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UNEX
HEAT EXCHANGERS

UniCompact

ST-JADX

INSTRUCTION MANUAL

IMPORTANT : This manual must be kept near the heat exchanger !

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This Manual is appointed to installation, maintenance and using of UniCompact into systems with working mediums classified according to art.2., PED 97/23 EC : Non-dangerous fluids – group 2.

I. APPLICATION

Heat exchangers, type **JAD – (K)** are designed to transfer heat between liquids and vapours at various temperatures, fluid flows, and pressures.

They are often utilised in the following applications:

- District heating installations
- Hot water systems
- Refrigeration (condensers, evaporators)
- Various process systems (heat recovery, aftercooling, etc.)

The construction and robust materials of UNEX heat exchangers enables them to be used with various fluids and chemicals.

This product is appointed to working fluids of group 2. (see PED 97/23 EC) and it is not possible to use it for fluids : – exploding
– oxidize
– extreme flammable
– highly flammable
– flammable
– highly toxic
– toxic

If working fluid is classified at group 1., as "Dangerous fluids" according to art. 2.of PED 97/23 EC, it is necessary to use proper heat exchanger, which was made with category corresponds to using of pressure equipment (working conditions, state of intended fluids and risk of intended fluids)!

II. CONSTRUCTION FEATURES

The heat exchangers are designed and fabricated as a single unit with non-removable parts.

The cylindrical shell encloses a tube bundle which consists of circular layers of helically, corrugated tubes. Each layer flows in the opposite direction to the layers surrounding it in a criss-cross manner. The tube bundle has perforated bottoms, which are welded near the connections. Both ends of the cylindrical shell are enclosed within hemispherical heads.
Each heat exchanger has a total of four (4) symmetrically located connections, two on each hemispherical head. One pair of opposing connections is connected to the tube side while the other pair is connected to the shell side.
Heat exchangers. Type **JAD (K)**, are manufactured in **3** sizes, according to heat-transfer area.

III. OPERATING PRINCIPLE

A heat exchanger is a device in which heat is transferred from one flowing fluid to another. Shell and Tube heat exchangers are the most common type of heat exchangers for liquid/liquid service although many applications also involve steam and certain gases.

UNEX heat exchangers are counterflow units, which from a thermodynamic point of view, extract more heat from a given fluid stream than the other common types of heat exchangers.

Normally, the heating medium flows through the tubes, although for specific properties or conditions (e.g. high viscosity, high pressure drops), the heating medium can flow through the shell side. Thermal energy is transferred through the tube walls. The total heat load is dependent on the flow parameters of the fluid.

IV. MATERIALS

UNEX heat exchangers are typically manufactured according to the following table, although different materials may be used to suit specific customer requirements.

Standard Materials

Shell	AISI 316L
Tubes	AISI 316L
Nozzle	AISI 316L
Connection flanges	Carbon Steel or Stainless Steel, optionally AISI 316L

V. OPERATING PARAMETERS AND SELECTION OF UNICOMPACT

Maximum working parameters of the heat exchangers are as follows:

Working section	Max. working pressure [bar]	Test pressure [bar]	Max. working temperature	Code of max. working conditions
Shell	16	31	165 °C	EE
Tubes	16	31	165 °C	

In order to select the proper heat exchangers, a customer should specify the following information :

- type of medium
- required heat load
- required inlet/outlet temperature of heating medium
- required inlet/outlet temperature of heated medium

Selection is made through a computer software program developed by UNEX and distributed to our customers.

VI. SAFETY INSTRUCTION

Heat exchangers are units which are partly fed with aggressive and toxic media and operated at high pressures and temperatures.
Thus, when operating the heat exchanger

SAFETY MUST COME FIRST.

Please observe the following instructions to ensure safe operation :

- Prevent non-authorized personnel from having free access to the unit.

- Open the unit only in pressurless condition and when a temperature between 10°C and 40°C has been reached.
- Leave safety equipment such as receivers, protection covers, safety valves in place and in function.
- Keep the space around the unit clean; dirty areas are often the cause for accidents.

- When doing maintenance and repair work make sure that
  – all pumps have been switched off and secured against unexpected restarts,
  – the unit is pressureless,
  – the temperature of the unit has dropped below 40°C and has increased above 10°C respectively.

