COMPABLOC

Installation, Operation and Maintenance Manual

IMCP0002 Rev. J / ENGLISH

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Original Instructions:

This Instruction Manual IMCP0002 revision J is a revision of IMCP0002 revision I.

J

This document is English version.

Scope of application:

- CP15, CP20, CP30, CP40, CP50, CP75 and CP120
- CPH15, CPH20 and CPH30
- CPF15, CPF20 and CPF30

IMPORTANT: All other specific information on the general arrangement drawing or other specific documents provided by Alfa Laval with the equipment takes precedence over information in this document.

If there is a QR Code on the nameplate of the Compabloc, scan it to access this Instruction Manual and to Troubleshooting assistant.

Editions & Revisions:

J	01/10/2021	M.BLANCHARD		A. BAYMONT		A. MACIVER		See where indicated
I	01/02/2020	M.BLANCHARD		A. BAYMONT		A. MACIVER		See where indicated
H	07/11/2016	M.BLANCHARD		A. BAYMONT		A. MACIVER		See where indicated
G	21/11/2014	M. CARVALHO		S. PELENC		A. MACIVER		PTFE gaskets torque values
F	22/10/12	M.BLANCHARD		S. PELENC		A. MACIVER		Sixth edition
…	…	…		…		…		…
A	15/02/02	M. LAVANCHY		C. ROUSSEL		R. CONSONNI		First Edition
REV	**DATE**	**NAME**	**VISA**	**NAME**	**VISA**	**NAME**	**VISA**	
		EDITED BY		**VERIFICATION**		**APPROVAL**		**OBSERVATIONS**

This is an electronic version of the IOM Manual in pdf format. Only the official paper version is signed and registered as per our QA system and copy can be obtained upon request.

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1 - Description

1.1 - General description

Compabloc is a welded plate heat exchanger without interplate gaskets allowing a large heat transfer area within a very compact space (low footprint). It is made from stacks of welded plate packs inserted in a rigid rectangular bolted frame for mechanical strength and the separation of the various circuits. Each circuit can be fitted with a detachable baffle plate assembly. Only 4 panel gaskets are installed, as indicated on the exploded view Figure 1.

Compabloc is designed and manufactured in accordance with a Pressure Vessel Code (ASME, EN-13445, etc.) and for defined working conditions. The Design & Manufacture of the Compabloc is made per a Quality System Management according to ISO 9001.

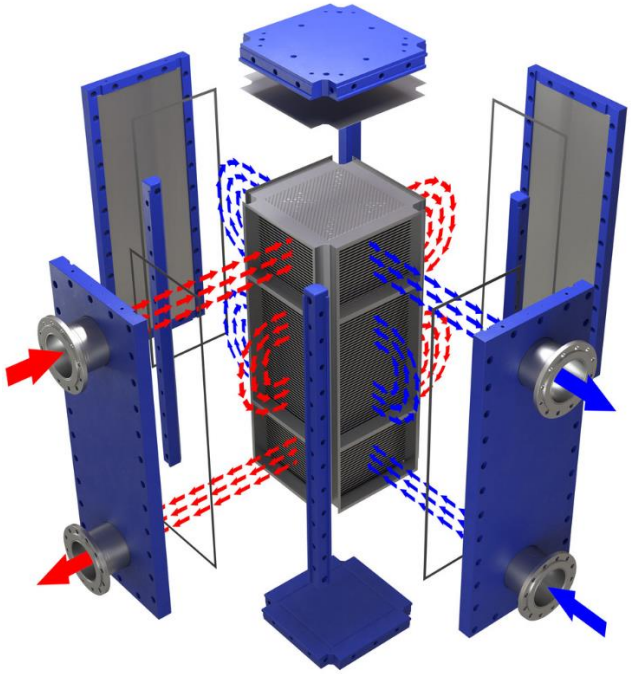

Figure 1: Compabloc exploded view

Four carbon-steel panels fitted with nozzles enable the connection of the pipework. Optionally, these panels can be lined with the same material as the plates themselves. The plates, baffle plates, nozzles and panels linings can be made from stainless steel 316L, Titanium, 254 SMO, Hastelloy, or other pressable and weldable material. The flow can be directed using baffles (number of passes chosen to maximize heat transfer and minimize fouling).
The bolts of panels are put in place with high temperature lubricant.

