Operation and Maintenance Manual

Buffalo Trident
BY BITZER GROUP

Product line: ***Heat exchanger coil***

Series description: ***Finned heat exchanger coil with or without droplet separator***

Series: ***Heater and cooler***

Contents

1. General safety instructions

1. General notes

Purpose

Safety instructions are instructions provided in order to prevent, or reduce to a minimum, possible risks associated with the (finned) heat exchanger coil and droplet separator during

– transport, delivery, installation
– commissioning
– maintenance/cleaning

in respect of persons, property and the environment.

Binding regulations

- ❖ Applicable national and international regulations for "Cooling systems and heat pumps, safety and environmental requirements"

This operation manual applies only to the supplied units: GCO

The manual focuses on instructions for the following:

- Transport and installation
- Commissioning
- Maintenance/cleaning

Should defects be detected in the (finned) heat exchanger coil, the manufacturer must be informed immediately so that the manufacturer can contribute to the elimination of the defects.

! To avoid resulting damage caused by disruptions of operations, the customer should possess a warning system that immediately indicates any kind of malfunction. Emergency measures must be planned and prepared, which in case of malfunctions help to avoid resulting damage.

1.2. Safety instructions

General

Symbols used in this manual:

Note!

Caution!

Warning!

The danger notes specified in the binding regulations generally apply according to section 1.1. "General notes"

These (finned) heat exchanger coils are designed for installation in systems. They are only permitted to be taken into operation provided they have been installed in the systems in compliance with the instructions given here, and that they in whole conform to all applicable legal regulations.

All work on the (finned) heat exchanger coils must be carried out by qualified, authorised staff only.

Only approved materials may be used.

(Finned) Heat exchanger coils

The (finned) heat exchanger coils are designed as state of the art and comply with applicable regulations. Particular value has been placed on the safety of users.

(Finned) heat exchanger coils carry an unavoidable residual risk of danger. All persons working with these (finned) heat exchanger coils must therefore carefully read this instruction manual. Mark all accessible positions!

Sharp edges and corners on the units, especially on the fins, cause danger of cutting fingers and hands; wear protective gloves!

When working on (finned) heat exchanger coils:
The unit may be working under pressure (maximum operating pressure).
Risk of injury!
Remove all pressure in the (finned) heat exchanger coil.

During maintenance work: Components must always be replaced with original spare parts!

Configuration and operation of the system: The maximum operating pressure specified on the type plate of the (finned) heat exchanger coils must not be exceeded!

Pressure-limiting safety switches must be provided in compliance with local regulations!

Operating agents:

The liquid used is a coolant in accordance with EN 378-1, section 3.7.2. There is no imminent danger for the staff.

2. Technical data, application, definition

Corresponding to the factory name plate of the unit in question.

1. Application

As a component in a system.

2. Definitions

(Finned) heat exchanger coils are devices used to exchange heat between a fluid and the ambient air.

The heat exchange surface is the entire outer surface area of the heat sink ((finned) heat exchanger coil) flowed over by the air to be cooled or heated.

The heating agent/coolant is the fluid (working fluid) used in a system for heat exchange, and that remains fluid during the absorption of heat (there is no change in the state of the fluid during the process).
The deployed heating agent/coolant, glycol, does not present any potential danger in regard to flammability (safety class 1, 2 or 3) or toxicity (safety class A or B) and therefore has no detrimental effects on staff (refer also to Section 1.2 "Safety instructions").

