Information in advance

for transport and installation

BUCOdelot
Falling-Film-Chiller BWP

Type: BWT + BWP

This is an information in advance, but not a manual on legal basis.

The legally valid manual will be provided by the manufacturer with delivery of the goods.

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Applications:

Falling film chillers are mainly used, to cool water down to near the freezing point. The system of **single open type , outside pressureless heat exchange panels** (htx) can be opend without tools, to be inspected and cleaned at any time.
A layer of ice on the panels, caused by regulation deviation, does not do harm to the panels.

Generally for falling film chillers, there are 4 basic types of applications :

1. Water in a **closed circuit** with a secondary heat exchanger. (Basic, like for a dairy)
2. Water **touching food**, like fish or poultry, where the water is used just once through and drained afterwards. (Typical: fruit, vegetables, fish or poultry)
3. Water being **added to food**, like for production of sausage or for dough.
4. Water **touching food**, and contaminated water beeing **recirculated** to the falling film chiller. (simple for fruit or vegetables, critical for sausages with fat and proteins in recirculated water)

The last types require the highest standard concerning hygienical criteria and they may have, compared to the basic type, many additional construction details, which depend on the special application. These details will be stated in the quotation data sheet.

Note:
„The appropriate adaptation can be just as good, as the information, given by the customer, concerning the application on site.“

1.0 Layout and construction

The **BUCO**delot Falling Film Chiller **BWT / BWP** consist of:

- Distribution tray for the water (at the top)
- Heat exchange system (HE-System)
- Frame and cover
- Bottom collecting tank for water (optional)

1.1 Water distribution tray

The water distribution tray consists of one or several distribution channels for the water. The tray shall distribute the water evenly to the vertical panels. The holes of the tray are placed centrically above the HE-panels. There may be plastic nozzles in the holes, depending on application and flow, which are stabalizing the water flow. Damaged nozzles should be replaced.
For a better cleanability there is a big hole with a plug in the tray.

A food adapted chiller (option) will have a water distribution system made of stainless steel completely, which allows high pressur cleaning.

1.2 Heat Exchange System (HE-System)

Water will flow in a thin film outside the vertical panels. Refrigerant (or e.g. glycol as coolant) will flow inside the panel system. The refrigerant will apply from header tubes at the lower or upper edge of the panels.
A version for dry expansion (dx operation) will include the venturi distributor system (see photo), but not the expansion valve.
The flow direction of the internal liquid can be designed as counter flow or parallel flow, depending on the operation conditions (see BUCO design data sheet and drawing).

Picture: Evaporator for refrigerant with dx operation.
Left: Suction at the bottom. Right: Suction at the top.

The panel system, in any case, is a **low charge system**, with a very low refrigerant volume, compared to usual coil system with the same htx-surface.

Evaporators for refrigerant are available alternatively for following operation conditions :

- **gravity** operation - for a surge drum separator, above, nearby the chiller. (see chap. 3.6)
- **pump** operation **-** for a refrigerant pump and surge drum separator, operating at the same evaporation temperature as the evaporator .
- **pump** operation – for a refrigerant pump and a “central” surge drum separator, running at a lower temperature compared to the evaporator, e.g. -10°C.(see chap 4.0.1)
- **dx – dry expansion**, suction at the “**top**” incl. suction gas superheating - for an expansion valve. (see chap. 3.5)
- **dx – dry expansion** with suction at the “**bottom**” **-** for an expansion valve and an external suction gas superheater. (Suitable for longer partial load periods as well.) (see chap. 3.5)

Alternatively:

- **heat exchanger for coolant, e. g. glycol**

1.3 Doors and Cover

For inspection and cleaning removable doors and covers can be opened:

- Removable doors at two face sides, allows service between the panels.
- Top cover allows service of the water distribution system.

1.4 Bottom water collecting tank (option) with chiller support

The bottom tank collects the cold water, which will be pumped to the process. (Water pump not included , or avilable as an option).
The tank has got supports for the top HE-System with 4 or 8 support points. See picture:
The tank may have different connection pipes, depending on project demand.

Picture: Bottom water collecting tank

1.5 Insulation of the Storage Tank

The insulation is normally made of 50 mm thick insulation plates (CFC-free and chlorine free) in a water steam tight design by silicone with an outer cover made of stainless steel fastened by rivets. The top chiller housing is insulated by a gap of air only.

The actual design can be seen in the BUCO’s design data sheet.

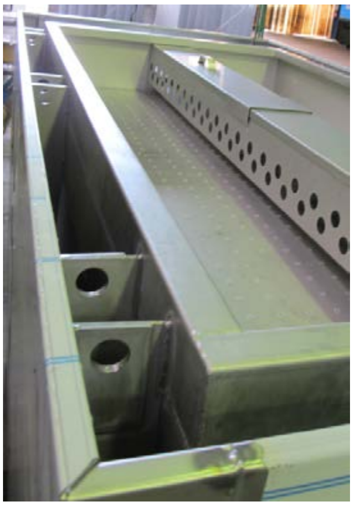
On demand the housing of the falling film system can be supplied with an insulation, which is neccessary for operation at places with temperatures below the freezing point for longer periods as one night.

2. Transport

The HE-System with frameworks, cover and distribution tray are to be transported as a complete package. The bottom storage tank is not connected with the framework and can be carried separately. (Other constructions with common housing are explicitely mentioned in the quotation.)

The system must be transported or stored with **plates standing upright**, otherwise there is a danger of bending.

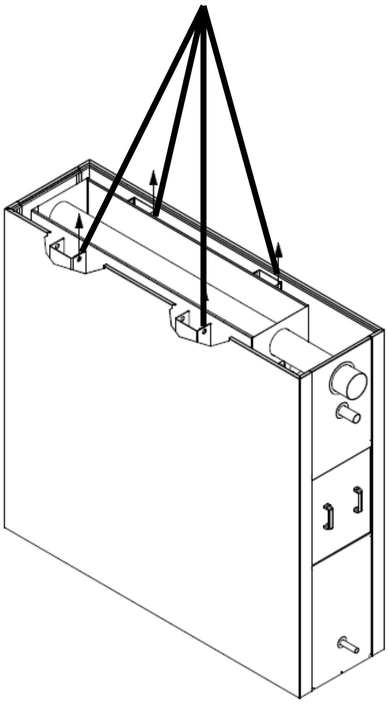
Inside the **rigid wooden crate** the unit has to be picked up by **fork lift**.
Unpacked, the unit may only be lifted **by crane** using the **lifting lugs at top** of the system (see picture). The top cover of the chiller has to be removed for that.



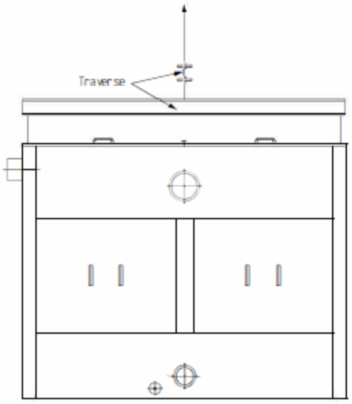
Picture left: lifting lugs, after removing the top chiller cover.
Picture right: rigid wooden crate to be transported by fork lift.

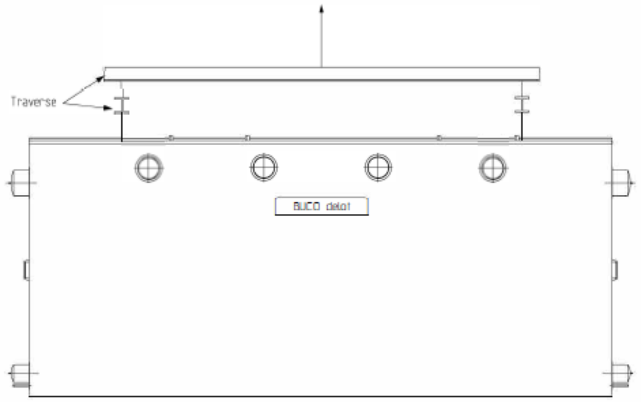
For cranage used **ropes or chains have to be used in a very vertical orientation**.

