to start both circuit at a time or each circuit singly.

6.0 Arrest

To arrest the PHE, follow the indications at point 5 in reverse order then drain the PHE.

7.0 Maintenance

Before opening the PHE, diagonally mark with colour the plate pack and check the tightening measure.

7.1 opening of PHE :

I M P O R T A N T

Open the PHE only when it has cooled down to room temperature !!!

Before opening the PHE, clean the surface of the plate pack and of the frame. Particles and dirt could stick between the plates and ruin the gaskets.

In multi-pass PHE, first disconnect the pipes on the follower frame, loosen the tightening bars (diagonally), slide the follower backwards along the guiding bar and remove the plates

7.2. removal of plates :

After having removed the follower, take out the plates starting from the end plate.

Attention :

plates have cutting edges – use protection gloves, always

Remove 2 or more plates at a time, taking care not to damage the gaskets or the plates.

I M P O R T A N T

In case of replacement of one or more plates in the PHE, the new plates could have a different tightening measure from the old ones. We recommend, therefore to replace the complete plate pack to avoid leakages.

7.3. cleaning plates

Always use protection gloves and goggles when cleaning the plates

Do not use metallic brushes on the plates – only plastic or wood.

Oil residues : can be removed with a brush and paraffin (kerosene), gasoline or fuel
Organic and protein residues : alkaline solution, 2% caustic soda at 50°C.

Scaling can be eliminated with a light acid solution, example 10% nitric acid at 50 °C

I M P O R T A N T

PROTECT EYES AND OTHER BODY PARTS WITH PROTECTION CLOTHING DURING THE CLEANING OPERATIONS – ACID SQUIRTS CAN BE VERY DANGEROUS

ACID VAPOURS CAN BE HARMFUL FOR HUMAN HEALTH : AIR THE MAINTENANCE ROOM FREQUENTLY.

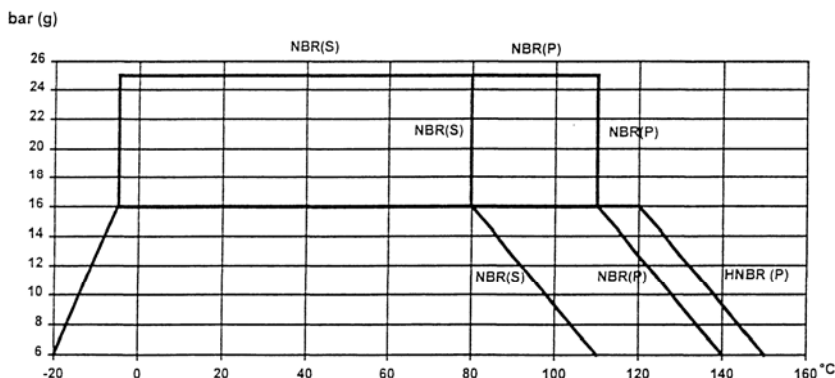
AFTER THE CLEANING WITH ACID OR DETERGENT, RINSE THE PLATES WITH FRESH WATER.

7.4 replacement of gaskets

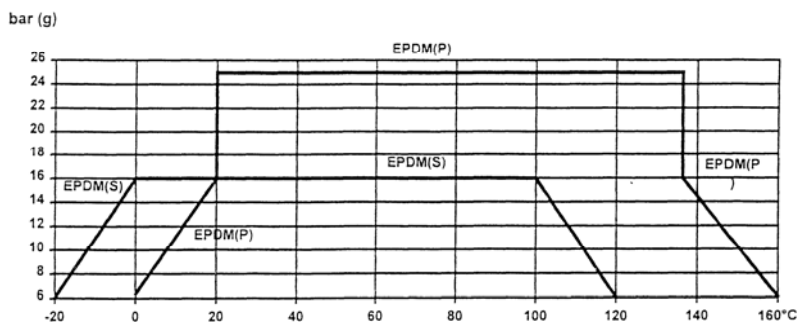
Gaskets are components that can wear rapidly and are therefore not included in the warranty
For that reason, an indication of the gasket's life cannot be given, since its duration depends on the working conditions of the PHE. In fact, pressure and working temperatures can determine the life of the gasket.
Frequent arrests of the PHE could cause the premature wear of the gaskets,

Potential resistance of gaskets to temperature and pressure

Nitrile -NBR:



EPDM:



Removal of the gaskets

Damaged or worn out gaskets must be removed from the plates. Here are some methods :

- blow hot air on the back of the plate to soften the glue in the gasket groove and detach the gasket from its groove;
- immerse the plate in liquid nitrogen for short time (-196 °C) until it becomes cold. The different elongation coefficients of steel and rubber make the gasket come out of the groove

Cleaning the gasket groove

After the removal of the gasket from its groove, purge the glue from the groove before placing the new gasket. No residue of the old glue must remain in the groove. Clean the groove from oil or grease with acetone before distributing the new glue in the groove.