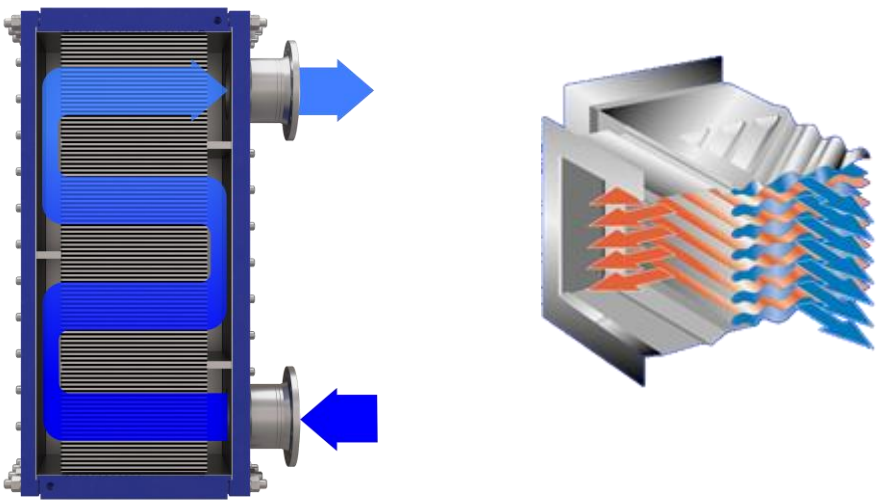

Figure 2: flow through Compabloc and cross-section in plate pack

1.2 - Function & duty

The Compabloc is a heat exchanger used for heating or cooling (with or without heat recovery), steam heater, condenser, 2-pass process condenser, reflux condenser, reboiler, gas cooler, etc…
Each of those duties requires a specific installation and the installation must be in conformity with the thermal data sheet and the general assembly drawing of the unit.

It is recommended that, in situations where sudden full vacuum or sudden increase of pressure could occur, that a relief valve be installed in the piping to protect the Compabloc.

- **Pressure and temperature limits**
  Never run the Compabloc at lower/higher pressures and/or lower/higher temperatures than those indicated on the name plate.

- **Continuous & cyclical duty**
  Compabloc has been designed for continuous and stable operating conditions. Compabloc is not suitable for cyclical operating conditions, especially when sudden temperature changes with high amplitude could occur.
  High cyclical duty (temperature and/or pressure) may create fatigue leading to a reduced lifetime of the unit.

- **Operating pressures**
  It is recommended that the Compabloc always have a differential pressure between the two circuits. An identical operating pressure on both circuits could make the plate pack behave like an accordion because of pressure inversion, creating fatigue, with the risk of a decreased lifetime.

  In case of a maximal differential pressure is indicated on the nameplate (*see Appendix 3*), make sure that the difference of pressure between both sides never exceeds this value because it could seriously damage the plate-pack.

- **Duty**
  In order to ensure optimal efficiency, it is strongly recommended to run your Compabloc as close as possible to the conditions used for initially designing the heat exchanger.

- **Corrosion risk**
  The material of the parts in contact with the used medium has been specified or chosen based on data supplied by the customer (fluid, composition, temperature, etc.). If the media passing through the unit and operating temperatures is different from those specified in the data sheet, the Customer is responsible for ensuring that the corrosion resistance is suitable.
  Special attention shall be given to the chloride content of the streams, as this is a frequent cause of corrosion of stainless-steel materials.
  Responsibility regarding the duty or cleaning medium and checking its compatibility with the materials used in the heat exchanger is with the customer or contractor, if otherwise not agreed with Alfa Laval. The quality of medium, can considerably affect the operation and lifetime of the heat exchanger.