For cranage: **Minimum length of each rope or chain: 2,5 m :**

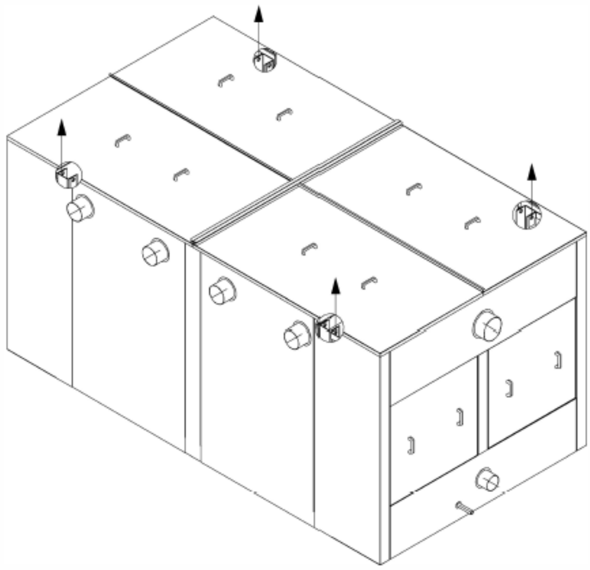


In case 2,5 m long ropes or chains are not possible,
or for long chillers (B-type, longer than 3000 mm), **cross-beam traverses** have to be used:





For transport purposes
please remove top cover
Zum Transport obere
Abdeckung entfernen



Special case: **small „K-type“ chiller** with 2 crossbars (no lifting lugs):

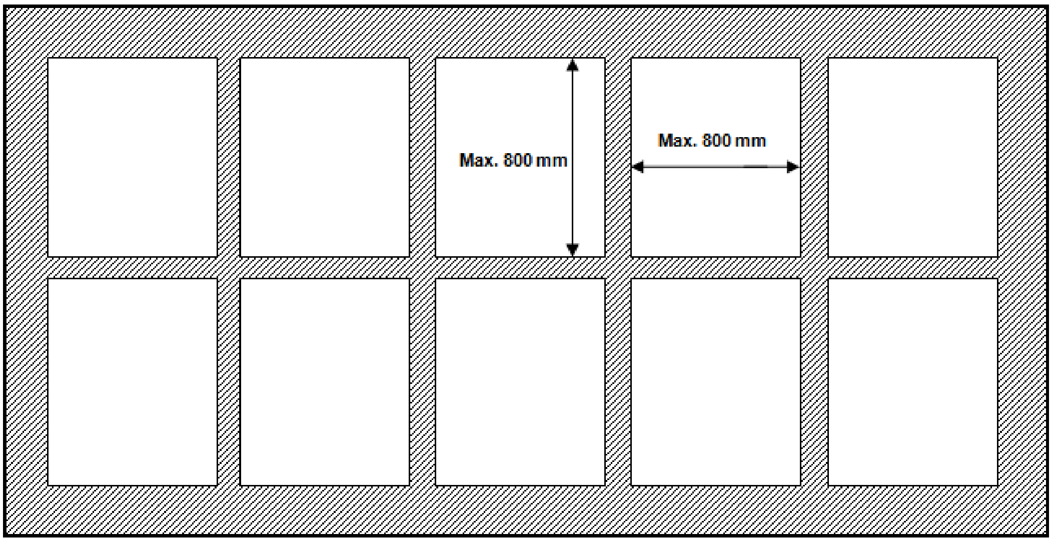
Picture: lifting bars for the **small chiller „K-type**“, after removing the top cover.

3. Installation

3.1 Conditions to place the bottom water tank

The bottom water tank can be placed on a horizontal, even and flat foundation (f. e. concrete floor) or a suitable console. For that the total loads are to be considered with complete filling of the system. Local peak loads of the tank bottom by uneven foundation are not allowed.

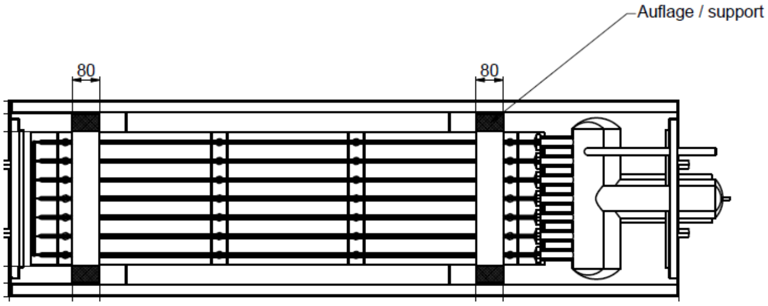
The bottom tank does not have a self supporting bottom. If using a console made of beams, these have to cover quite a part of the foot print.
The outer edges have to be supported completely, the area in between has to have a support beam every 800 mm.



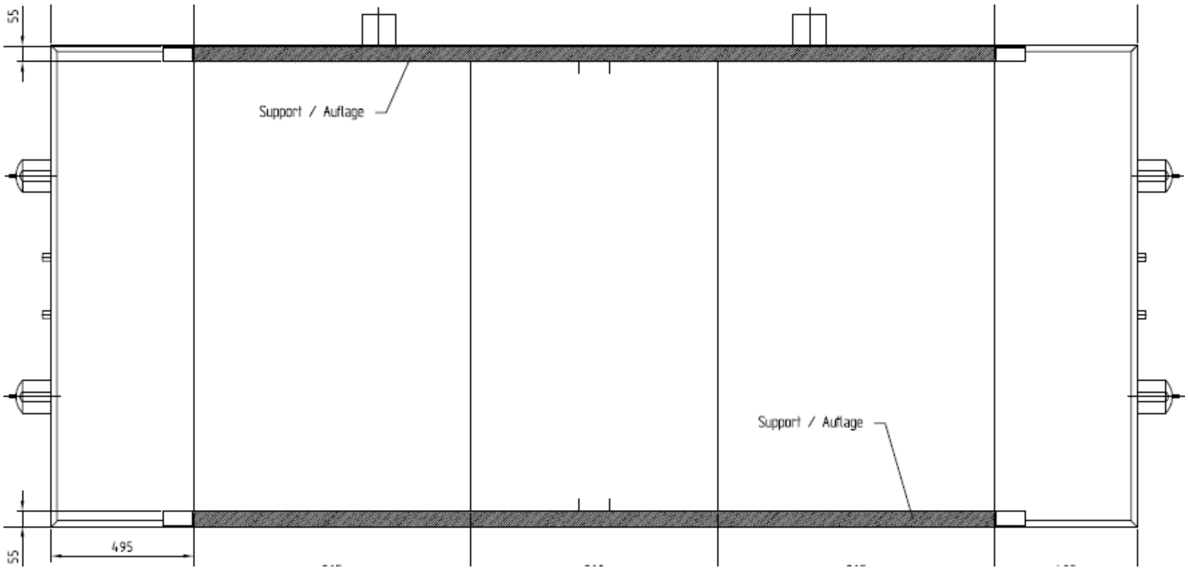
Picture (top view): steel console to support the bottom water collecting tank, if needed.
200 mm wide profiles all around
100 mm wide profiles in between

Attention:
The place of the BUCO-Chiller has to be protected in that way, that leaking water cannot do any harm to the area outside the direct space at the chiller.
This can be achieved by limiting walls or a bottom trough or a floor with slope and a floor drain.

