Gasketed Plate Heat Exchanger Installation, Operation & Maintenance Manual

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Appendix A – Sample Documentation
1. Introduction

This manual contains important information needed to install, operate and maintain your Gasketed Plate Heat Exchanger.

UK Exchangers Ltd will not accept responsibility for any damage or injury as a result of not following the instructions in this manual.

The heat exchanger must be installed, operated and maintained by authorised persons who have studied the instructions in this manual and are familiar with the process conditions and local safety regulations.

The heat exchanger is designed to operate at the design conditions detailed in the documentation package supplied to you in electronic format.

If you wish to change the design conditions, please contact UK Exchangers Ltd for their written confirmation. A new name plate may be required.

2. Safety

The heat exchanger may contain hot and/or corrosive fluids at high pressure so special attention must be paid to safety, local safety regulations and the use of safety equipment.

Yellow Triangle - This symbol identifies specific safety hazards

Note – Indicates a potential situation which, if not avoided may result in the equipment being damaged.

The operating company is responsible for the safe operation of the Plate Heat Exchanger

3. General Hazards

Prior to commencing any work on the heat exchanger ensure that the heat exchanger is depressurised, drained down and below 40°C.

Sharp Edges – The heat transfer plates have very sharp edges. Always wear gloves when handling them.

Follow all local safety regulations.

If in doubt, please contact the UK Exchangers Ltd Technical Department.
4. **Supplied Documentation**

   The heat exchanger is supplied with the following documentation that is sent in electronic format:

   - **Datasheet** – Details the technical information for the unit – serial number, materials of construction, process design conditions (flow rates, temperatures, pressure drops), design pressure, design temperature, weight etc..

   - **Plate Sequence Sheet** – Gives details on the configuration of plates in the heat exchanger and the plate pack tightening dimensions “A”

   - **Declaration of Conformity with the Pressure Equipment Directive Certificate**

   - **General Arrangement Drawing**

   - **Installation Operation & Maintenance Manual**
5. General Description

5.1 Function

A Gasketed Plate Heat Exchanger consists of a pack of corrugated metal plates each with a rubber gasket compressed between two steel end plates.

The arrangement of the gaskets enables the hot and cold fluids to pass down & up alternate channels.

5.2 Main Components

To ensure that this manual is fully understood all personnel connected with the installation, operation and maintenance should familiarise themselves with the names of the major components:

_Gasketed Plate Heat Exchanger with Rubber Port Liners & Support Leg_
5.3 Name Plate

The name plate is manufactured from stainless steel and is attached to the heat exchanger by rivets at each corner.

**Warning!** – The design pressures & temperatures for each unit are marked on the name plate. These must not be exceeded.
5.4 Heat Transfer Plate Identification

There are two types of pressing pattern:

“H” – Higher thermal performance with a higher pressure drop characteristic and can be identified by an obtuse pressing pattern
“L” - Lower thermal performance but with a lower pressure drop and can be identified by an acute pressing pattern

Plate packs can be either all H, all L or a combination of H & L to optimise the thermal performance whilst meeting any pressure drop requirements.

Depending on which way up the H & L plates are installed in the heat exchanger determines whether they are either a Right-Hand Flow Plate or a Left-Hand Flow Plate.
5.5 Gasket Types

- Flow plate gasket
- Start Plate Gasket
- Start Plate Gasket no O Rings (made from 2 flow gaskets)

5.6 Heat Transfer Plate Ports

Open ports are numbered 1, 2, 3 & 4 starting at the top left-hand side and going in a clockwise direction. If the port is closed, then it has the number 0.

Examples are:

- 1234
- 0000
- 1200
- 0034

The Plate Sequence Sheet gives details of the arrangement of the plates in the heat exchanger and should be followed precisely to ensure that the heat exchanger functions correctly.
5.7 Frame Nozzle Locations

5.8 Plate Pack Tightening Dimension “A”

The heat exchanger plate pack should be tightened down to the “A” dimension detailed in the contract documentation. The “A” dimension is measured between the inside faces of the Head & Follower Plates.
5.9 Optional Extras

Depending on the scope of supply the following options may or may not be supplied.