1.3 - PED/Risk Analysis

All units delivered in the EEC follow the PED (Pressure Equipment Directive) with a level of risk depending on parameters such as nature of the fluid (gas, liquid, steam, fluid vapour pressure), and the danger level of the fluid, Design Pressure, Volume of each circuit or Design temperature.

These parameters will determine a PED Category to which is linked a risk analysis as per the PED.
Make sure that the category of your unit matches your operating conditions.

2 - Installation

2.1 - General requirements & precautions

- To allow maintenance and inspection, we recommend leaving a 50 to 120 cm (19 to 48") wide space all around the Compabloc unit to facilitate panel dismantling.
  At the top of the exchanger, it is necessary to have a 100cm (40") free space to allow the possible setting of a panel-lifting device.
- It is strongly recommended to install the Compabloc on a foundation. Please pay attention in foundation design: make sure that you have enough space (at least 30 cm) under the bottom bolting of each panel to use tightening tools in case of maintenance or cleaning. Notice that the panel bolts placed behind flanges may be unaccessible if the foundation is too close. Please refer to the General Arrangement Drawing when designing foundation.
- Follow good engineering practice both in the design and operation of the plant. Take appropriate precautions to avoid hydraulic shocks (water hammer), which could damage Compabloc (see Start up section 3.2).
- The connecting pipework should be provided with valves in order to isolate the unit. Valves are essential between any pump and the Compabloc.
- All valves should have a slow valve action. Flowrates should be increased slowly and gradually during start up and reduced gradually during shut down.
- Centrifugal pumps are recommended**.** Do not use piston-type pumps in line with the Compabloc (these generate repetitive pulsations in flowrate which may cause serious damage to the plate pack).
- Preferably pumps should be installed on the outlet instead of inlet to limit stress on the plate pack when pump load varies.
- When specifying pumps and heat exchangers, allow ample margins for pressure drop increases above stated design values. These can be the result of possible variations in fluid properties, flow rates, scaling or deposits on the heat transfer surfaces.
- When using live steam as heating medium, install a steam trap on the condensate outlet pipe, preferably with automatic venting of non-condensables.
- Make a check of the torques of the panel bolting before insulating the unit (see para 3.1 for more details) and piping it.
- When provided with the unit, place the shearing pins in position before fastening the feet on the Compabloc.
- Detach any label fastened to vent and/or drain before connecting.

2.2 – Installation

- **Pipework**

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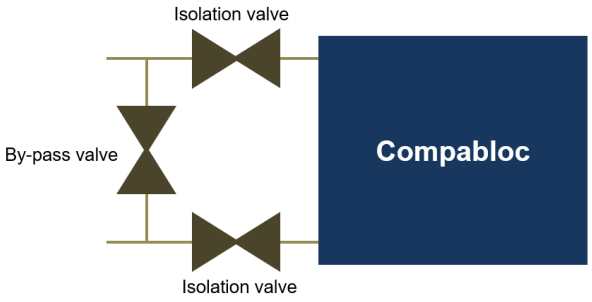
No specific precaution needs to be taken when connecting the Compabloc. However, if the connection pipework includes long, straight runs, it is essential to insert correct bends, or expansion devices. Alfa Laval suggests placing the pipe supports at a maximum of 2 meters (72 in) distance from the unit.

- **By-pass**
The connecting pipework should be provided with valves in order to isolate the unit and with by-pass valve for start-up and shutdown on each side.



The isolation valves for the process circuits should be positioned in such a way as to enable the panels to be dismantled without having to remove the valves.
Valves must be kept in good working order. The use of globe or butterfly valves is recommended.

This by-pass line must be used for flushing the line before start-up of the Compabloc.

- **Venting & draining**
CP15, CP20, CP30 and CP40 are provided with nozzles located as low and high as possible acting as vents and drains, thus allowing a complete draining and venting of the units. They are self-venting and self-draining.