3.2 Conditions for placing the chiller on a bottom water collecting tank



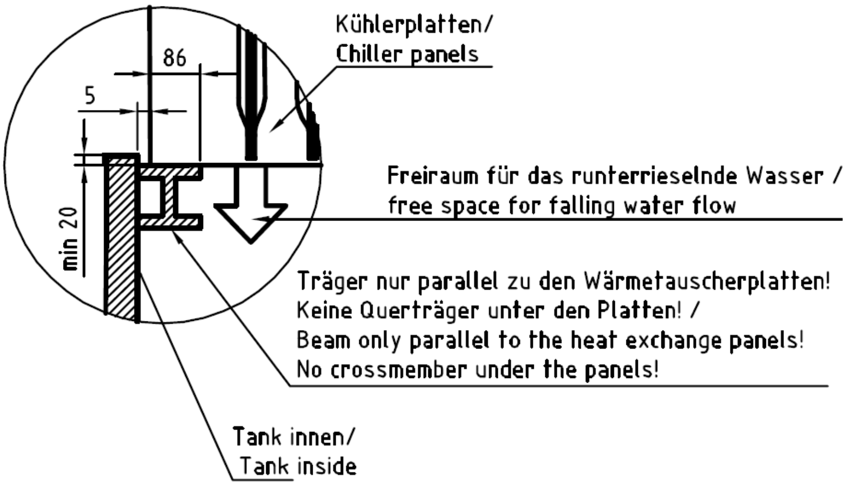
picture: example of a typical small chiller with mit 4 support points. (view from below)

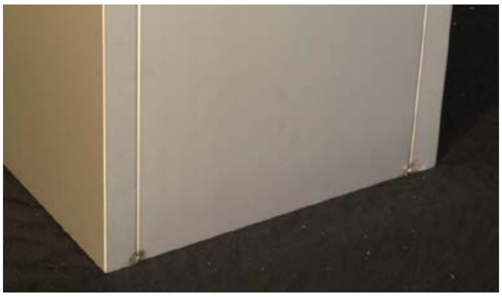


picture: example of a big chiller for 2 support bars at both sides of the tank, parallel to the panels.
(view of the chiller from below)

In case of locally built tanks, for the supports of the chiller, we strongly recommed:

- Use two **support beams** at the two sides of the chiller, **parallel to the panels**. That will guarantee free water flow downwards.
- If you prefer two support beams across, at a right angle to the panels, please let the tank wall be 20 mm higher than the support beams. That will avoid water to run out of the system. (see drawing detail)



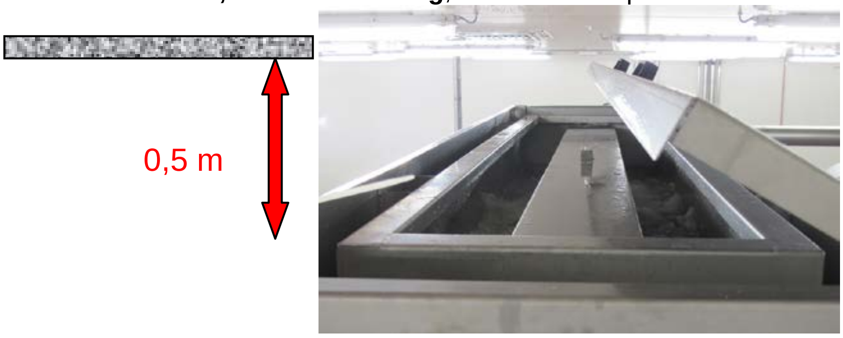


picture: bottom part of a falling film chiller with basic housing

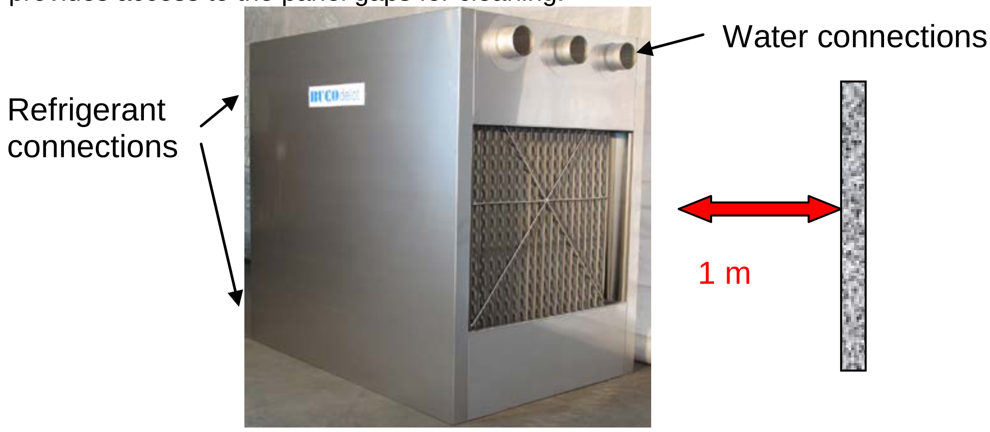
Distance to walls for service access:

Falling film chillers normally have two service doors at the face side and back side, as well as a top cover. When placing the chiller on site, following distance to walls or ceiling shall be observed:

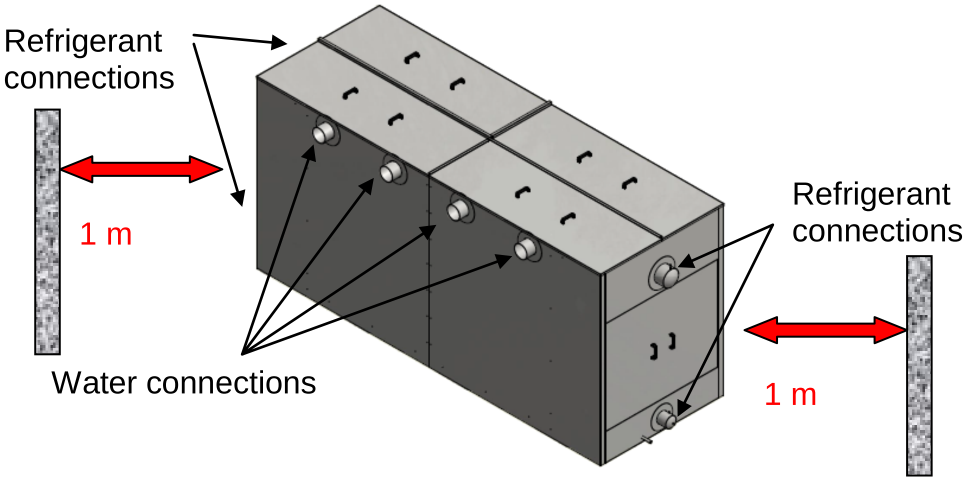
- **Minimum 0,5 m to the ceiling**, to clean the top water distribution system.



- Chillers type K and M, with single sided refrigerant connections: **1 m to the wall, at the opposite side of the refrigerant connections (back side)**, there, where the big service door provides access to the panel gaps for cleaning.



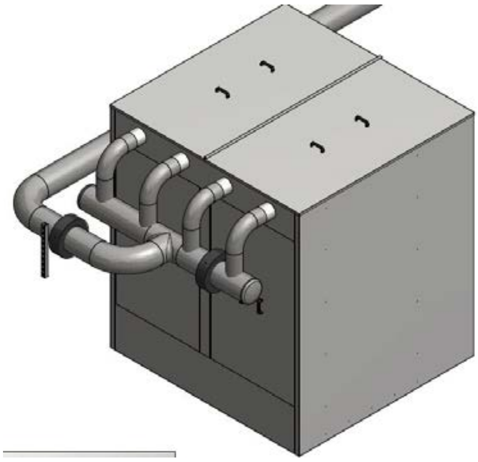
- Chillers type B, with double sided refrigerant connections: **1 m to the wall, at both sides, where the refrigerant connections are**. Here the accessability is limited by the pipework.



3.3 Connecting the system

The connection of the water for the falling film is locaded at the top distribution tray of the system.

Some chillers have **several water inlets pipes** which shall calm down the flow to the water distribution tray. These pipes have to be connected **symmetrically, T-type, to acheive a homogenious distribution.**
The water pipes preferably shall come **from below** (see picture). 1 m distance of the distribution header to the chiller allowes access to the doors for cleaning.



