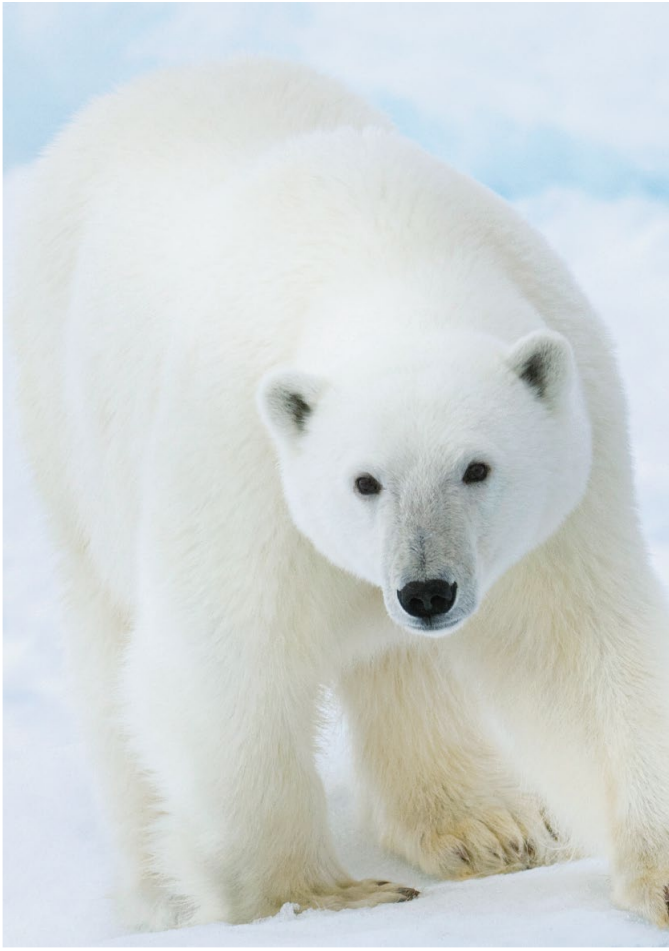
Oil rectifier
MESS/MERG/MERS



The power behind **your mission**

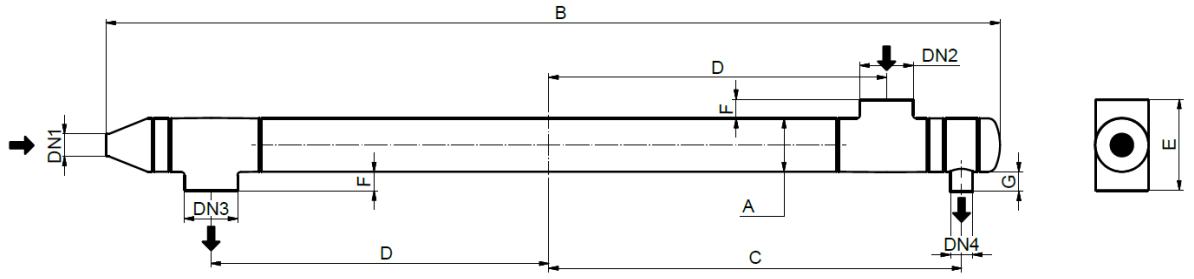
Johnson Controls

Design

In principle, the oil rectifier consists of a cylindrical shell with a tube insert. It has inlet and outlet branches in the shell and end covers. The tube insert consists of two tube plates into which a number of tubes are fit. The oil rectifier is fitted with end covers, which are welded onto the tube plates.

The oil rectifier is made of carbon steel. On request, it is also available in stainless steel.

On delivery, the nozzles are blanked off with seal caps, which protect against moisture and dirt during transport and storage.



			Volume [l]		[kg]	[mm]							Refrigerant/oil		Refrigerant	
													inlet	outlet	inlet	outlet
Part No	**Type**	**Tubes**	**shell**	**tube**	**weight**	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**DN1**	**DN4**	**DN2**	**DN3**
4245-020	MESS 031701	1	0.7	0.4	9	33.7	1800	875	787	96	21	33	20	20	25	25
4245-057	MESS 061701	3	2.5	1.5	20	60.3	1880	880	745	300	118	50	20	20	40	40
4245-022	MESS 081701	7	5.9	3	31	88.9	1920	890	738	235	42	55	32	32	80	80
4245-023	MESS 091701	9	4.9	4	34	88.9	1920	890	738	235	42	55	32	32	80	80
4245-024	MESS 111701	14	9	6	50	88.9	1925	890	727	235	42	42	40	40	100	100