IMPORTANT

Use only chlorine-free solutions.

Gluing the gasket

Evenly apply a light layer of glue in the groove and let it dry for short time. It is important that the gasket is well flat and that there are no bumps due to excesses of glue.

After the application of the glue and the positioning of the gasket, let them rest for 5 hours to dry the glue completely.

When this time is though, it is possible to re-assemble the plates in the frame.

Glue

To stick the gaskets you can use :

- Pliobond 20 o 30
- 3M EC 1022
- Bond Spray 77
- Bostik 1782

7.5 assembly of the PHE :

To assemble the PHE, follow the indications at points 7.1 and 7.2 in reverse order.

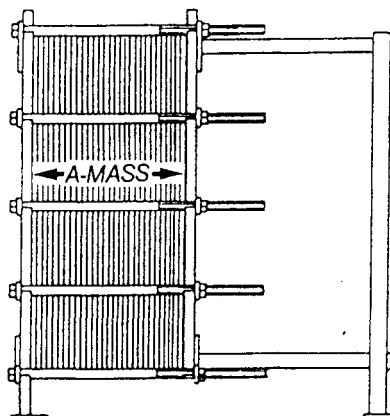
Tightening the plate pack

Lubricate the bars before tightening the plate pack

Start to tighten the bars diagonally, making sure that the head frame is always parallel to the follower.

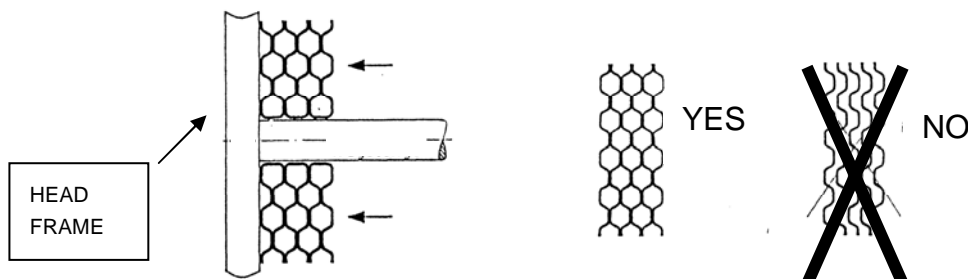
The plate pack is to reach the measure indicated on the label (tightening measure max). This measure is the distance between the head frame and the follower. Because of material tolerances, this measure can oscillate of $\pm 3\%$.

We suggest to tighten the nuts until very close to the tightening measure max. and in case tighten the nuts furtherly till you reach the tightening measure min.



Before reaching the definitive measure, check that the plates are assembled correctly.

Looking at PHE from the side, the plate pack is to look like a honeycomb



8.0 Troubleshooting

8.1 leakage (gasket)

In gasketed PHEs, leakages of fluid can occur, this is mainly due to the cooling down of the rubber. Once the PHE reaches the working temperature, the leakage should stop.

If the leakage persists even during the normal working, it is necessary to slightly tighten the plate pack. First check that the tightening measure is consistent along all the plate pack, let the PHE cool down and tighten the measure down to the minimum value indicated on the label, then return to working temperature. Do not go beyond the minimum tightening measure without the agreement of a UNEX technician, If the problem does not disappear, contact UNEX Scambio Termico Srl : Tel. 045 6717709

8.2 fluid contamination (middle plate)

Due to corrosion, holes or tears can appear on the plates – these holes allow the fluids in the 2 circuits to mix. To detect the defect, drain one of the circuit completely and put the other one under pressure (at least 5 bar) Check the bottom connection of the empty circuit – the fluid contained in the other circuit should come out from there.

Disassemble the PHE and identify the damaged plate with penetrating fluids, replace the faulty plate and the 2 adjoining one (before and after).

8.3 changes in temperature

When outlet temperatures change from the design ones, it could be due to the fouling that has decreased the heat transfer coefficient of the circuit. Carry on manual or chemical cleaning

The change of the flow rates, makes also outlet temperature change. Check that the design data are in conformity with the actual working data.

8.4 high pressure drop

The increase of pressure drop, can depend on bigger flow rates, from fouling or from the presence of impurities in the PHE, arrived from the conduit.

To eliminate fouling quickly, back flush the PHE. If this is not possible, carry on manual or chemical cleaning



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