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Installation, Operation and Maintenance Instructions

ThermaFlex Gasketed Plate Heat Exchanger

OM010

The operating and maintenance instructions contained within this package are for 'ThermaFlex' gasketed plate heat exchangers. Please note that an electronic version of these instructions is available from our website. Please contact our sales office for further information.

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1.0 Standard Unit Information & Description

The heat transfer surfaces - the heat exchanger plates - are clamped between two cover plates of steel with the aid of tightening bolts. This enables a plate heat exchanger to be easily opened for inspection and cleaning.
Each heat exchanger plate is pressed in one piece, with no joints or welds whatsoever, each plate has four holes punched out, one in each corner. Single pass heat exchangers also have an end plate with no holes punched out. Multi-pass heat exchangers have special turning plate(s) in which two of the holes are left blank.
Rubber gaskets are glued in the gasket groove round the heat transfer surface and holes. The gaskets are supported on both sides by the corrugations in the plate. Some models have glueless gaskets which are clipped to the plates.
The gaskets are double around the ports to prevent leakage between the media. In the event of gasket failure the medium runs straight out of the exchanger.
GX heat exchanger plates are made with two different arrowhead angles - obtuse, giving a “high-theta” plate or acute, giving a “low theta” plate.
Between two adjacent plates a flow channel is formed with the aid of the gasket, the positioning of the gaskets produces two separate channel systems through the entire plate pack in which the heat exchanger’s two media flow separately.

Please refer to our brochure for standard connection and dimensional data.

2.0 PED Information

The standard range of 'ThermaFlex' plate heat exchangers are designed in accordance with the requirements of the Pressure Equipment Directive 2014/68/EU. Units classed as SEP in the PED category are not supplied with a CE mark. Units in category 1 and above are CE marked and appropriate markings and certification is supplied with each unit.

It is the responsibility of the user and/or installer to ensure that the unit is installed and operated safely, and in accordance with the instructions supplied within this manual.

Each heat exchanger varies in size, duty and quantity of heat exchanger plates, therefore, if applicable, a PED certificate will be supplied for a particular heat exchanger.

3.0 Installation

Siting: The unit must be bolted to the floor to ensure stability during and after installation

Installation: The unit must be installed indoors, away from damp, frost and ambient temperatures exceeding 40°C and bolted to a firm base. Provide adequate space at sides and front for access for operation and servicing. Ensure that pipework is adequately sized and supported.
Fit isolating valves and make provision for air venting, draining and thermal expansion of both pipework and water.
The working pressure and temperature ranges of the unit are stated on its data plate. The unit must only be operated within the stated range of temperatures and pressures.

4.0 Commissioning and Operation

Check that the operating data does not exceed that given on the GMS nameplate attached to the heat exchanger. Check that all tightening bolts are properly tightened

Pumps
Pumps feeding the heat exchanger must be provided with regulating valves. If the pumps can deliver a higher pressure than the rated pressure for the heat exchanger safety valves must be installed. The pumps must not suck in air.

Start-up
To avoid pressure shock the pumps must be started against closed valves. The valves in the inlet and outlet should be opened at the same time as far as possible. The flowrate is then increased slowly until operating temperature is reached.
Hammering must be avoided, otherwise the rubber gaskets may be displaced and cause leakage.

Venting
Immediately after start-up the exchanger must be vented.
Remaining air can cause air locks and serious scorching of the plates, reducing the heat transfer capacity and increasing the risk of corrosion.

Shut-down

Shutdown should take place slowly.

Some leakage may occur when the heat exchanger is cooled down after a long period of operation at high temperature. This is caused by gasket settlement and subsequent thermal contraction. Any leakage can often be cured by tightening the bolts (provided the tightening distance limits are observed). If tightening does not cure the leaks then new gaskets are required.