For CP50, CP75 & CP120 range, which have separate vent and drain connections, there is a need to provide, as a minimum, a permanent venting of the cold circuit (the one which is heated up) in order to allow proper gas release, preventing the gas released being trapped inside the unit.
Connection of the nozzles with the drain and vent circuits should be done with isolation valves provided by the end customer or contractor.

Venting is mandatory on both sides during start-up to remove any presence of vapor/gas pocket in the upper section of the exchanger.

A typical way to vent a CP50, CP75 or CP120 is shown in Figure 3 (liquid/liquid).
The vent valve must be open on hot and cold side during start-up.
In operation, we recommend that you connect and keep open the cold side vent to allow continuous and permanent self-venting of Compabloc as the working cold medium stream generates gases. This is the case in most heat recovery systems - “feed / pumpdown” where the cold stream generally releases a lot of trapped gas or air.

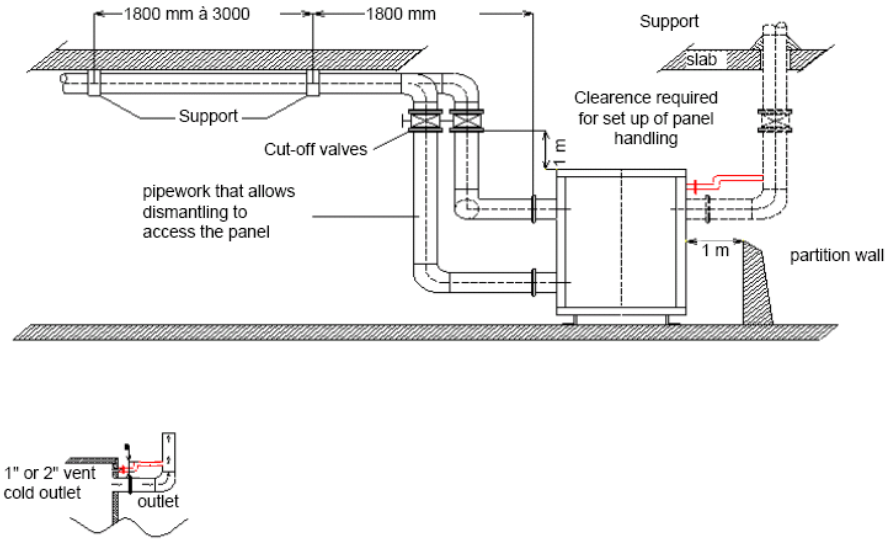


Figure 3: typical Vertical Compabloc installation

- **Case of condensers**
  For unit operating in the mode of condenser, it is recommended that the valve at the drain nozzle be open as much as possible in order to prevent condensate accumulation.

- **Filters**
  If the service conditions require it, or if the fluid is loaded with particles, install a filter with maximum mesh of 3 mm (1/8") for all Compablocs, except the CP15 which shall have a maximum filter mesh of 2 mm (1/12"), upstream of the exchanger.

- **Connections/nozzles**
  All connections/nozzles are marked and should be piped accordingly. In case of doubt, check with the arrangement drawing. Standard nozzle load limits are indicated on the General Arrangement drawing. For piping connections, Alfa Laval strongly recommends using a gasket with a gasket factor = 2.5 and a seating load = 21 MPa and SA193B7M bolting to comply with the calculation hypothesis regarding nozzle. Specific allowable nozzle loads, and moments can be calculated on request.

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- **Other external loads**
  Compabloc is designed without any other external loads, except if specifically required by customer. In this case, please refer to the General Drawing and Calculations Note.

- **Controls and adjustments**
  To prevent water hammer and shock, all valves must be opened gradually.
  The adjustments and controls, as well as the process used in the circuit, must be studied with care to avoid any thermal or mechanical stress-during the start up and transient operating conditions.

- **Earthing lugs**
  The connection of the Compabloc to Earth is mandatory prior to operation start-up. Please use earthing lugs provided for this purpose

Always use control valves with a PID system, set for the maximum proportional range. Avoid operating conditions with only one circuit in operation.

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Depending on the properties of the fluid, install Compabloc within a spill containment tray to avoid any pollution due to potential leakage.