3. Transport, delivery, installation

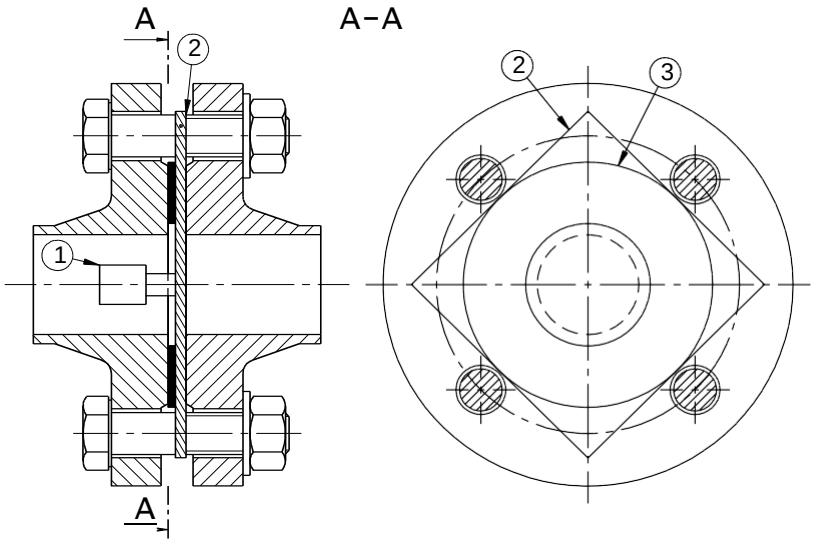
3.1. Packaging

Pallets, crates, boxes	HPE Directive on packaging by the Federal Association for Wooden Packaging Materials, Pallets and Export Packaging e.V. (incorporated society) and the VDW
Transportation packaging	Güntner transportation packaging is made from environmentally compatible material and is suitable for recycling

3.2. Transportation and unloading

The (finned) heat exchanger coils intended for transport must be adequately protected against the occurrence of transport damage and damaging influences of the atmosphere (packaging units).

(Finned) heat exchanger coils are sealed when delivered and filled with clean, dry air. The filling overpressure (transport pressure) is 0.5 to 1 bar.



1 Schrader valve

2 Sealing plate

3 Flange seal

All flange connections are secured by a counter flange with sealing plate.

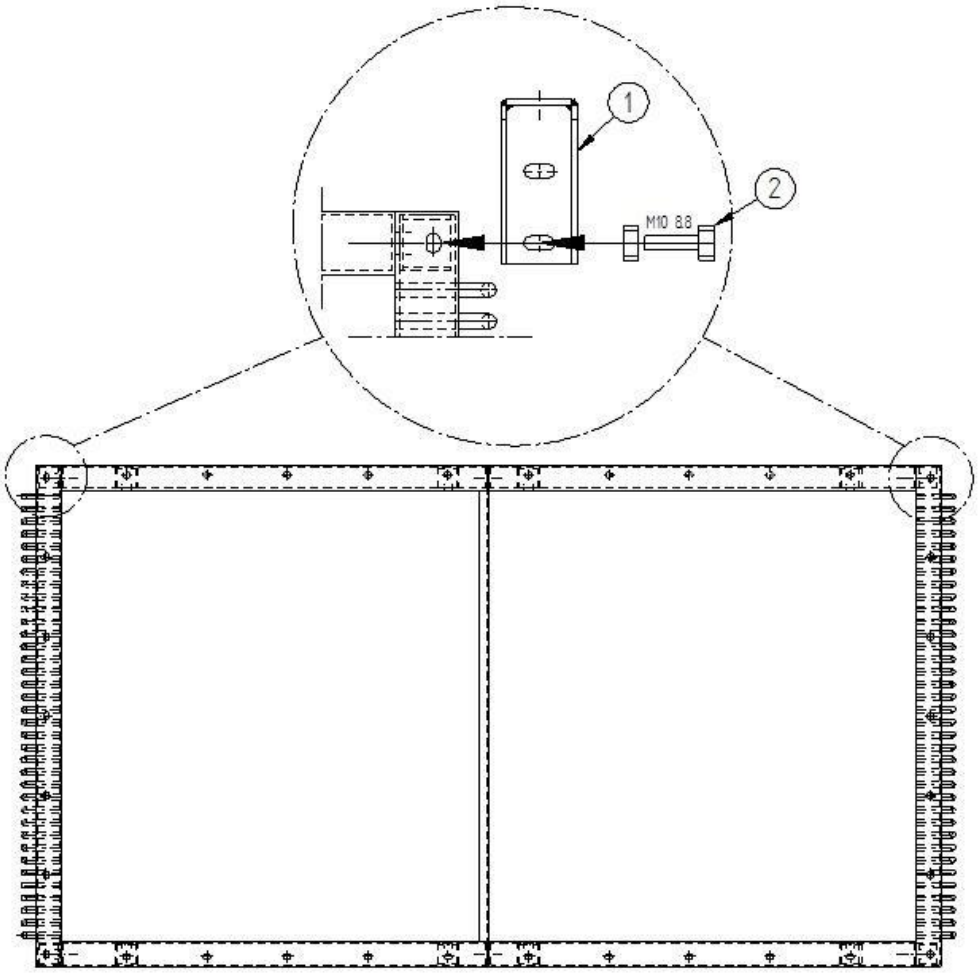
Completeness of delivery must be checked upon receipt. Any transport damage and/or missing parts must be recorded on the delivery note. The facts must immediately be reported to the manufacturer in writing.