5.9.1 **Insulation Jacket** - Is removable and is designed to insulate the heat exchanger to reduce heat loss.

5.9.2 **Spray Screen** – A stainless steel sheet that fits over the Plate Pack and is designed to protect personnel in the vicinity of the heat exchanger in the event of a gasket failure and the resultant discharge of hot or corrosive fluids.

5.9.3 **Mounting Feet** - Allows the heat exchanger to be bolted down to either foundation bolts or a steel base frame.

5.9.4 **Tie Bolt Bearing Boxes** – Reduce the tie bolt nut friction which in turn speeds up the dismantling and assembly of the heat exchanger.
5.9.5 **PHE Protection Valves** – Should be located in the pipework before the heat exchanger to filter out larger particles in the fluid that could block the heat exchanger. Valves are available in the following sizes - \( \frac{3}{4} \), 1", 1\( \frac{1}{4} \), 1\( \frac{1}{2} \) & 2".

5.9.6 **Drip Tray** – If the heat exchanger is in a sensitive area the Drip Tray will offer protection in the event of leakage.

A threaded boss is provided that should be piped to a suitable drain

5.9.7 **Flange Connections Studs** – Factory installed
6. Storage

All UK Exchangers Ltd Plate Heat Exchangers are supplied fully assembled, tested and ready to put into service. If the unit is to be stored for one month or longer prior to installation the following procedures should be followed:

6.1 Indoor Storage

- Store at a temperature between 15 & 20°C & a relative humidity below 70%
- Store away from electric motors & welding equipment as these produce Ozone which could damage the gaskets.
- Store away from organic solvents & acids as these can damage the gaskets
- Do not store in direct sunlight. If this is not possible the plate pack needs to be covered with black plastic.
- Blank off the connections.
- Cover the tie bolts with a thin layer of grease.

6.2 Outdoor Storage

All items detailed under Indoor Storage need to be covered as far as practical. In addition:

- Visually check the heat exchanger every second month.
- If the storage temperature is below 15°C then the heat exchanger should be allowed to warm up in side over 48 hours to allow the gaskets to adjust to the temperature.
7. Installation

7.1 Unpacking

All UK Exchangers Ltd Gasketed Plate Heat Exchangers are delivered strapped to wooden pallets and covered in shrink-wrap plastic and held to the pallet with plastic straps.

Prior to unpacking the package should be inspected to ensure that no damage occurred during transportation.

The heat exchanger should be lifted using appropriate slings and shackles connected to the lifting holes located on the frame plates. Smaller heat exchangers (models UKE-1 & 2) can be lifted into position by hand.

The weight of the heat exchanger can be found on the Datasheet.

Never lift the heat exchanger using the connections or connection studs as this may result in damage to the connections and the internal plates.

Upright Plate Heat Exchangers have a high centre of gravity and may fall over. Great care should be taken that this does not happen after unpacking and prior to installation.

7.2 Disposal of packing materials

Disposal of all packing materials is the responsibility of the purchaser. Wooden pallets can be reused or recycled. Plastics should be recycled.
7.3 Space Requirements

It is very important that enough space is left each side and in front of the heat exchanger so it can be services effectively.

As a minimum 1 m should be left each side to enable access to the tie bolts and removal of the heat transfer plates.

A distance equal to at least the length of the tie bolts should be left in front of the heat exchanger head plate to allow tightening bolt withdrawal & removal.

7.4 Pre-Installation checks

- Make sure that the pipework that is to be connected to the heat exchanger is flushed out and free from foreign objects.
- Check that all the heat exchanger tie bolts are tight and that the plate pack is set at the correct “A” dimension.
- Safety valves should be installed in accordance with local regulations.
- Install air vents in the pipework to remove any air from the heat exchanger.
- To avoid water hammer do not use fast acting valves.
- Isolation valves should be provided on all connections so the heat exchanger can be opened for servicing without draining the whole pipe-work system.