Picture: Examples of **distributor header and water feeding pipes „from below"**
Advice: 1 m distance between header and door (like on the photo), allows good access for cleaning.

Note for outside water :
If feeding water from the top, there might remain air in the pipes and the water will „drop" down with some pulsing as the chiller inlet is pressureless.
It is much better to let the **water flow from below** into the chiller, in order to get the air out of the pipes. There will be a small counterpressure of the water column, that allows a smooth and continuous flow into the top water distribition tray.

Note for liquids inside :
Liquid / liquid type heat exchangers will need a degassing connection, preferably at the top of the pipeworks behind the header of the heat exchanger.
The way of flow for a liquid / liquid htx (counterflow or parallel flow) depends on the design. (see design data sheet)

Note for refrigerants :
Evaporators for ammonia-gravity or -pump operation have a connection for deoiling the system.
Othe systems will probably need a deoiling installation in the pipeworks independently from the evaporator.
The refrigerant is fed to the system by a distributor pipe and is collected at a suction header.
The flow pass for evaporators (dx -operation) can be seen in the drawing.

All connecting pipes are designed for welding.

3.4 Limitation equipment against overpressure of pressure vessel

It must be ensured by suitable means, that an increase over the maximum allowed operating pressure in the plates is impossible. For this e.g. a pressure control valve has to be installed for the inner cycle of the plate system.

3.5 Design as dx – dry expansion evaporator

BUCO dx-evaporators as falling film chillers are designed individually according to specific prozessdata. Deviations from this data base are allowed in a limited range only. As far as discussed in the project phase, adaption can be made, f. e. by using a special chanel design for the refrigerant , or f. e. for constant process parameter, for higher or lower inlet temperatures of the outside medium or alternatively for partial cooling loads with fluctuations.

Suction pipe at the top:

For typical falling film chiller applications with water-inlet-temperatures higher than 6°C, dx-evaporators with **suction pipe at the top are more effective**, because the special patented channel design causes **less pressure drop** (less evaporation temperature-glide) and the warm water at the top of the panels has the potential for superheating the suction gas.

We strongly recommend to use "**electronical" controlled expansion** valves !

Attention: Return of oil:
The dx-chiller with suction pipe at the top just allows limited partial loads for a short periods only (depending on the compressor design).
In case of a oil pile-up inside the evaporator-panels, the oil can be returned by a short procedure, by sucking through the dx-injection pipe (at the common pipe in front of the venturi distributor).

Picture : dx-evaporator with suction pipe at the „**top**"

Suction pipe at the bottom:

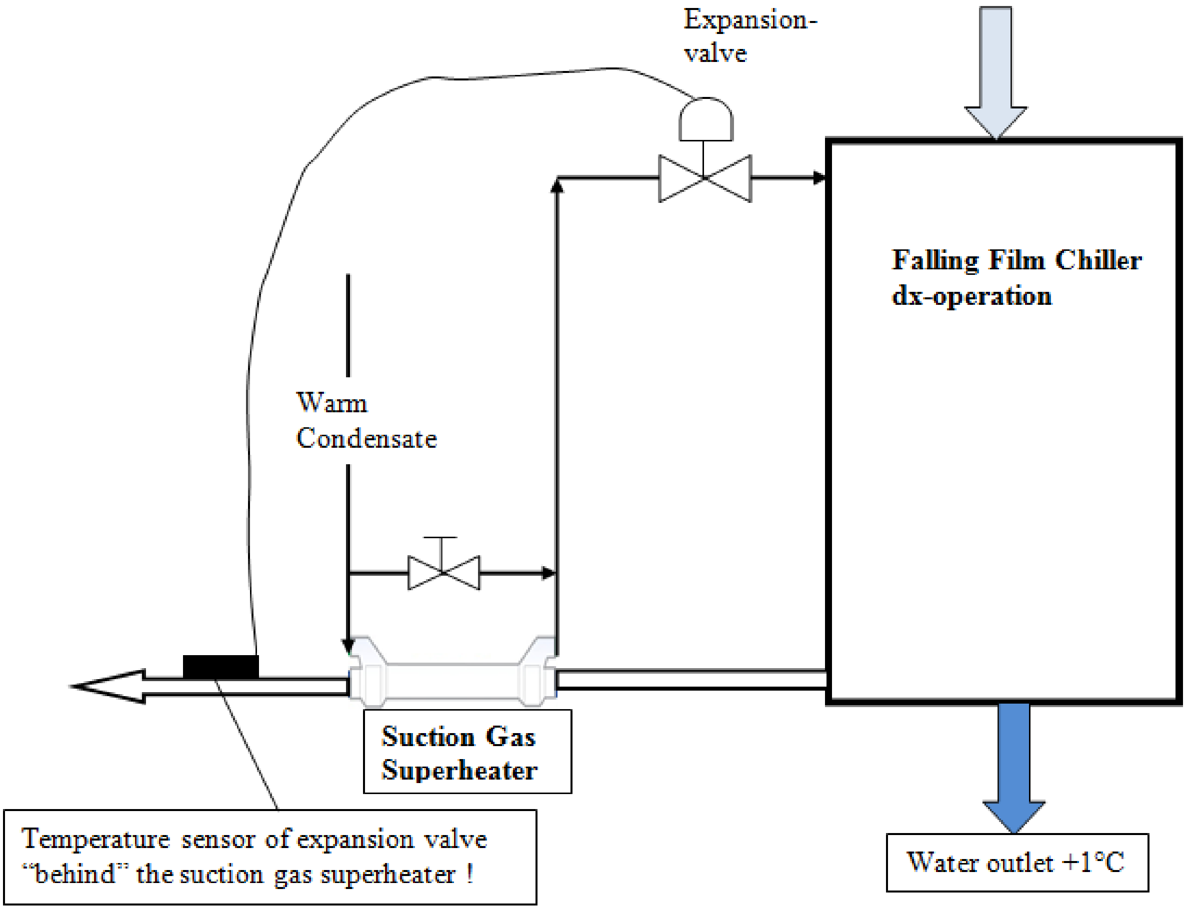
In case of **partial cooling load over longer periods** or in case of relative low water inlet temperatures a design with **suction pipe at the bottom** is needed.

Picture : dx-evaporator with suction pipe at the „**bottom**"

Except some special cases, BUCO falling film evaporators for dry expansion with **“suction pipe at the bottom”** are designed **without internal superheating zone** for the suction gas.

The typicl application with very cold water at the bottom of the panels (e. g. 1°C) does not have the potential to supply sufficient superheating of the suction gas, so that an external suction gas superheater is definitely needed.

In order to acheive an adequate superheating of the suction gas, needed for the controll of the expansion valves, **the machine builder on site has to add an external superheater to the suction pipe** of the evaporator, in case of several refrigeration circuits, one superheater for each circuit.
The superheater should preferably be heated by warm condensate, which will then flow to the expansion valve, so proportional to the cooling power ! The amount of superheating can be adjusted by a handvalve parallel to the superheater.



Scheme: Falling film chiller in dx-operation with external suction gas superheater

This graph shows a dx-chiller with the suction pipe at the bottom.
(Compare with the drawing of your order)

Note:
As well for dx-evaporators with **“suction pipe at the top”** the additional installation of an external superheater is recommended. So you obtain the superheating by a cheap external device, and you can use the more expensive and special falling film chiller more efficiently. By the better COP, that will pay back after a short time.

3.8 Temperature Control (suction pressure or refrigerant temperature)

Falling film chiller very often are designed for cooling water to near the freeezing point.

In order to avoid building of ice at the panels, the **suction gas pressure** at the evaporator suction header has to be regulated, to keep the evaporation temperature not lower than the designed one, e. g. -3°C, as well as accordingly the water temperatures and flow. (please see the data sheet) .

At systems used with e. g. glycol inside, the glycol inlet temperature has to be controlled.