VII. OPERATING PRECAUTIONS

In order to achieve maximum performance from the heat exchanger, the following must be strictly followed:

- Heat exchangers should be used according to the specification given to UNEX.
- Pressures and temperatures should not exceed limits set forth in ***Section V: Operating Parameters and Selection of Heat Exchangers.***
- Initial start up should be done according to ***Section XII: Start Up***.
- Heat exchangers should be free of any debris existing in the fluid.
- In central heating applications, the hot water should not exceed 60 °C. Over this limit, lime will form on the tube walls.
- Prevent evaporation of fluid on the shell side. Steam or vapour should only flow through the tubes.
- Clean heat exchangers according to ***Section XIV: Cleaning***.
- The system should be designed to prevent the heat exchanger from encountering pressure shocks.
- Prevent rapid temperature increases in the heat exchangers. This would include installation of expansion tanks and safety valves into the system.
- Prevent any of the fluids from dropping below their freezing point.

  Applications with steam are not allowed.

VIII. INSTALLATION

Heat exchangers should be mounted vertically by means of stainless steel brackets or stands. Other positions should first be consulted with a UNEX salesperson. Install the heat exchanger in a manner where it will not be exposed to mechanical stresses or moments. (example: in cases of pipe expansions, use expansion compensators to relieve the stress from the connections of the heat exchanger). Contact of carbon steel with the heat exchanger is not allowed.

IX. NAME PLATE

The name plate is placed on the shell and includes the following data:

- type of heat exchanger
- serial number
- production year

- maximum working pressure and temperature
- heat transfer area
- volume
- manufacturer logo
- manufacturer code

Name plate is not allowed to take off.

X. STORAGE & TRANSPORTATION

Heat exchangers should be stored in a clean place away from corrosive environments or weather elements (e.g. rain). During transportation, ensure that they are not exposed to mechanical damages.

XI. STARTUP

To prepare the heat exchanger for operation, it should initially be:

- mounted properly
- filled with working fluids
- deaerated
- all connections checked for leaks

During startup, first open the valves, then start the pump of the heated medium followed by opening the cycle of the heating medium. The valves should be opened gradually in order to achieve a steady increase in flow and pressure. The pressure increase/decrease should not exceed 3 bar/min.

XII. INSULATION

After the mounting and installation of the heat exchanger, followed by inspection for leaks, the units should be insulated. Insulation would prevent heat loss to the surroundings and in cases of high temperature use, would also protect the operators.

XIII. CLEANING

The heat exchangers are cleansed by flushing the units with fluids which do not react with stainless steel.

Dirt deposited in the heat exchanger will result in an increase in pressure drop, lower temperature difference in the heated medium or a higher exit temperature on the heating medium side. Flushing can be done without removal of the heat exchanger from the system, although extra connections and bypasses would be required.

The following fluids are prohibited for use as a flushing agent:

- hydrochloric acid up to 0.1 % concentration
- solutions which contain MCl

- Chlorides ($MgCl_2$, NaCl between 0.01 - 1%, CuCl up to 1%, $CaCl_2$ from 5% to saturation, KCl, $MgCl_2$)
- any fluid which would deposit alkaline residue or phosphorous

The cleaning solutions are easily assessable at businesses carrying chemical cleaning agents for heat exchangers or tubing and piping applications. As a guideline to purchasing the cleaning solutions, check for the following product data:

- compatibility with stainless steel
- accepted for use in food processing industries (if applicable)
- removes scale, slag, tarnishes, and hard water deposits
- easily rinsed out of the system
- no objectionable or corrosive fumes

XIV. CERTIFICATION

UNEX works in accordance with ISO 9001-2000. UNEX UniCompact are certified by modul H - PED 97/23 EC. Copies of the above certificates are available upon request. The manufacturer issues declaration of conformity for each unit.

XV. WARRANTY

UNEX guarantees its products are free of defective materials and faulty workmanship. Commencing with date of shipment, UNEX's warranty runs for 12 months. Should the product fail to perform according to the specifications set forth by UNEX during the warranty period, UNEX will repair or replace without charge the products that it finds defective.

UNEX will not be responsible for any products that operate outside of the conditions and parameters given to UNEX at the time of purchase, or any product which have been installed incorrectly.

XVI. SALES AND SERVICE

UNEX serves its customers through a network of distributors. For application assistance, performance specifications, pricing, or name of the nearest Authorized Distributor, contact us at:

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