7.5 Piping up

When connecting the pipework to the heat exchanger make sure that no stress or strain is imposed by the pipework onto the heat exchanger. If the pipework is subject to vibration and/or thermal expansion flexible couplings should be fitted.

**Threaded Connections** – Use two wrenches when attaching the union to ensure that the connection does not rotate.

If the threaded connection is allowed to rotate it will destroy sealing gasket on the Start Plate inside the heat exchanger which will cause a leak. Should this happen the heat exchanger will need to be dismantled and the Start Plate gasket replaced.
**Rubber Lined Flanged Connections** – The mating flange should be bolted directly onto the head plate using the rubber liner as the flange gasket using either the connection studs supplied with the heat exchanger (additional price option) or suitable bolts.

Care should be taken to ensure that the bolts attaching the flange to the heat exchanger are not too long. Over long bolts will pass through the heat exchanger head plate and damage the first heat transfer plate require the heat exchanger to be dismantled for repair.

**7.6 Filtration**

Particles up to 1 mm diameter will pass through the heat exchanger. If either fluid contains particles, we recommend that filters be fitted before the heat exchanger with a filter mesh size of 1.0 mm maximum, 0.5 mm mesh size is preferred to allow for irregular particle shapes.

**7.7 Vents & Drains**

Sufficient vents and drains should be incorporated into the system pipework to ensure that the system can be vented, and the heat exchanger drained down when required. Safety valves should be included to protect the heat exchanger from fluid expansion when all valves are closed.
8. Operation

It is essential that the heat exchanger is not subjected to thermal or mechanical shock which could lead to gasket failure and leakage.

8.1 Commissioning & Pre-Start Checks

- Check that the heat exchanger is piped up correctly. Refer to contract documentation for nozzle locations.
- Check that all the heat exchanger tie bolts are tight and that the plate pack dimension is correct – Refer to the contract documentation for the correct “A” dimension.
- Check that the system maximum working temperature & pressure do not exceed the figures stated on the heat exchanger datasheet and nameplate.

8.2 Start-up

Start up the cold circuit first and then the hot circuit. The system should be filled and fully vented.

- Close the shut-off valve between the pump and the heat exchanger
- Fully open the valve on the return line from the heat exchanger
- Start the circulating pump
- Slowly open the shut-off valve between the pump and the heat exchanger
- Vent the system again if necessary

Repeat the above operation for the hot circuit

When using steam as the heating media:

- Ensure that the steam valve is fully closed
- Check that the heat exchanger is fully drained of condensate
- Start up the cold circuit
- Slowly open the steam valve
- Check that the system pressure and temperatures do not exceed the heat exchanger design specification

8.3 In Operation

Check for pressure pulses in the system caused by the pumps or control valves. Continuous pressure pulses will result in fatigue failure of the plates.

Visually check the heat exchanger for leaks

The maximum operating conditions as detailed on the heat exchanger nameplate should not be exceeded.
8.4 Shutdown

- Slowly close the valve on the hot circuit
- Switch off the hot circulating pump
- Allow the heat exchanger to cool down to below 40°C
- Slowly close the valve on the cold circuit
- Switch off the cold side circulating pump
- Close all remaining shut-off valves

If the heat exchanger is to be shut down for an extended period, the following should be carried out:

- Drain both sides of the heat exchanger
- Depending on the fluids the heat exchanger should be rinsed then dried
- Lubricate the tie bolts
- Loosen the tie bolts so that the A dimension is at max + 10%. This relieves pressure on the gaskets to help them remain elastic.
- If the heat exchanger is to be disconnected from the pipework the connections should be covered
- Cover the plate pack with a black plastic sheet
9. Maintenance

It is very hard to determine precisely how often the heat exchanger should be dismantled and the plates cleaned this will depend on types of fluid and operating conditions.