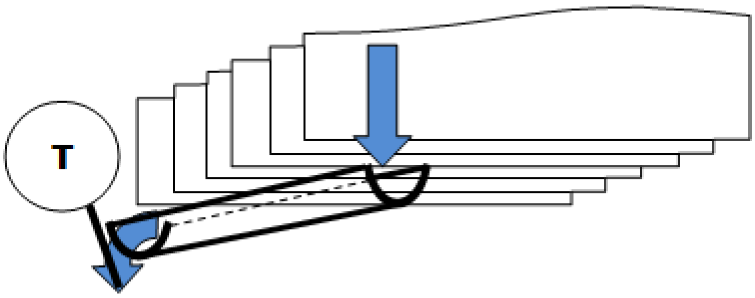
A layer of ice on the panels will reduce the heat transfer and reduce the cooling power of the falling film chiller.

Building of ice at the panels may accure for some minutes. This will not damage the chiller, which is one of the basic criteria for using falling film chillers. Ice will melt automatically after raising of the temperature inside the panels.

The **regulation** shall be done **according to the water <u>outlet</u> temperature** of the chiller.

Measuring the water temperature:
*For measuring the water **outlet** temperture, a temperature sensor can be placed in the bottom water tank or the the water out pipe of the bottom tank.*
This is the way for typical applications with constant operation conditions or for very slow fluctuations (water inlet temperature and/or water flow over many minutes). In practise only such condition will be a safe way of operation.

*(For rather unwanted condition with quick fluctuations a **temperature sensor in a small hopper** right below the panels is recommended, to achieve a quick response and to have less influence of the surroundings.)*



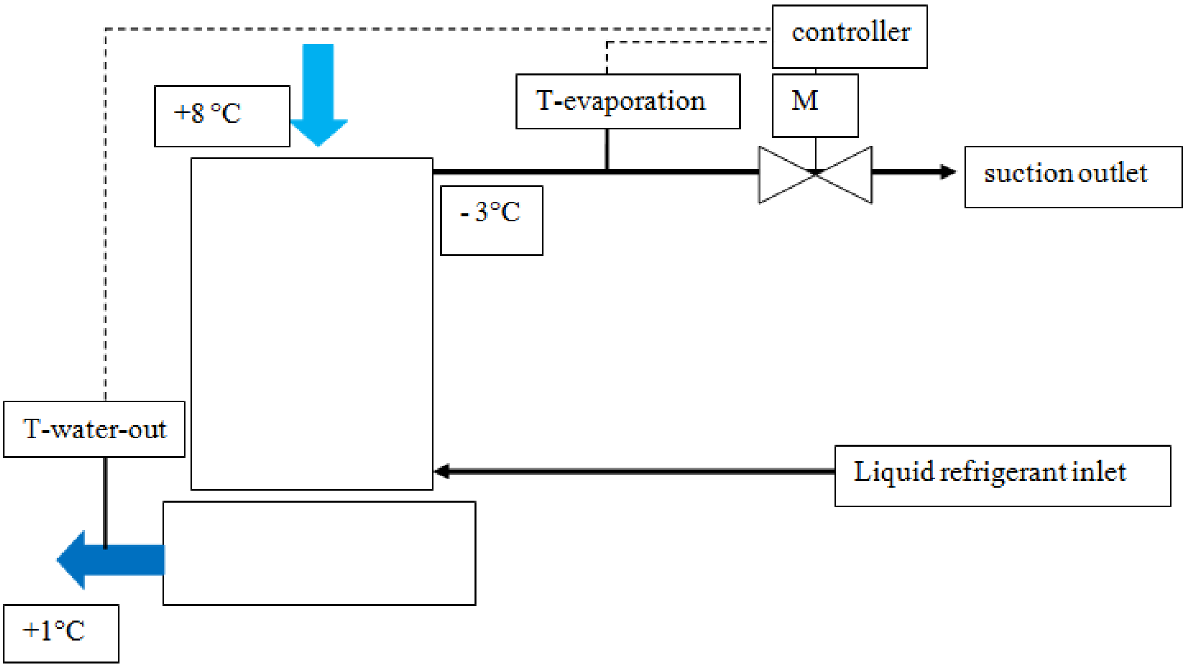
*For water **outlet** temperature below the designed one (e. g. 1°C or 0,5°C) , the evaporation temperature (or that of glycol) shall be raised. A very accurate temperature measurement and a precisely working PID-controller is required.*

Attention at the border to building ice:
To use the water outlet temperature for regulation near the freezing point is tricky, because after building a layer of ice on the panels, the water outlet temperature, compared to icefree operation, will rise (not drop !), but the temperatur inside the panel has to rise in this case ! (although the controller will want lower it automatically !)
The dependence of the water outlet temperature at the border of builing ice is not steady, after a layer of ice has been build, the control would have to react reversed. Unfortunately a thin layer of ice on the panels is not really easy to measure in practise.

Recommendation:
*Alternatively, for constant water flows, the **water <u>inlet</u> temperature** may be measured to control the suction pressure in advance, according to thermodynamical calculations or according to experiences at the existing installation. (Lower water inlet temperatures than designed, require higher evaporation temperature, to avoid building of ice.)*

It is recommended to do the **suction pressure control by the compressor** (frequency of the drive, or switching of cylinders, or bypass for screw compressors,…), which is the energy efficient way to do.

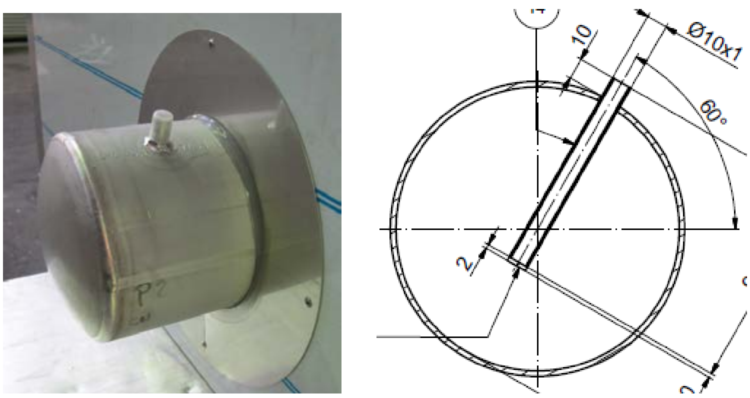
Alternatively at simple installations, it may be done by a pressure regulating valve, especially at big central refrigeration systems with a comparably small evaporator to controll.
A simple version could be to use two parallel suction pressure valves, one switchable on and off by a solenoid valve.
Another better version would be a motor driven suction pressure valve (like Danfoss KVS for small systems) with a temperature controller. (See this principle for pump operation or gravity operation:)



picture: suction pressure control following the water **outlet** temperature of a evaporator system

Sleeves for temperature measurement:

The connection pipes of the falling film chillers for suction and liquid have got sleeves for temperature sensors, which stand out of the pipes angularly at the top and lead to the centre of the pipe, where they are closed. These sleeves with 8 mm inner diameter allow a precise and quickly reacting temperature measurement. (Better compared to contact sensors outside the pipe walls.) The sleeves, ex works, are covered with plastic plugs, to avoid moisture to condense and freeze inside. For measuring with sensors of a smaller diameter, oil may be filled in for better heat conductivity.



picture: sleeve for temperature measurment

4.0.3 Special case: Central refrigeration systems at -10°C

c) Dx-operation with “suction at the bottom”:

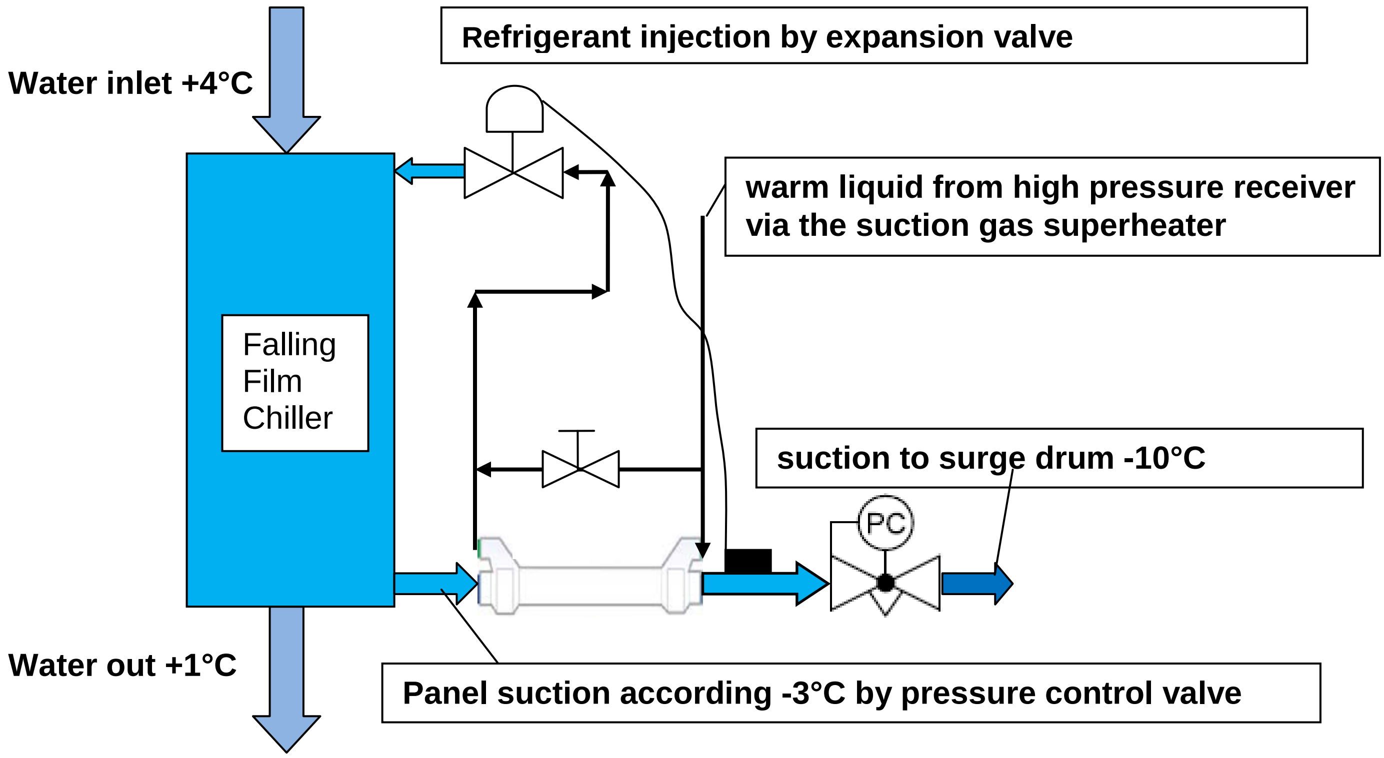
To connect a falling film chiller, designed for **dx-operation at** suction pressure according **-3°C** to a central refrigeration system with surge drum running a temperature of **-10°C**, there has to be added:

- **a suction pressure control valve for -3°C,**
- **an external suction gas superheater.**

The suction pressure control valve is needed to avoid building of ice on the panels.

The external suction gas superherater is needed, because to cold water at the bottom of the panels does not have the temperaure potential to provide a sufficient super heating for controlling the expansion valve.

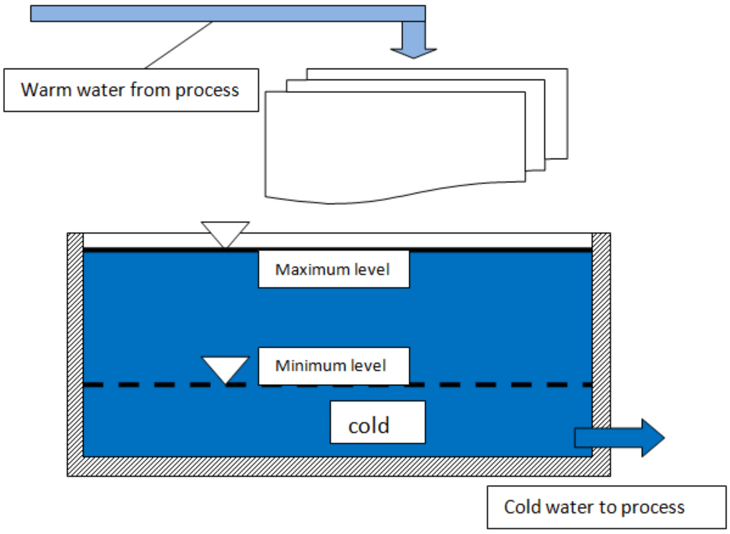
The liquid refrigerant will flash out at the expansion valve and automatically have the required temperature.



4.1 Bottom Tank Design

4.1.1 Basic design:

For **constant water inlet conditions**, or if the water **inlet temperature will fluctuate just slowly** (over many minutes) the warm water will be fed to the chillers top directly. The inlet water flow may vary not more than +/- 10%. The cold water is collected in a bottom tank with basic design:



Picture: Cold water collecting tank with "**basic design**".

The typical application is a **closed cooling circuit via a secondary htx**.
But the **cold water consumption may be discontinuous** as well, as in batch processes. (e. g. for making dough). The volume between maximum- and minimum-level (a bit above the outlet connection) can be used.
A **float valve** (option) can be used. Fresh water would be injected into the top warm water pipe to the chiller. A possibility of tank water flowing back into the fresh water system is eliminated. The pipework between float valve in the tank and chiller inlet has to be made locally.

4.1.2 Split-Tank designs with internal water recirculation:

For other operating conditions with **fluctuation of water inlet condition** to the chiller, the bottom tank is designed as „**split tank**".

Warm water will be fed, either to the warm compartment or the mixing chamber of the split-tank. When using a split tank, an **additional water circulation pump** has to be installed locally, as well as a pipe and handvalve, to pump the water from the warm side to the top distribution tray of the chiller. The cold water from the cold split-tank compartment will flow to the factory process.

The size of the internal circulation pump is recommeded to be about 10% bigger than the designed volume flow of the process water, to be on the safe side.

For other special applications, the water temperature to the panels shall be reduced, or the flow shall be increased. For those conditions, the circulating flow may be much bigger than the flow of the process water. (see design data sheet)

The falling film chiller is pressureless at the open top. There is just the static height difference and some dynamic pressure drop of the pipes and valve installation to be taken into account for the pump design (0,5 bar pressure at the designed flow should be enough).

4.2 Water level control

The bottom tanks of the falling film chillers are generally supplied without level control for the water in the tank, independent if it is make-up water or circulating water.
For all once through water consuming processes, like spray tunnels, a fresh water supply is needed.
We recommend to place your (electric) level control sensor in a pipe between drain and overflow pipe, switching a solenoid fresh water valve or better to control a motor valve, in order to add water to the warm water pipe of the chiller or alternatively to the warm water compartment of a split-tank.

Picture: recommended pipe for level control outside the tank

In case of a closed cooling water circuit via a secondary heat exchanger, the losses of water will be very small and maybe controlled and filled up manually as well.