2.3 - Control system

- ***Control system for liquid/liquid applications***

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A classical system where the outlet process temperature drives the control valve at the service inlet is good as long it is an automatic control such as a PI or PID system and the control valve is correctly sized.
An oversized control valve creates the risk of ON/OFF operation which is not good, thereby causing fatigue and stress.

- ***Control system for steam heaters***

It is generally a continuous process with the purpose of heating a fluid by condensing live or secondary steam (while with process condensers the purpose is to condense the vapours, not to heat the cooling medium).
To avoid a sudden vacuum inside the unit, due for example to an emergency shut down and a sudden closure of the steam inlet valve, it is strongly recommended to install a vacuum breaker valve (safety valve) on the steam inlet line near the Compabloc steam inlet. If the steam inlet valve is closed suddenly, air will be admitted in the steam inlet line tol avoid vacuum inside the heat exchanger.

✓ **Steady flowrate of the media to be heated:**
It is mandatory that a control system as indicated below is installed. We recommend a control system based on a condensate level control. The temperature relay (TIC) starts up the condensate control valve located after the steam trap. The steam trap is essential as it will allow only the condensate to pass.
The condensate control valve must not be oversized! It should typically be sized to handle the maximum, normal, and the minimum duty of the exchanger. Typically, this translates into the control valve operating being between 60-80 % open at maximum load and not less than 20 % open at minimum load. It will avoid ON/OFF behavior.
The controller will act by increasing or decreasing the liquid level in the heat exchanger, allowing smooth control.
Check the design so that the velocity of the condensate is below approximately 0.5 m/s so the condensate outlet will be self-venting. Higher speeds can lead to flooding of the connections by accumulation of condensate.

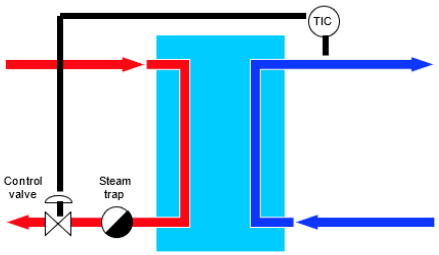


Figure 24:
Steam heater – liquid level control

In case of steam pressure control, it is essential to consider the different operating loads to properly size the control valve. (fig.25)

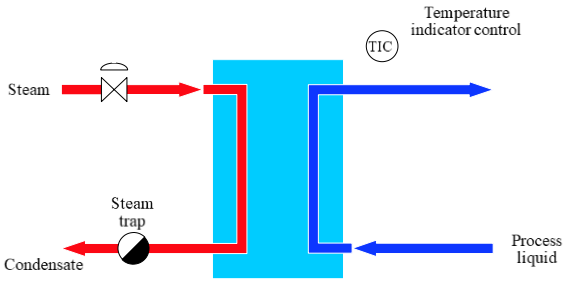


Figure 25 :
Steam heater – steam control

✓ **Unsteady flowrate of the media to be heated:**
If the liquid flowrate is expected to vary a lot, it may generate fatigue leading to reduced lifetime of the equipment.

- ***Control system on Process condensers***

To avoid a sudden vacuum inside the echanger, due for example to an emergency shut down, it is strongly recommended to install a vacuum breaker valve (safety valve) on the vapour inlet line near the Compabloc inlet.

- ***Control system on low pressure feed-water heater***

For low pressure feed-water heaters, it is highly recommended to use a level control for the condensate with high and low level. The outlet valve located on the condensate outlet pipe is opening in order to prevent the condensate level to go higher than the high limit.
This system prevents any contact between steam and condensate.