When loading and unloading the packaging units of the (finned) heat exchanger coils (transport with a fork lift or by crane is possible using two loops around the entire packaging) the instructions on the transport labels affixed to the packaging units of the (finned) heat exchanger coils must be strictly observed.

Only unloading equipment that is suitable for handling the weight of the packaging units of the (finned) heat exchanger coils is permitted to be used, and the operating staff must be trained in use of the correct unloading procedures. Transport by fork lift is preferred.

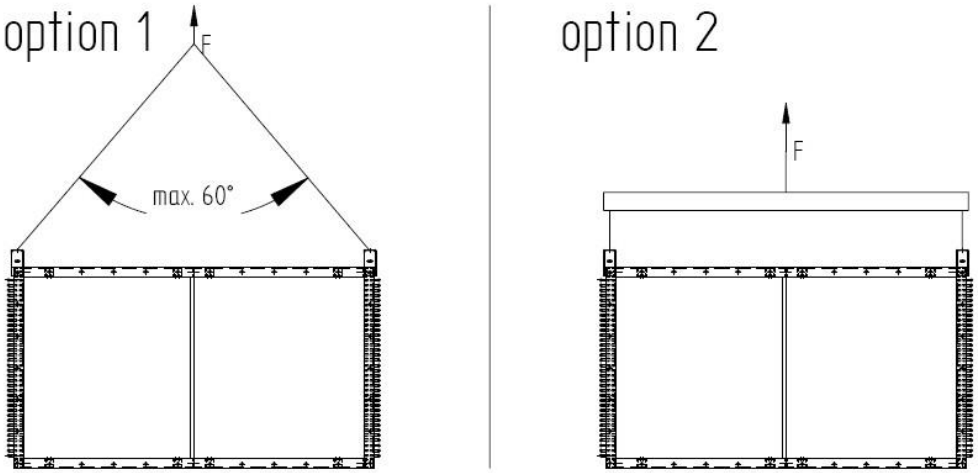
The (finned) heat exchanger coils must be protected against severe impacts and being set down roughly, as well as against slippage and mechanical damage during unloading and transport within the company.

Crane transport



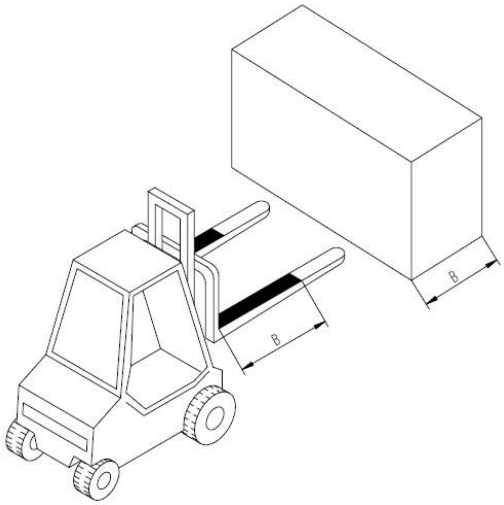
1 crane lug, 2 sets of M10 8.8 screws (torque: 50 Nm)

Transport by crane must be performed with a maximum angle of the transport rope of 60° (option 1), or if required, with a lifting beam (option 2) or, if possible without risk of danger, with a cable sling around the box.



The transport weight must be considered.

The equipment must only be lifted with a fork lift with adequate fork length.



When transporting the (finned) heat exchanger coils by crane or fork lift, an even weight distribution must be strictly observed!