For longer periods of downtime and especially when there is a risk of freezing or if the media are aggressive, the heat exchanger must be emptied and cleaned. While the unit is not in use, ease the tension on the tightening bolts so that the plates just lie against each other, but close enough to prevent any dirt entering between them.

5.0 Maintenance

Opening the heat exchanger
- Cool the heat exchanger. If possible allow the heat exchanger to stand and cool overnight.
- Disconnect any connections to the movable cover plate (multi-pass units).
- Slacken nuts & remove bolts alternately, so that the movable cover plate can move parallel with the frame plate.

Taking out the plates
Use gloves - the plate edges are sharp!
If two or more plates have stuck together they must be separated carefully so that the gaskets are kept on the correct plate.
The plates support each other in pairs. It a plate has been so damaged that it must be taken out and cannot be repaired or replaced with an identical one, its adjacent plate must also be taken out of the exchanger.
If the number of plates are changed, so is the thickness of the clamped plate pack, A. (Dimension A refers to the distance in between the painted steel end plates - see general arrangement drawing.)
Special plates, such as the first and last plates, and turning plates in multi-pass heat exchangers, must be replaced with identical plates.

Cleaning the plates
Fouling of the plate heat exchanger often depends on the flow velocity through the heat exchanger being too low. Where the possibility exists to increase the flow this should be tried out if the heat exchanger shows signs of reduced capacity or increased pressure drop.
However, with products that crystallize or heavily foul the plates, or if the heat transfer surfaces have been scorched, opening and cleaning the heat exchanger is necessary.
- The heat exchanger is opened as above.
- Steel wool or brushes of carbon steel must not be used, nor may stainless steel be used on titanium plates.
- Firstly, the heat transfer surface should be cleaned by rinsing with a powerful jet of water and scrubbing with a nylon or similar brush
- Take care not to damage the gaskets.
- Oxide or chalk deposits are removed with a soft brush and 2.5% nitric acid solution, (Hydrochloric or sulphuric acid may not be used). Organic deposits containing proteins are removed with a soft brush and 2% solution of sodium hydroxide solution at 50oC.
- Surfaces with greasy deposits are cleaned with kerosene and a soft brush. After cleaning, rinse thoroughly with water.

IMPORTANT: SODIUM HYDROXIDE AND CONCENTRATED NITRIC ACID CAN SERIOUSLY HARM THE SKIN AND MUSCOUS MEMBRANES. THE SOLUTION MUST BE HANDLED WITH THE GREATEST CARE. ALWAYS WEAR PROTECTIVE GOGGLES AND PROTECT HANDS WITH RUBBER GLOVES.

Gaskets
GX heat exchange plates differ from conventional plates. Because the gasket groove lies in the plate's neutral plane alternate plates have gaskets on both their sides, while the interleaving alternate plates have no gaskets at all. The gaskets used next to the cover plates are half thickness. The double 'ring' sections of the gasket are always placed at the top right and the bottom left of the plate.

Adjusting the gaskets
A gasket that has come loose, either partly or entirely, must be glued or clipped back into place depending on the type of gasket used. If only a short length has become detached, gluing can be carried out immediately before clamping, with the plate still sitting in the frame. If the entire gasket has become detached, the plate should be taken out of the heat exchanger.

Suitable gasket glue
Only certain glues may be used for gluing gaskets, namely 'Bostik' 1782, 3M EC 1099, Bond Spray 77 or 'Pliobond 20/30' Synthetic glue. Do not use other types of glue as they may contain chlorine or other substances that may attack the plate material. To facilitate application with a brush, the glue should be diluted with acetone, Maximum dilution 1:1.

Cleaning the gasket groove
The solvent must not contain chlorine. Clean the plates from residues of old gaskets. – Small patches of glue, hard to remove, that are securely stuck to the gasket groove may remain there. They provide an excellent foundation for the new gasket. Wash the gasket groove so that it is completely free of oil and other greasy substances, using a rag and acetone or other solvent not containing chlorine compounds. Then let the plate dry off.