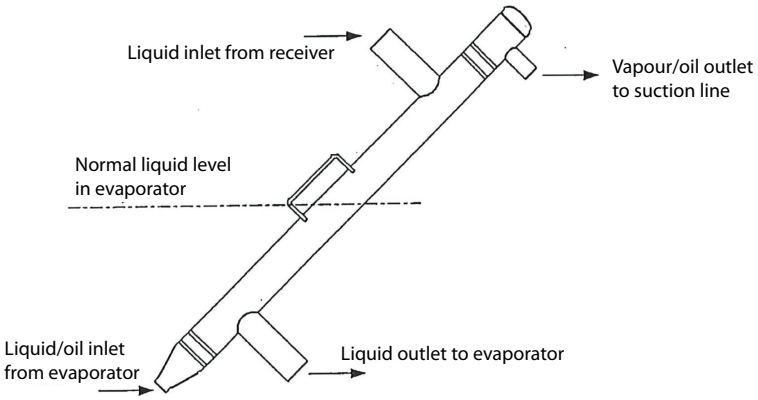
Function

In principle, the oil rectifier is a small heat exchanger constructed for an oil return system in a flooded evaporator with refrigerants HCFC, HCF and CO_2. The tube element usually consists of 1 to 14 tubes.

The oil rectifier is mounted on the evaporator in a 45-degree angle and in such a way that the middle of the tube element is at the same level as the normal liquid level in the evaporator.

The tube element is submerged in the warm liquid, which is supplied from the high-pressure side. After the oil rectifier, the liquid is led further on to the evaporator. From the evaporator, cold refrigerant liquid is led to the oil rectifier, where the liquid/oil mixture will evaporate.

The oil rectifier is designed in such a way that the vapours get a high velocity, by means of which the oil is entrained. The outlet pipe of the oil rectifier is led to the suction line from the evaporator and from there, further on to the compressor where the oil is separated.

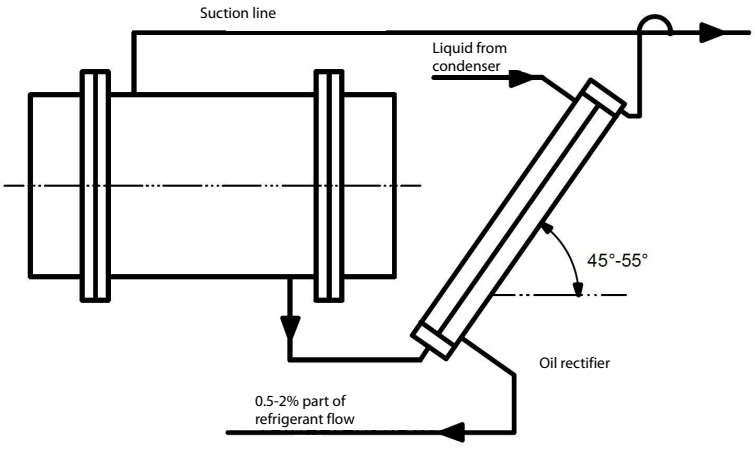


Description

A flooded evaporator requires separate oil return to the compressor. The oil rectifier solution ensures that the content of oil in the evaporator does not exceed 1%. This is typically done by leading a part of refrigerant flow from the evaporator through the oil rectifier, which is directly connected to the suction line.

CFC/HCFC/CO_2 refrigerants have the quality of oil being more or less soluble in these. Therefore, it is impossible to drain the oil somewhere in the plant, as can be done with for instance ammonia, where the oil will sink to the bottom of the vessel in question. The oil concentration in a CFC/HCFC/CO_2 plant will, however, increase in the evaporator, as this oil cannot be led further on with the refrigerant vapours owing to their low velocity.

If the oil concentration is allowed to increase in the evaporator, the oil will be separated sooner or later and settle on the pipes, which causes irregular boiling and capacity loss. Therefore, the oil concentration must be kept suitably low (normally 0.5 - 1.0%). The suction from the MESS has to be close to the suction of the compressor in order to avoid the oil running back into the evaporator.



During setup of UniSAB III, it is important not to start the rectifier before the level in the evaporator is stable. (Parameters can be seen in the UniSAB III manual). Furthermore, if there is any dramatic change in the condensing/suction pressure, the oil rectifier has to be prohibited as there is a reasonable risk of liquid slugging because the level in the oil rectifier is very erratic.

Shipping

The heat exchanger must be blanked off and primed on delivery. The primer is not intended for outdoor storage. If the heat exchanger is not put into immediate service, take precautions against corrosion or contamination.

Only lift the heat exchanger when it is empty, and make sure it is not subjected to strokes or bumps during transport. When lifting the heat exchanger before it is built into the unit, always use straps around the shell.

The weight is stated in the technical data.

A shipping description can be made when the heat exchanger is built together with the unit.

Installation

The site and personal protection must be in accordance with EN 378-3 or national requirements.