When lifting: Pay careful attention to the position of the centre of gravity.

When transporting by crane: The hooks and shackles of the load take-up devices must be attached only to the positions specified by the manufacturer!

Connecting pieces: These must never be used as attachment points for transportation!

3.3. Storage

The storage conditions for the packaging units must be strictly observed.

Storage of (finned) heat exchanger coils: Only with protection against dust, contamination, wetness, damage and other damaging influences!

Letting the (finned) heat exchanger coils stand around unnecessarily freely and the permeating of humidity and dirt into the open coils are not permissible because of the danger of corrosion and contamination. (Finned) heat exchanger coils must be installed/connected without delay after their packaging has been opened.

Prevent humidity from entering the coils at all costs.
Install an open (finned) heat exchanger coil in the system without delay.
Seal (finned) heat exchanger coils during any interruption in assembly or installation.

The same applies to unpacking the (finned) heat exchanger coils, cleaning and installation before start-up.

General:

The binding directives, standards and accident prevention regulations regarding the following points must be observed.

- Lifting gear
- Cranes
- Load suspension devices in lifting gear operation
- Powered industrial trucks

4. Installation, assembly

1. Installation

Before installation or assembly, the heat exchanger coils (and droplet separators, if available) must be inspected in regard to the following points:

- Transport overpressure available
- Visual examination of the (finned) heat exchanger coils (in the case of coils with fins: check if the fins are bent or damaged; re-align with a fin comb if necessary)

The (finned) heat exchanger coils are under transport overpressure when delivered. Risk of injury to skin and eyes if handled incorrectly!
Always wear protective goggles when working on (finned) heat exchanger coils!
Do not open any connections before the transport overpressure has been removed.

Before removing the counter flange, check whether the overpressure still exists.
An unpressurised (finned) heat exchanger coil indicates a leak (transport damage; leak test!).

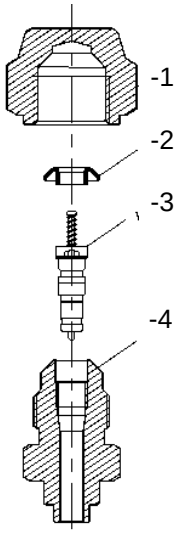
If a (finned) heat exchanger coil arrives without pressure, the manufacturer must be consulted immediately.

Before connecting the pipes, the transport overpressure must be released and the counter flange must be removed.

Dismantled counter flanges are not permitted to be re-used!
They must be replaced by flanges attached on the pipe side at the installation site.

The transport overpressure is released by pressing the mechanical needle on the filling connection (Schrader valve). Use a suitable tool to depress the air pin in the valve, which opens the valve.

Schrader valve



1 Union nut
2 Seal
3 Valve mechanism
4 Schrader valve

Open the valve carefully. Overpressure!

Open the connections carefully!

The (finned) heat exchanger coils can be transported as system components with assembled droplet separators and trays included in packaging units. If (finned) heat exchanger coils are not to be pre-assembled before delivery, they must be assembled in accordance with the drawings associated with the order.

On-site installation of droplet separators: correct installation position (note and use the airflow direction and drainage).

3.4.2. Installation instructions

The (finned) heat exchanger coils must be positioned in accordance with the positioning plan by the site installation staff.

The (finned) heat exchanger coils must be secured at fixing points that are appropriate for their weight and then bolted with fixing bolts.

The points for securing the design construction on site must be defined.

The (finned) heat exchanger coils must be screwed into position at all bolting points all around the coils (M10 8.8 or greater quality screws at the site).

The operator or installer of the equipment is responsible for ensuring that the bolted connections are of an adequate strength.

Excess strength is not permitted to be applied when securing the (finned) heat exchanger coils (danger of destruction of the bolting screws).

The following instructions must be observed when fixing the (finned) heat exchanger coils in position:

- The diameters of the mounting holes have been statically determined by the manufacturer; the fixing bolts must be adapted accordingly.
- The fixing bolts must be secured against loosening with an appropriate locking device.
- The fixing bolts must not be overtightened or stripped.
- All fastening bolts must be tightened equally to achieve a load distribution that is as balanced as possible.
- In the course of maintenance intervals, the fastening bolts must be tested for functional safety (see also Section 5. "Maintenance/cleaning").