Gluing the gaskets
The glue is applied with a small flat brush to those parts of the plate's gasket groove in which the gasket shall lie. These parts of the gasket groove are easily recognised as they differ in colour arising from previous residues of glue. The gasket is then placed into position on the plate. After drying for about 30 seconds (the time depends on the thickness of the glue film and how much the glue has been diluted), the glue holds the rubber gasket firmly in place in the gasket groove, thus facilitating mounting. The plate must then be held under light pressure with the aid of other plates or a stiff sheet of other material of suitable weight for about 30 minutes.
When the glue joint has dried the gasket should be coated with talc to prevent the plates subsequently sticking to each other. The plates are then ready to assemble into the frame.

THE PLATES

Marking
A GX plate is identified by means of an embossed code letter. This letter can be found to the RIGHT of the UPPER carrying bar cut out, when the plate is facing TOWARDS the frame plate.

Assembly
Before the heat exchanger is assembled, inspect all gaskets and surfaces that are against the gaskets. Particles that may jeopardise the integrity of the seats or damage the gaskets or sealing surfaces must be removed. Note that contaminants usually collect at the lower part of the plates. Plates that have been provided with new gaskets must be checked to make sure that the gaskets are in the correct gasket groove. Also check the half thickness gaskets on the first and last plates.

Inserting the plates
Each delivery is accompanied by a computer printout of the grouping scheme, giving each Plate's code letter together with the plate's position in the heat exchanger.

When the plates are correctly positioned the flanged cut outs at the upper carrying bar should point towards each other.

The plate edges form a regular honeycomb pattern

Tightening the heat exchanger

The plate pack must be compressed to a specific thickness - the A-dimension. The A- dimension +/- 3% gives the inside length in millimetres between the fixed cover plate and the movable cover plate.

The A dimension: (plate thickness 0.5 mm).

GX-6, GX-7, GL-08 3.0 x number of plates
GX-12, GC-16, GL-13 3.4 x number of plates
GX-26, GC-26, 42 3.8 x number of plates
GX-51, GC-51 3.8 x number of plates
GX-37, 64, 91, 118 3.4 x number of plates
GX-60, 100, 140, 180 3.8 x number of plates
GX-85, 145, 205, 265, 325 3.8 X number of plates

Example:
A plate heat exchanger GL13 has a total of 51 plates in the pack. The tightening length of the pack is:

$$51 \times 3.4 = 173.4 \pm 3\%.$$

NOTE:
With large plate packs the A-dimension, due to tolerances in the plate thickness and depth of pressing, can deviate somewhat from that given above +/- 3%. With the correct 'A' dimension the plates lie in metallic contact with each other. Check this by examining the plate edges around the heat exchanger. Further compression can deform the plates. The nuts must be tightened alternately. The movable cover plate must always be moved parallel to the frame at all times and not drawn out of alignment.
Tighten bolts alternately.
Check the A dimension along the heat exchanger.

NOTE: This is for general purposes only. For the actual A-dimension specific to the individual unit, please refer to the general arrangement drawing or contact the GMS Technical Team on 01457 835 700.

NOTE! NEVER TIGHTEN THE EXCHANGER WHILE IT IS UNDER PRESSURE!

Lubrication
The tightening bolts must be kept lubricated with molybdenum disulphide or its equivalent, particularly on the sections of thread used for opening and closing the equipment.

6.0 End of Life Disassembly, Recycling & Disposal

Please consult the general assembly drawing and product data sheets of the supplied unit for specific information regarding the materials used. Dispose of all material responsibly and in accordance with all local regulations. For further information, please contact the GMS Technical Team on 01457 835 700.

7.0 Recommended Spares

The recommended spares for the ThermaFlex Gasketed Plate Heat Exchanger are;

- Gasket Set
- Plates & Gasket Set

Please contact our sales department for recommended spares prices and availability.