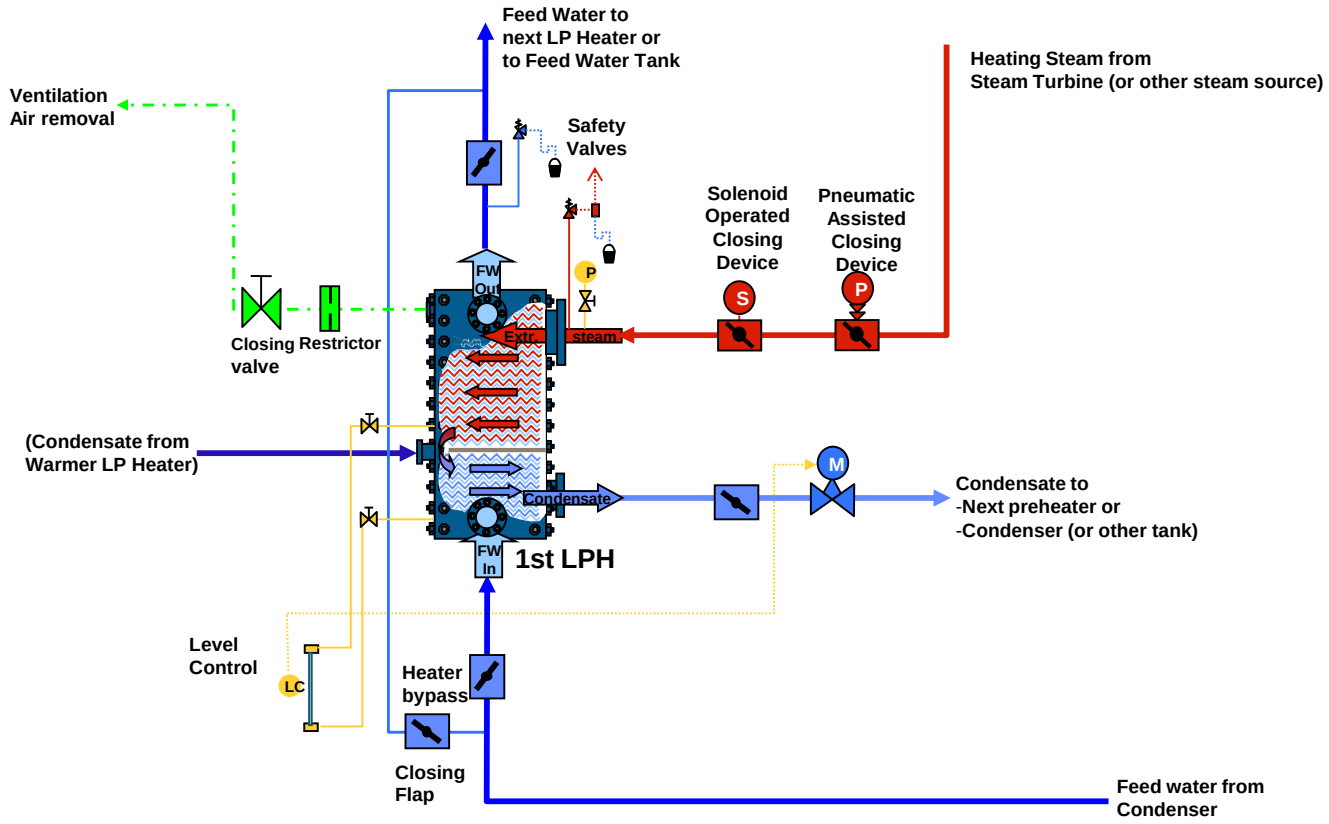


Figure 27:
P&I Diagram for LPFW Heater

Make sure a vacuum relief valve is installed in order to avoid sudden vacuum when shutting down the unit.

2.4 – Lifting

The handling of heat exchangers Compabloc should be done by using certified straps, slings and shackles, and also by appropriate lifting means (jib or bridge crane).