The (finned) heat exchanger coils must be fixed and set up so that they are not damaged by environment-conditional hazard sources (production, transport and other processes at the set-up point) or that their functioning is not disturbed by the intervention of unauthorised persons.

Take appropriate measures if intended for use in extreme locations (for example, aggressive atmospheric conditions, low outdoor temperature, etc.).
Consult the manufacturer if necessary.

All fixing points must maintain the same spacing to the fixing level permanently and under load, so that no mechanical stress occurs in the unit structure.
The (finned) heat exchanger coils are anchored in their fixing position in order to prevent the equipment from moving.

Set up and fix (finned) heat exchanger coils as follows: sufficient free space for droplet separators and other additional units.

Set up and fix (finned) heat exchanger coils as follows: installation such that they can be inspected, checked and maintained from all sides at any time, i.e. there must be unobstructed access to the fluid-carrying and attached components, connections and lines, the pipeline labelling must be identifiable and adequate space must be available for testing!

The pipe connections are designed in such a way that pipes with typical millimetre and inch dimensioning can be used.

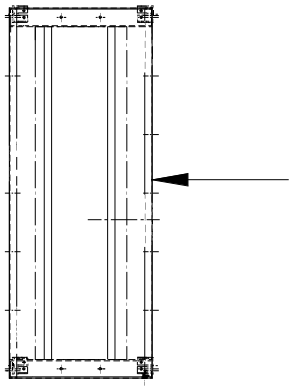
Fluid-carrying pipelines: must be protected against mechanical damage!
On-site connections: Install free of load; force must not be exerted on the pipes.

The bid documents specific to the order are used as the installation plan for fixing the (finned) heat exchanger coils in position.

In sub-zero temperatures there is risk of the unit freezing with use of the operating fluid water. With units that cannot be drained completely the hazard of frostbite also remains after draining. It is imperative that the proper ventilation be ensured when draining the unit. Units under pressure testing, operation and shutdown of units filled with water or with insufficient frost protection filling will be destroyed at minus temperatures. Damage of this nature is excluded from liability compensation claims.

3.4.3. Installation guidelines

The (finned) heat exchanger coils must be installed in accordance with the specifications given in the order-specific bid documentation.



Airflow direction

3.4.4. Assembly

All assembly work must be carried out by experts. Damage caused by incorrect installation invalidates the manufacturer's warranty obligations.

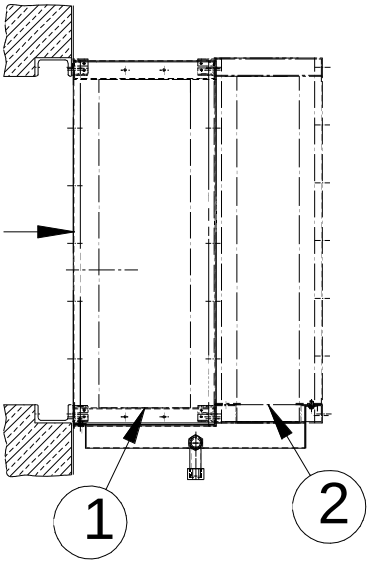
The (finned) heat exchanger coils may only be fastened at the designated anchoring points.

For supplied trays:

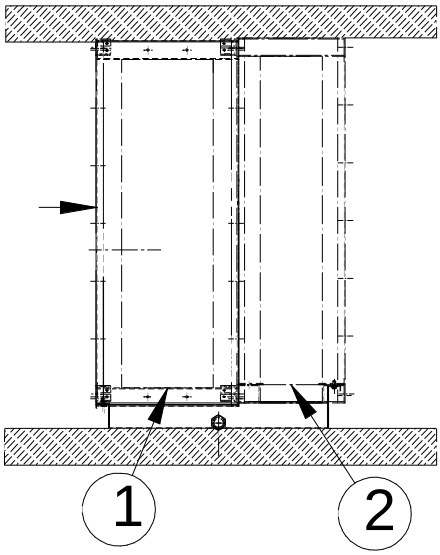
The instructions included with the delivery must be observed when installing trays.
The supplied tray is included in the delivery on the unit (see Section 3.4.1. "Installation").