If the heat exchanger is achieving its thermal performance and the pressure drops are as per the datasheet then we suggest that the unit is left alone. We do not recommend opening the heat exchanger just to have a look as this can displace the gaskets and result in leaks when the unit is re-assembled.

A decrease in thermal performance and an increase in pressure drops are indications that the plates in the heat exchanger are becoming dirty and require cleaning.

The heat exchanger should be visually inspected regularly for signs of any leakage. If a leak is discovered between two plates mark its location with a felt tip pen so that it can be found easily after the heat exchanger has been dismantled.

After a long period of use the gaskets may require replacing.

9.1 Cleaning in Place (CIP)

CIP cleaning can be performed if the deposits on the plates are soluble and the heat exchanger is not completely blocked.

The supplier of the cleaning solution should be consulted to ensure that the proposed fluid does not damage the heat transfer plates & gaskets.

The CIP circulation rate should be as high as possible and as a minimum at least as much as the process circulation rate with the cleaning fluid circulated for a least 30 minutes.

After cleaning the heat exchanger should be thoroughly flushed with clean water for at least 10 minutes.

9.2 Back Flushing

If fibres or large particles are present in the process fluid these can collect at the inlet of each plate resulting in the inlet port blocking.

Back flushing can be a successful method or removing this debris.

The installation of strainers before the heat exchanger should be considered to reduce the frequency that back flushing is required.
9.3 Cleaning Detergents

Oil, grease & wax: Emulsifying agent (Jizer, Gunk). Kerosene
Gasket Glue Acetone

Regarding other deposits please consult a cleaning specialist for the most suitable detergent.

Ensure that any detergent that is used is compatible with the plate and gasket materials. Hydrochloric or Hydrofluoric Acid should never be used as the plates will be damaged.

After using any type of cleaning agent rinse thoroughly with fresh water.

9.4 Safety

Always use safety boots, gloves and safety glasses when handling plates and cleaning fluids. Face or gas masks should be worn if the fluids within the heat exchanger are volatile or toxic.

9.5 Opening the Heat Exchanger

- Shut down the heat exchanger as detailed in section 6.4
- Allow the heat exchanger to cool to below 40°C
- Check that the heat exchanger is not under pressure
- Drain the heat exchanger down
- Remove any debris from the top of the plate pack using either a brush or an air line
- Clean the Tie Bolts and lightly oil the threads
- Undo the tie bolts in sequence starting with the top and bottom bolts (No 1). Make sure that the Follower Plate remains parallel to the Head Plate throughout the operation.

Loosening Sequence - No 1 first

- Push Back the Follower Plate to gain access to the Heat Transfer Plates
- Carefully separate the Heat Transfer Plates to avoid damaging the gaskets
• When removing the plates number them with a felt tip pen so that the correct order and orientation is maintained

WARNING – For models where the plate pack is supported by the lower frame bar with the top frame bar acting as a guide there is a risk that the plate pack can fall back when the Follower Plate is moved. Care should be taken when pulling back the Follower Plate to ensure that the Plate Pack remains in place. This is of particular importance for taller heat exchangers.

9.6 Cleaning the Plates

Use a soft scrubbing brush. Never use a wire brush, steel wool or sandpaper to mechanically clean the plates.

Refer to section 9.3 for the correct cleaning fluid or consult a cleaning specialist. Take care not to damage the gaskets during the cleaning process.

The plates should be thoroughly rinsed with fresh water after cleaning.

After cleaning check for any plate damage or deformation. If this has occurred the plate will need to be replaced.

9.7 Gasket Replacement

All flow and end plate gaskets are glue free hang-on type. These are easy to install but care should be taken that the gasket isn’t dislodged before or during the installation of the plates back into the heat exchanger.