Check the heat exchanger immediately upon receipt for any damage occurred during transport. If the heat exchanger is damaged, the unit must not be installed and started. When positioning the heat exchanger, make sure to leave enough space for inspection, maintenance, escape and emergency.

Foundations must be sufficiently robust as their purpose is to provide permanent support without settling and to absorb any normal vibrations from outside causes.

The heat exchanger is equipped with support for horizontal installation.

Blanked off branches must be cut off at the cutting groove depending on metal thickness on adjoining tubes. Make sure that no impurities get into the heat exchanger during installation.

Do not remove protective plugs and covers until immediately before installation.

The entire system must be clean before starting operation. Under certain conditions, it may be required to use strainers in the piping.

When fitting the tube connections, make sure that stress in the heat exchanger during test, start-up, operation and standstill does not exceed the allowable values. Vibrations must be minimised possibly by means of a vibration damper.

Apart from branch connections, saddle plates and supports, welding must not be carried out on the heat exchanger.

The heat exchanger must be secured against exceeding the allowable pressures and temperatures.

Max. temperature difference (shell - tube) is 50 K. During normal operation, this corresponds to inlet temperature - evaporating temperature of 50 K. During operation, the heat exchanger must be filled on both sides.

All outer surfaces must have a corrosion-resistant surface coating to allow the heat exchanger to be installed in certain environments without it causing corrosion.

Hot surfaces must be marked "Hot".

Safety equipment

The heat exchanger must be provided with safety equipment before it is put into service. The manufacturer of the refrigerating plant carries the responsibility for the safety equipment as it is not included in the heat exchanger supply.

Start-up and operation

Before start-up, make sure that all connections are tight.

To avoid accidents or personal injury, the person responsible for the plant must make sure that the operating staff is duly trained and instructed before the refrigeration plant is started. The instruction should be based on the unit instruction manuals and should include instructions in construction, supervision, operation and maintenance of the system as well as the handling of used refrigerant.

Evacuation and charging with refrigerant must be carried out in accordance with the description in the unit instruction manual.

Before operation, the refrigeration plant must be leak tested and inspected by an authorised person.

Local safety and health regulations must be observed.

The authorised person makes a certificate which must be kept by the user.

Under no circumstances must the heat exchanger operate at temperatures or pressures higher than the ones indicated in the design specification. Excessive operation can cause stress and severely damage the heat exchanger tube bundle. During operation, the system must be completely filled with the operating fluid on both sides.

Start-up operation

Because the heat exchanger is equipped with a fixed tube sheet, fluids must be introduced in a manner that minimises differential expansion between the shell and tubes.

Shutdown operation

Because the heat exchanger is equipped with a fixed tube sheet, fluids must be shut down in a manner that minimises differential expansion between the shell and tubes.

Temperature shocks

The heat exchanger should not be subjected to abrupt temperature fluctuations. Hot fluids must not suddenly be introduced when the unit is cold nor must cold fluids suddenly be introduced when the unit is hot.

Maintenance

Only qualified personnel must carry out inspection.

Operating experience will determine how often inspection of the heat exchanger is needed. It depends on the operating conditions. Johnson Controls Denmark recommends inspection to be carried out in monthly intervals during the running-in period. After a running-in period of six months, a maintenance plan must be made. Johnson Controls Denmark recommends inspection to be carried out every third month as a minimum.

Do not dismount or tighten connections when the equipment is under pressure.

Periodic inspection during the service life of the heat exchanger must meet the requirements of national legislation or EN 378-2. Correspondingly, a visual inspection of connections, outer surfaces, bases, the vibration damper and safety equipment must be carried out.

If corrosion, erosion or other weaknesses in the heat exchanger are found, the heat exchanger must be inspected by a qualified authorised third party, who will provide the necessary permission to continue using the heat exchanger. If repair is requested, approved personnel together with a qualified third party and Johnson Controls Denmark will carry this out. If permission to continue using the heat exchanger is not granted, the heat exchanger must be scrapped.

Internal cleaning during normal operation is not needed.

The gasket and gasket surface must be thoroughly cleaned and free of scratches and other defects. Make sure that the gasket is properly positioned before re-tightening.

Spare parts and replacement parts

See unit spare parts.

Environmentally correct removal

The heat exchanger does not contain environmentally damaging material such as asbestos, mercury or heavy metals.

All parts of the heat exchanger can be re-used after being scrapped.

- Refrigerant and oil must be drained off before destruction.
- All steel materials can be used again after remelting.
- During the re-melting process, coating will disappear without damaging the environment.

Johnson Controls Denmark ApS
Sabroe Factory
Christian X's Vej 201 · 8270 Højbjerg
Denmark
Phone +45 87 36 70 00
www.sabroe.com

Version 1