Unit models

Wall attachment



Duct installation/cased unit (tray installed on site)



1…Heat exchanger; 2…Droplet separator

Wall attachment:
Install one connection for each tray (even if three models are possible).

If a droplet separator is included in the delivery:

Tighten the screws on the supplied and installed droplet separator.

After assembly (or reconnection), clean the inside of the (finned) heat exchanger coils.

The (finned) heat exchanger coil is filled with dried air (see Section 3.2. "Transportation and unloading"). Before discharging the dried air: disconnect all pipe installation work completed at the site.

Fluid-carrying connections: Install absolutely free of mechanical stress. The customer pipeline system must be supported before connecting to the (finned) heat exchanger coil.

Soldering and/or welding work is only permitted on depressurised (finned) heat exchanger coils.

That the pipeline installation is kept as short as possible. Use as few bends as possible, and if bends are necessary, use large radii.

General requirements concerning the installation of the (finned) heat exchanger coils must be followed in accordance with the applicable regulations (see Section 1. "General safety instructions").

The free space around the (finned) heat exchanger coils must be large enough to ensure there is no danger to the coils; regular maintenance of the components must be possible, and it must also be possible to check and repair components, pipes and fittings.

It must be possible to shut off the (finned) heat exchanger coil if a leak occurs.

The following applies to the piping of the (finned) heat exchanger coils:

- Pipes, valves and their components for the lines to and from the (finned) heat exchanger coils must be installed in accordance with the applicable national regulations.
- Only ever use pipes and system components that are
  - clean and dry inside (free of scale, swarf and layers of rust and phosphate, etc.)
  - delivered as hermetically sealed.
- All connections are brazed or welded depending on the material.
- Avoid percussive brazing joints; use copper pipe ends that are expanded on one side (capillary brazing); avoid leakiness, braze precisely and carefully
- Avoid overheating when brazing (danger of excessive scaling)
- Use shielding gas when brazing (to prevent excessive scaling).
- After completion of the piping installation and before connection of the (finned) heat exchanger coil, clean the insides appropriately and perform a pressure test.

4. Commissioning, operation

1. Commissioning

Before starting up the unit, readiness for operation must be checked and determined using the following checklist:

All connections in the system must be checked for tightness in accordance with the applicable standards and regulations (see Section 1. "General safety instructions") and the system must be professionally evacuated in accordance with the local applicable regulations.

Evacuation

Open all shut-off and magnetic valves. Evacuate the entire system using a vacuum pump. For a closed vacuum pump, a "fixed vacuum" of less than 1.5 mbar must exist. Repeat the process a number of times.

The (finned) heat exchanger coils are tested at the factory as individual pressure containers. After assembly, the airtightness of the connections and piping system must be tested again.

Testing airtightness

Create test overpressure using a suitable test medium (e.g., dry nitrogen). Test the (finned) heat exchanger coil and pipes, including fittings, for leakage.

The test pressure must not exceed the maximum operating pressure (see the type plate). Observe the safety instructions in all cases (see Section 1.2. "Safety instructions").

- All screw connections, fastenings, etc. must be examined for correctness.
- All specified control equipment must be checked for correct functioning.
- All safety equipment must be checked on preset on/off switching point settings.
- Check the entire system, in particular pipes and connections, for strong vibrations. If necessary, take additional safety measures.

Burst pipes and leakages in the system components are possible.
Avoid strong vibrations.

During and after filling of the system, the unit must be correctly ventilated. In this regard, keep the ventilation nozzles open until no more air escapes from the unit.

The (finned) heat exchanger coil is not permitted to be taken into operation until after it has been accepted by the responsible department or person and released by the supervisor.

2. Operation

1. Normal operation

To operate the (finned) heat exchanger coil, the entire system must be in operation, including the electrical installations.

The (finned) heat exchanger coil must be connected to the entire system by opening the corresponding values on the feed and outlet sides.

The coil is ready for operation after reaching the specified operating data specifications (see order-specific bid documents).