The start plate has a glued-on gasket that covers all the port holes. The start plate gasket is made by cutting down two standard flow gaskets and removing the hang-on tabs.
The gasket glue needs to be chlorine free with the work carried out in a well ventilated area using gloves.

Suitable gasket glues: Pliobond 20 or 30, Bostic 1782, 3M EC 1099, Scotchgrip 847

**9.8 Plate Re-Installation**

Before installing the plates back into the frame make sure that they are clean dry and free from oil or grease which will cause the plates to slip leading to miss-alignment.

Old or damaged gaskets should be replaced.

Fit the plate in accordance with the Plate Sequence Sheet making sure that the gaskets face the Head Plate. If the plates were numbered when removed this makes the process a lot quicker & easier.

Install the plates one at a time. Wipe the gasket face and the back of the gasket groove of the previously installed plate to make sure that there is no dirt or grit on the sealing surfaces. Check that the gasket is correctly located.
WARNING – For models where the plate pack is supported by the lower frame bar with the top frame bar acting as a guide there is a risk that the plate pack can fall back before the Follower Plate is pushed back into position. Care should be taken in case the unsupported plate pack topples over before the Follower Plate is pushed back into position. This is of particular importance for taller heat exchangers.

9.9 Assembling & Pressure Testing

- Lightly oil the tie bolt threads. Do not allow oil to get onto the gaskets
- Visually check that the gaskets are located correctly and no of the hang-on clips are protruding.
- Slide the Follower Plate up against the plate pack and install the Tie Bolts.

![Tightening Sequence - No 1 first]

- Tighten the heat exchanger initially using Bolts 1, then 2 ensuring that the Head Plate & Follower Plate do not skew by more than 10 mm.
- As the Plate Pack becomes tighter tighten using all the Tie Bolts.

![Tightening sequence with dimension]

- Tighten the plate pack down to the “A” dimension detailed in the Plate Sequence Sheet.
- After assembly the heat exchanger can be hydrostatically tested to the design pressure maximum. The test should be performed on one side at a time with the other side open to atmosphere. Test duration per side 10 minutes minimum.
Do not tighten the plate pack below the minimum tightening dimension as this will cause damage to the plates & gaskets

9.10 Routine Maintenance

Periodically inspect the heat exchanger for leaks. If there is a slight leak from the plate pack and the tightening dimension is greater than the minimum value in many cases the leak can be cured by tightening the plate pack down to the minimum tightening dimension. This should only be carried out with the heat exchanger depressurised.

If a leak occurs with the plate pack set at the minimum tightening dimension this can indicate that the gaskets have deteriorated and require changing.

The Tie Bolts should be lightly lubricated from time to time so as they can be easily loosened. Ensure that no oil comes into contact with the plates or gaskets.

9.11 Ordering Spare Parts

When ordering spare parts or requesting technical assistance please provide us with the model number & serial number of the heat exchanger.
### 10. Trouble Shooting