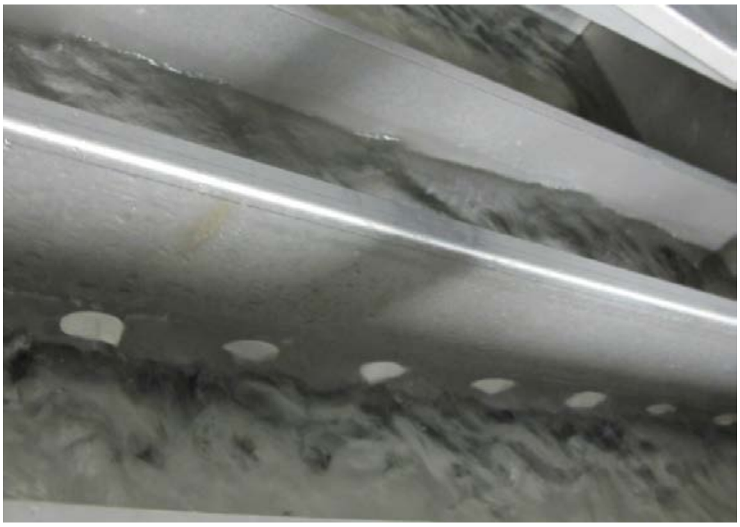
4.3 Water level control in the bottom tank

In order to replace losses of water when using a closed cooling circuit or as well for using water once through in small chillers (for bird cooling or for making dough) the installation of a float valve inside the bottom tank is possible as well. (optional BUCO supply for max ca. 15 m3/h at minimum 4 bar water pressure)
(see Chapter 4.1 for operating conditions for different tank designs.)
In case the fresh water shall be added to the top chiller, instead of into the bottom tank, the pipework for that will have to be made locally, after essembly of the chiller on the tank.

Picture: float valve to feed fresh water

5.0 Water-level - Volume-flow

The flow rate of the falling film is to be regulated, so that the liquid level in the distribution tray is kept at normally about 100-150 mm.
This level will provide a homogenious falling film on the plates.

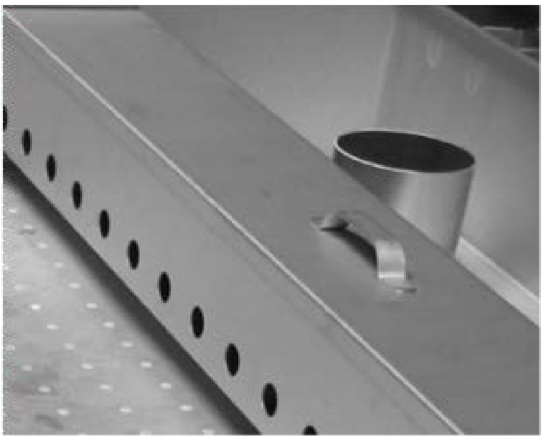


Picture : Waterlevel in the top waterdistribution tray ca. 100 – 150 mm

The chiller is designed individually for a single process with a certain volume flow. (see Datasheet of the quotation). The nominal power is acheived at this volumeflow only.
Generally a perfect falling film can only be built by the small holes with a special diameter in the bottom of the tray within a **volume flow range of +/- 10%.**
Less volume flow, due to turbulences inside the distribution tray, will lead to an inhomogeneous falling film, as well as to sprinkling, which will remain partly uncooled. Building of ice on parts of the panel will probably occur, which can be compensated by a higher evaporation temperature.

If larger variation of the **volumeflow** of the water is expected (up to **max + 20% / - 20%**), the system can be designed for an accordingly higher level in the distribution tray.

If a volumeflow of sometimes **more than additionally 20%** than the nominal value is expected, a bypass inside the tray is needed. Via this bypass the additional flow can pass by (uncooled) into the bottom tank. This bypass can be provided optionally.



Picture: Water-bypass-pipe in the top water distribution tray

5.1 Fluid Quality

The heat exchange system may be operated only with the fluids designed for. For other fluids or different fluid characteristics the danger of the corrosion exists.

- No impurities may be contained, which could block the top water distribution tray.
- The water and possible additives may not attack the material of the water-affecting parts corrosively.
- The water shall have a nearly **neutral pH value** (6 – 8).
- The concentration of "**chloride**" (**Cl^- - ionic)** shall be
    - **less than 50 mg/l** with material **AISI 304** / 1.4301, or alternatively
    - **less than 200 mg/l** with material **AISI 316** / 1.4571.
    - This is the concentration of "chloride" as a chemical compound of chlorine (Chlor) with other substances, like Natrium to salt "NaCl", or other compounds.
- The **pure chlorine** (free chlorine, freies Chlor), solved in water, shall be **less than 1 mg/l**.
- Those mentioned max. concentrations refer not only to the water supplied to the chiller, but as well shall not be higher at any parts of the unit, e. g. the housing walls or in gaps or any parts not fully wetted, after concentrating up by humidification.
- If there is salt or dirt or other chemicals in the water (f. e. seawater) the chiller has to be rinsed with fresh drinking water and cleaned completely after every production stop, "before" getting dry.

5.2 Winter operation

With the start-up of the heat exchanger it is to be made certain that the pipings and the distribution tray are ice-free. During the production of ice water, if necessary trace heating and isolations are to be used, to avoid ice water pipes and the water distribution system to freeze, with durable frost. At extreme winter temperatures an accommodation in a heated enclosure area is recommended.

5.4 Cleaning

The critical part of the chiller concerning soiling is the top water distribution tray with rows of small holes. More soilings may collect in the bottom water collecting tank. A cleaning may be done with brushes or high pressure cleaner if needed.

For frequent need of cleaning, we recommend to add a service-platform at the side of the chiller, for an easy and safe access to the top water distribution tray:

picture: service-platform at the side

Caution :
The evaporator panels are filled with refrigerant (liquid-gas mixture). The pressure inside the panels will follow the temperatur.
The maximum allowed operating temperature as average shall not be exceeded (usually 30°C or up to 40 °C).
The panels may be treated locally by a „warm“ stream of the high pressure cleaner for some seconds, but the maximum operating pressure, caused by the „average“ system temperature, shall not be exceeded.

For disinfektion and decalcification, chemicals based on citric acid shall be used.
Other more intensive chemicals may be used as well, as long as after use, these will be rinsed completely and immediately, before the range gets dry.
Especially **chlorides may not** remain on the evaporator panels, as those may cause pitting corrosion.

After every longer stop of operation, before the chiller is getting dry, so still in wet condition, the following shall be adhered:
After the use of chemicals or of dirty liquids or seawater, the chiller, still in wet condition, has to be rinsed and cleaned completely. The water touching parts and especially the parts, which are not fully wettened, have to be rinsed with clean water, until all chemicals, deposits or salts are removed completely !

6. Safety Advice

During transport, installation, operation and servicing it is very important to follow the relevant regulations for prevention of accidents.
During operation care should be taken in order to prevent an increase over the maximum operation pressure or the maximum operation temperature of the refrigerant, respectively.
This could be prevented by means of a pressure relief valve in the refrigerant circuit.

All Components of this machine have to be installed and used according to applicable safety rules, operating safety instructions and accident prevention regulations, applicable in the county of use.

Electrical Components have to be installed according to the applicable regulations, done by specialist workers only. In Germany following rules are applicable: „Bestimmungen des Verbandes Deutscher Elektrotechniker – VDE“, in other countries applicable regulations have to be followed.

The refrigeration machine has to be installed according to EN 378 sfety regulations.

Opening and /or cleaning of the ice machine may be done only, when the main power supply of the electric switch cabinet switched off.

Taking the range into operation is forbidden, until it is established, that the machine / range, in which the ice maker is integrated, corresponds with the applicable machinery directive.