The operating data –

- airflow volume
- air inlet temperature
- air outlet temperature
- fluid flow rate
- fluid inlet temperature
- fluid outlet temperature

– must be checked as described in Section 2. "Technical data". A data log must be produced.

The (finned) heat exchanger coil must be regularly inspected by a technical expert if necessary. The inspection intervals depend on the type of operation. They must be specified by the operator in accordance with Section 1.2 "Safety instructions".

4.2.2. Decommissioning, shutdown

In the event of damage, the (finned) heat exchanger coil must be disconnected from the supply network and replaced or repaired.

Should faults or damage be detected in the (finned) heat exchanger coil, the manufacturer must be informed immediately so that the manufacturer can contribute to the elimination of the defects.

The (finned) heat exchanger coil is removed from operation by switching off the supply network.
The fluid-carrying lines from the system must be shut off.
The fluid must then be drained.
If the (finned) heat exchanger coil is to be taken out of operation and/or decommissioned (for repair, replacement, etc.), the fluid should be pumped out and disposed of in an environmentally friendly manner.

Contaminated fluid must be disposed of in an environmentally friendly manner.

When shutting down, the maximum operating pressure and maximum operating temperature must be observed.
If necessary, take precautions so that these cannot be exceeded.

The (finned) heat exchanger coils are components of a system. Taking out of service and recommissioning must be carried out in accordance with the system-specific configuration in accordance with the applicable standards and accident prevention regulations (see Section 1. "General safety instructions").

The pressure test after recommissioning may only be carried out with appropriate media at the appropriate test pressure.

4.2.3. Changes to the unit and non-permissible operating conditions and working practices

Changes to the unit are:

– Changing the function in accordance with Section 2. "Technical data, application and definition"
– Changing the operating data in accordance with Section 2. "Technical data, application and definition"
– Changing over to another fluid

Non-permissible operating conditions and working practices as far as the warranty is concerned are:

– Changing the function in accordance with Section 2. "Technical data, application and definition"
– Incorrect set-up (for details, see Section 2. "Technical data, application and definition")
– Changing the operating data (for details, see Section 2. "Technical data, application and definition")
– Changes in the fluid

For these changes, operating conditions and working practices the manufacturer must be consulted and he must approve them if the warranty cover is to be maintained.

5. Maintenance/cleaning

1. General

(Finned) heat exchanger coils (and droplet separators if included in the delivery) are designed for maintenance-free operation. However, regular checking will ensure that the equipment operates without problems. The inspection intervals depend on the installation site and the operating conditions. During inspections, the main focus should in particular be placed on searching for leaks, corrosion, strong vibrations and on the safety equipment and measures.

2. Cleaning

The planned and guaranteed heat transfer rate of the unit can only be provided if the (finned) heat exchanger coil (and droplet separator, if available) is clean. Dirt, dust, evaporation residue, etc. must be kept well away from the heat exchanger coil as well as the immediate surroundings of the unit.

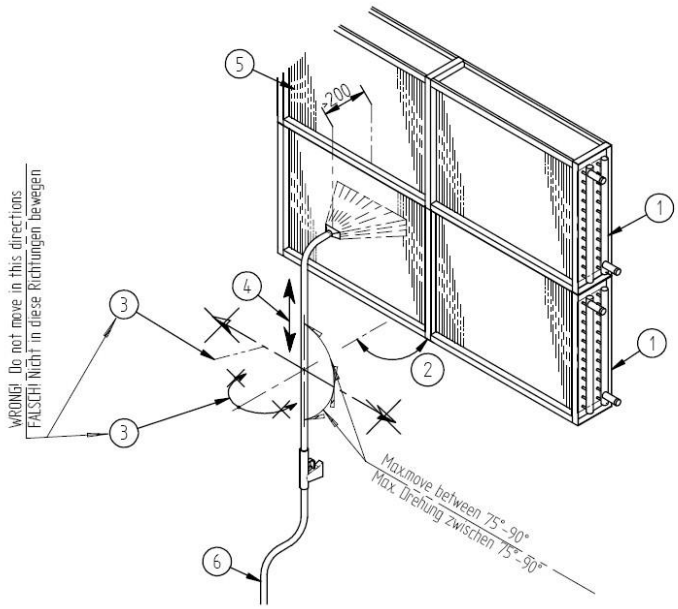
Dry dust or dirt can be removed using a brush, a hand brush, with compressed air (max. pressure of 80 bar; against direction of air movement) or using a powerful industrial vacuum cleaner.