#### 10.1 Fluid Leakage

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Fluid Leakage</td>
<td>Plate Pack not tightened down to the correct dimension.</td>
<td>Depressurise the heat exchanger and tighten down to the correct tightening dimension. If the plate pack is at the maximum tightening dimension then tighten down to the minimum tightening dimension.</td>
</tr>
<tr>
<td></td>
<td>Displacement of gasket(s) due to system pressure pulsations or pressure shocks.</td>
<td>Shutdown &amp; dismantle the heat exchanger. Relocate the gasket(s). Find &amp; cure the cause of the shocks otherwise the unit will fail again.</td>
</tr>
<tr>
<td></td>
<td>Cold Leakage. A sudden change in temperature can temporarily reduce the sealing properties of the gaskets</td>
<td>No action required. The gaskets should re-seal once the temperature has stabilised</td>
</tr>
<tr>
<td></td>
<td>Old age</td>
<td>Dismantle heat exchanger &amp; replace the gaskets</td>
</tr>
<tr>
<td>Internal fluid leaking from one side to the other</td>
<td>Cracked or holed plate(s)</td>
<td>Dismantle heat exchanger, identify cracked Plate(s) and replace.</td>
</tr>
<tr>
<td></td>
<td>Plate Pack not tightened down to the correct dimension.</td>
<td>Depressurise the heat exchanger and tighten down to the correct tightening dimension.</td>
</tr>
<tr>
<td>Leak around the outside of threaded connection and between Head Plate &amp; Start Plate</td>
<td>The connection has been allowed to turn during installation which has displaced or split the gasket on the Start Plate</td>
<td>Dismantle heat exchanger &amp; replace start plate gasket. When assembling ensure that the connection doesn’t turn when connection if re-connecting the pipework.</td>
</tr>
<tr>
<td>Flanged Connections - Leak between Start Plate &amp; Head Plate</td>
<td>The Rubber Port Liner has deteriorated</td>
<td>Dismantle the heat exchanger and install new Rubber Port Liners.</td>
</tr>
<tr>
<td></td>
<td>If the connection flange has been bolted to the Heat Plate with bolts that are too long these can puncture the Start Plate and cause it to leak</td>
<td>Dismantle the heat exchanger and replace the Start Plate.</td>
</tr>
</tbody>
</table>
Do not use the Plate Heat Exchanger as an earth when welding. This can cause internal sparking across the plates leading to damage and leakage.

### 10.2 Not Meeting Operation Specification

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Cause</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process temperatures not being met</td>
<td>Incorrect flow rates</td>
<td>Adjust flow rates</td>
</tr>
<tr>
<td></td>
<td>Service medium temperature not as per design conditions.</td>
<td>Adjust temperature. If this is not possible then additional plates may be required</td>
</tr>
<tr>
<td></td>
<td>For example, cooling water temperature higher than the specification</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Air in the system</td>
<td>Vent air</td>
</tr>
<tr>
<td>Pressure drop too high – Process temperatures correct</td>
<td>The plates are clean but the inlet to the plates is blocked by particles</td>
<td>Back flush to remove the particles</td>
</tr>
<tr>
<td>Pressure drop too high - Process temperatures not meeting the design</td>
<td></td>
<td></td>
</tr>
<tr>
<td>specification.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure drop too high. Heat Exchanger clean</td>
<td>Build-up of dirt on the surface of the plates.</td>
<td>Clean using CIP or dismantle the heat exchanger and manually clean the plates</td>
</tr>
<tr>
<td>Pressure drop too high. Heat Exchanger clean</td>
<td>Flow rate too high.</td>
<td>Adjust flow rate</td>
</tr>
<tr>
<td></td>
<td>Fluid specification has been changed. For example, glycol added when unit was</td>
<td>If the higher pressure drop is not acceptable then additional plates will need to be added to the heat exchanger to reduce this.</td>
</tr>
<tr>
<td></td>
<td>designed for water</td>
<td></td>
</tr>
<tr>
<td>Process temperatures not meeting the design specification – Heat</td>
<td>Fluid specification has been changed. For example, glycol added when unit was</td>
<td>Additional plates will need to be added to the heat exchanger.</td>
</tr>
<tr>
<td>Exchanger is clean</td>
<td>designed for water</td>
<td></td>
</tr>
</tbody>
</table>

Please note that the above assume that the heat exchanger is assembled correctly with the plates in the correct sequence. As an example, if the End Plate is installed part way through the Plate Pack rather than at the end this will lead to higher pressure drops and reduced thermal performance.
## Appendix A – Sample Documentation