BUCOdelot falling film chiller BWP

v1340S

Position	Number	Product
1	**1 piece**	**BWP - 211 kW**

Technical data

Outside		Inside	
Medium	Water	Refrigerant	R507
Flow rate per chiller	40 m³/h	Operation	dx
Inlet temperature	5,5 °C	Evaporating temperature	-3,0 °C
Outlet temperature	1,0 °C	Condensing temperature	40,0 °C
Capacity per chiller	211 kW	Volume pressure chamber approx.	2 x 89 dm³
Fouling factor	0,1 m²K/kW		

Design specification

Certificate	Works certificate		
Water distribution in sections	1	Number of sections per chiller	2
Min./Max. allowed temperature	-10 / 40 °C	Design pressure	16,0 bar(g)
		Test pressure	20,8 bar(g)

Dimensions, weights, material

Chiller			
Nominal length	1950 mm	Empty weight	710 kg
Nominal width	1336 mm	Operation weight	1270 kg
Nominal height	1888 mm		

Material of chiller			
Water distribution	AISI 304	Plates	AISI 304
Frame	AISI 304	Collector/ distributor pipes	AISI 316Ti / Cu
Frame cover	AISI 304	Venturi distributor	CuZn

Supply

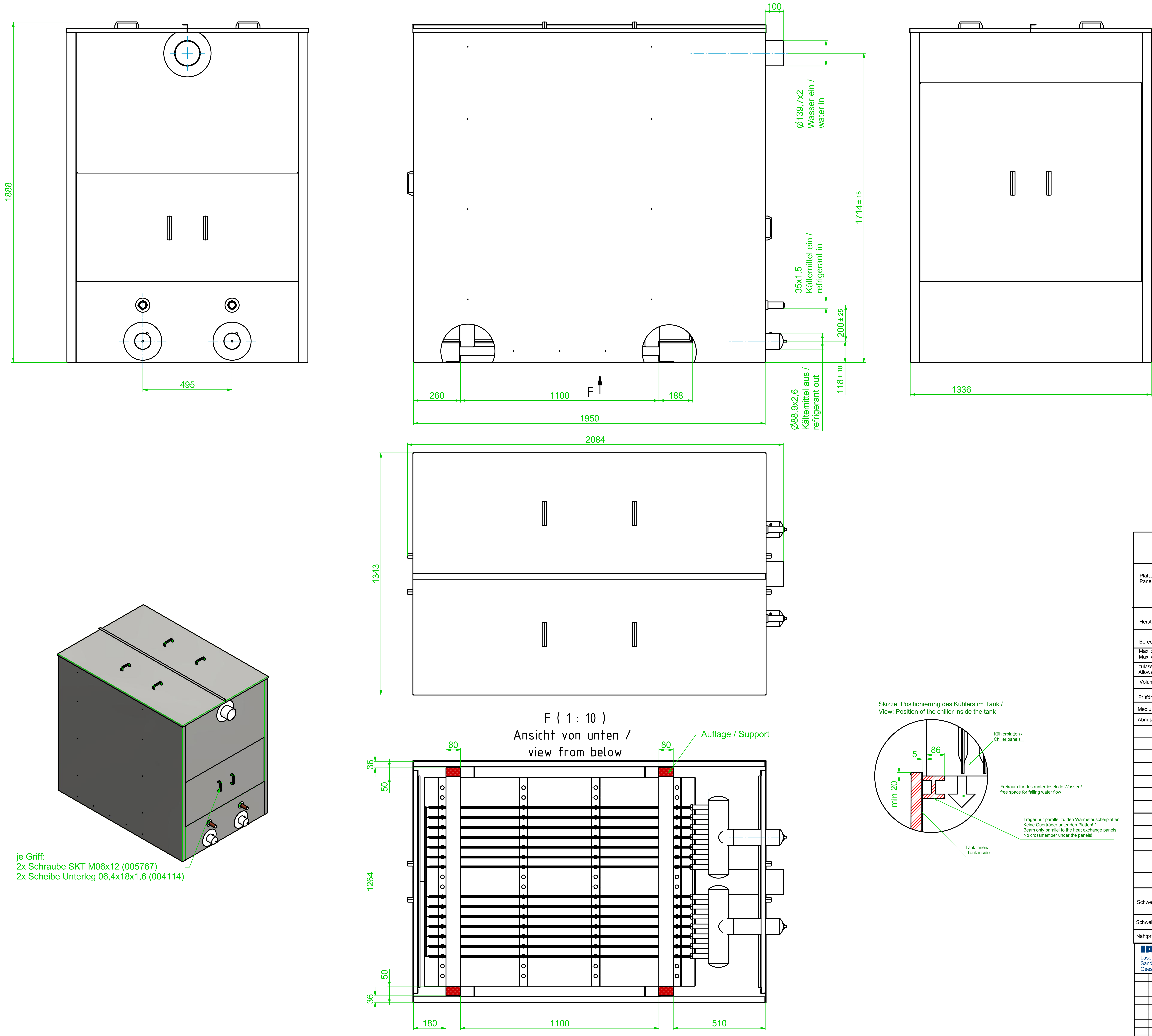
Product	**Yes**	**No**
Falling film chiller	X	
Bottom collector tank		X

Remarks:

- Cover at connection side and opposite side of the evaporator are demountable for inspection.
- All connections with welding ends. Pressure chamber delivered with gauge pressure (0,5 bar).
- For coarse dirt a filter is recommended.
- The water distribution tray has to be cleaned periodically if fouling occurs.

You have to provide an external suction gas super heater at site.

We propose to use electronic expansion valves for this BWP.



BUCO LASERPLATE GMBH D-21502 Geesthacht Tel. ++49 4152 8082-0					
Herst. Nr. / Serial-No.	P29136-1F17-1S	zul. Betr. Temp. / Design temp.	-10/+40 °C	Inhalt / Volume	78 L
Baujahr / Year of manuf.	2017	zul. Betr. Ueberdruck / Design pressure (gauge)	16 bar	Medium	R507

System mit 0,5 bar getrocknete Luft beaufschlagen und Systemein-/austritt mit Deckel verschließen
Charge system with dry air at 0,5 bar and close system inlet/outlet with cap.

	Abnahme / Acceptance		
	nach / acc. to	durch / by	
Plattenraum Panel Space	Werksabnahme / works certificate		Anzahl / number of units : 1x

Herstell-Nr. / Mfr. Serial-No	P29136-1F17-1S	Herstelljahr / Year built	2017

Berechnungsangaben / Design data	Plattenraum Panel space	Plattenraum Panel space	Plattenraum Panel space
Max. zulässiger Druck PS / Max. allowable pressure	16 bar	16 bar	bar
zulässige Temperatur min./max. TS / Allowable temperature min./max.	-10/+40 °C	-10/+40 °C	/ °C
Volumen / Volume V	78 l	78 l	l
Prüfdruck / Test pressure PT	20,8 bar mit: getrockneter Luft with: unter Wasser	20,8 bar mit: getrockneter Luft with: unter Wasser	bar mit: getrockneter Luft with: unter Wasser
Medium / medium	R507	R507	
Abnutzungszuschlag / Corrosions allowance			

Gewicht BWP / weight BWP	706 kg
Gewicht Tank / weight Tank	0 kg
Gewicht netto / net weight	706 kg
Werkstoff Platten / material evap. plates	1.4301 (AISI 304)
Werkstoff Sammler / material collector/distributor	1.4571 (AISI 316 Ti)
Werkstoff Rieselwanne / material water distributor	1.4301 (AISI 304)
Werkstoff Rahmen / material frame	1.4301 (AISI 304)
Werkstoff Gehäuse / material cover	1.4301 (AISI 304)
	(AISI 304)
Oberfläche / surface	gebeizt / pickled

Herstellerangaben / Manufacturing

Schweißzusatzwerkstoff / welding material		Thermanit GE-316L / W19123L	
Schweißverfahren / Welding procedure		Wärmebehandlung / Heat treatment	
		Nicht vermaßte Kehlnahtdicken / Filleweld thickness without dimensions	0,7 t min. / a min. = 3mm
Schweißnahtwertigkeit / Weld efficiency %	85	Schraubenlochanordnung der Flansche nach DIN2501/ANSI B16,5 / Arrangement of flange bolt holes acc. b. DIN 2501/ ANSI B16,5	
Nahtprüfung/ Weld test			

BUCO
Laserplate GMBH
Sandstraße 31 - 21502
Geesthacht

	Datum	Name
Bearb.	24.04.2017	Lorenzen
Gepr.	25.04.2017	Herbst
Norm		
S-prfg.		

Zust.	Änderung	Datum	Name

BUCO - Werks - Norm 1

Maßstab P29136

Schutzvermerk ISO 16016 beachten
Refer to protection notice ISO 16016

BWP / 211 kW

17/13210/0

Blatt 2 von 3 Bl.