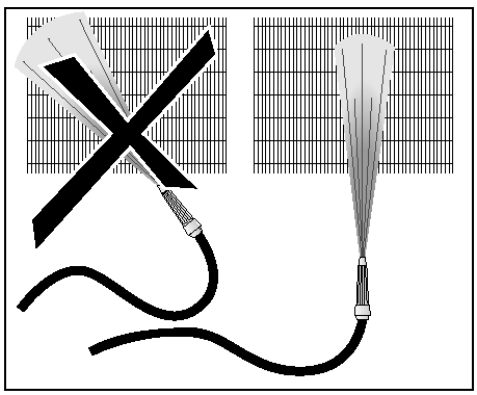
Always brush or rinse in the longitudinal direction of the fins.
Use soft brushes!

Heavier solid, moist or greasy dirt must be removed with a high-pressure water jet (min. 80 bar pressure), steam pressure jet (max. 80 bar pressure), min. 200 mm distance with flat jet nozzle, or using neutral cleaning agent where applicable, always against the airflow direction.

For finned heat exchanger coils:

As much as possible, the jet of the cleaner should be held vertical to the heat exchanger coil (max. deviation of ±5 degrees) to prevent fin bending.





1 – Heat exchanger unit

2 – 90° only

3– Do not move in this direction

4– Direction of movement of the steam cleaner

5 – Heat exchanger coil fins

6 – Steam pressure from the flat jet nozzle: max. 80 bar

Cleaning and maintenance instructions:

- Clean the (finned) heat exchanger coil (and droplet separator) from both sides if necessary.
- Re-align bent fins with a suitable comb.
- Check all cleaning agents that come into contact with the heat exchanger for compatibility with the heat exchanger materials.

Clean from the inside towards the outside and from the top towards the bottom of the unit.

Continue cleaning until all dirt has been removed.

Only use cleaning agents that are compatible with the materials from which the units are made, they may be neither aggressive nor corrosive!

Mechanical cleaning with hard objects (e.g. steel brushes, screw drivers, or similar) damages the heat exchanger. Their use is forbidden!

5.3. Maintenance, repair

Maintenance and repair measures become necessary as a consequence of incidents (see Section 4.2.2. "Decommissioning and shutdown") and results of the inspections stated in Section 5.1. "General".

Before starting maintenance or repair measures, the fluid must be drained off (see 4.2.2. "Decommissioning and shutdown").

Maintenance and repair work must be carried out in such a way that danger to people and property is avoided as much as possible.
Maintenance and repair work must be carried out in accordance with applicable regulations.
A repaired (finned) heat exchanger coil (and droplet separator) must be checked in accordance with the applicable regulations.

The following plan is recommended for inspections.

Recommended care and maintenance plan

Measure	Cleaning agent	Interval
Component cleaning	Mechanical	As required (visual inspection)
Complete cleaning	Water or cleaning agent that is neutral to the materials and environmentally friendly	In accordance with the operator's regulations
Leak check	External visual inspection (e.g., EN 378-2; Annex A, B)	According to leak rate (for example, see EN 378-2; Annex C)
Corrosion protection check	–Visual inspection –Inspection of the fluid for inhibitors (specifications by the refrigerant producer)	According to leak rate (for example, see EN 378-2; Annex C)

Recommended inspection plan

Component/control point	Interval	Measure	When
Heat exchanger coil/ fluid connections	Monthly	Repair or replace*	Immediately
Tray	Monthly	Clean	Immediately
Frame/fastenings	Every 3 months	Tighten	Immediately
Droplet separator	Monthly	Clean or replace	Immediately

*) The (finned) heat exchanger coils (and droplet separator) may in some cases be dismantled for maintenance and repair measures during lengthy maintenance intervals. When taking into operation again, the information given in Section 4.1. "Commissioning" must be observed.

6. Contact information

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