### Sample Data Sheet

<table>
<thead>
<tr>
<th>UK EXCHANGERS LTD DATA SHEET</th>
<th>Contract No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model Number :</td>
<td></td>
</tr>
<tr>
<td>OKE-4 (45 plates)</td>
<td></td>
</tr>
<tr>
<td>Quantity : 1 off</td>
<td></td>
</tr>
<tr>
<td><strong>Equipment :</strong></td>
<td></td>
</tr>
<tr>
<td>Gasketed Plate Heat Exchanger</td>
<td></td>
</tr>
<tr>
<td><strong>Serial Numbers :</strong></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td><strong>Number of plates :</strong></td>
<td></td>
</tr>
<tr>
<td>45</td>
<td></td>
</tr>
<tr>
<td><strong>Heat transfer area :</strong></td>
<td></td>
</tr>
<tr>
<td>6.45 m²</td>
<td></td>
</tr>
<tr>
<td><strong>Plate material &amp; type :</strong></td>
<td></td>
</tr>
<tr>
<td>0.4 mm / 316 plates / single wall</td>
<td></td>
</tr>
<tr>
<td><strong>Gasket material :</strong></td>
<td></td>
</tr>
<tr>
<td>Nitrile - Clip on</td>
<td></td>
</tr>
<tr>
<td><strong>Frame material :</strong></td>
<td></td>
</tr>
<tr>
<td>ST727N</td>
<td></td>
</tr>
<tr>
<td><strong>Frame material prep :</strong></td>
<td></td>
</tr>
<tr>
<td>Shot blasted &amp; primed</td>
<td></td>
</tr>
<tr>
<td><strong>Frame finish :</strong></td>
<td></td>
</tr>
<tr>
<td>3 Pack Anodize - BAL 8210</td>
<td></td>
</tr>
<tr>
<td><strong>Bolt :</strong></td>
<td></td>
</tr>
<tr>
<td>M36 Gr. 8.8 (SEP)</td>
<td></td>
</tr>
</tbody>
</table>

### Heat exchanger circuit :
- Side 1
- Side 2

### Fluid description :
- Water
- Water

| Inlet / outlet locations :                                      |              |
| Fi / Fi                                                          |              |
| Inlet connection :                                               |              |
| 2 inch BSPT male                                                 |              |
| Outlet connection :                                              |              |
| 2 inch BSPT male                                                 |              |
| **Connection material :**                                        |              |
| 316 Stainless                                                    |              |
| 316 Stainless                                                    |              |
| **Design pressure :**                                           |              |
| 15 Bar g.                                                        | 16 Bar g.    |
| **Design temperature :**                                        |              |
| 150 Deg C.                                                       | 150 Deg C.   |
| **Test pressure :**                                             |              |
| 15 Bar g.                                                       | 15 Bar g.    |
| **Hold up volume :**                                            |              |
| 7.61 Litres                                                      | 7.61 Litres  |

### Fluid flow rate :
- 2.74 kg/s
- 2.74 kg/s

### Inlet temperature :
- 88.00 Deg C.
- 88.00 Deg C.

### Outlet temperature :
- 88.00 Deg C.
- 88.00 Deg C.

### P.D. through PHE :
- 0.09 Bar g.
- 0.09 Bar g.

### Weight empty :
- 132 kg
- 147 kg (assuming S.G. of both fluids = 1 kg/l)

### Design code :
- Based on PFD5500

### PFD 2014/05/25 Category :
- 2FF / Art. 4 / Para. 3

### Method of testing :
- Cold static hydraulic

### Frame length ("L" dim) :
- 432 mm (+/- 5 mm)

### Tightening Dimension A :
- Maximum : 133mm (2.95 mm / plate)
- Minimum : 126mm (2.8 mm / plate)

This contract Data Sheet relates to the relevant C.A. drawing that has been issued as part of the Contract Documentation. Please refer to this drawing for further dimensional details and to determine the correct locations of the fluid inlet and outlet connections for both circuits.
### UE EXCHANGERS LTD SEQUENCE SHEET

**Serial No.:**

**Page 1**

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**Plates pack summary:**

- 1234 HIGH - double gasket x 1
- 1234 HIGH x 33
- 1234 HIGH x 8
- 0000 HIGH x 1