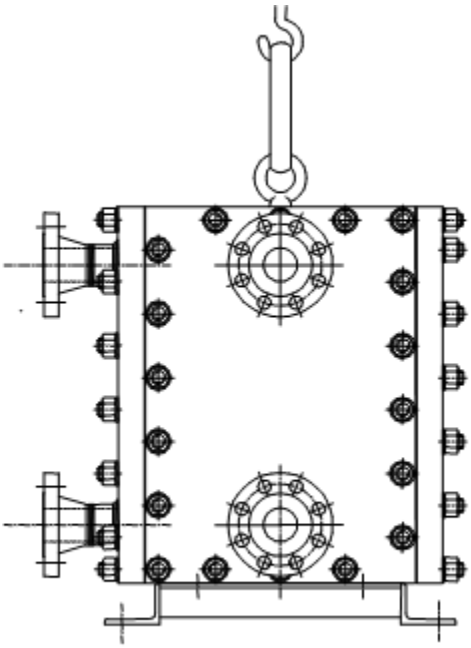
The nozzles must never be used for handling purposes.
Do not use the welded or screwed lifting lugs located on the panels for lifting of the complete unit, these are for lifting individual panels only!

It is very important to check that the capacity of the lifting means correspond to the lift weight.
In general, it is not recommended to handle the Compabloc by using a forklift truck.

For safety reasons, never stand or work under suspended loads.

Lifting rings cannot be used at less than -20°C (-4°F).

- **ertical Compabloc**
  Lifting rings and lugs are located on the top of the unit.



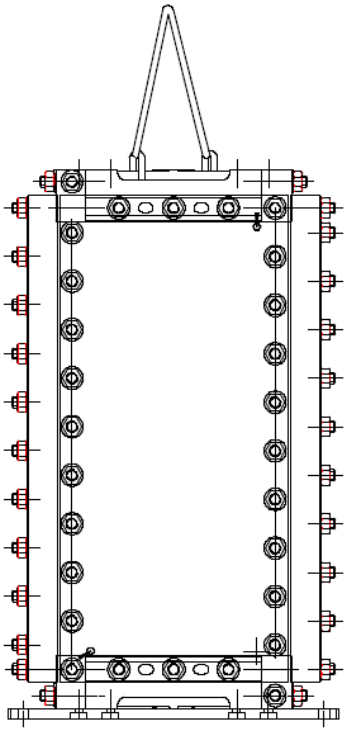


Figure 4: lifting of Vertical Compabloc

Remark: For safety reasons during transportation, many big units are delivered in horizontal position. If needed, handling & tilting procedures are available:

- for CP50 & CP75, please refer to procedure CLIB1001
- for CP120, please refer to procedure CPPB1103

CP120

You can obtain these procedures by scanning the QR code available on the equipment or by scanning now the QR codes which are on this page.

CP50-CP75

- **Horizontal Compabloc**
  CP15-CP20-CP30-CP40**:** lift the exchanger using two soft slings fixed on the lifting lugs.

  CP50, CP75 and CP120 range : use the lugs located on the end heads.
  For a CP75 unit fitted with more than 200 plates or any CP120, a lifting-beam must be used.

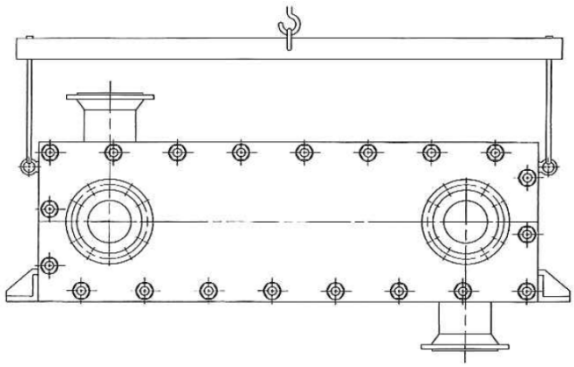


Figure 5: lifting of Horizontal Compabloc

2.5 – Storage

Compabloc must be stored, rinsed, drained and dried to avoid corrosion. Connections must be closed with blind flanges, wooden covers or plastic tape.
It is strongly recommended not to store Compabloc outdoor.

If spare parts are delivered with the unit (we strongly recommend to always keep as spare parts a set of gaskets and 10% of bolting for preventive maintenance), they can be stored without time limitation in their original packing and in a dry area (no outdoor storage). Gaskets must be stored in horizontal position.

3 - Operation

3.1 - Before start-up (& before eventual insulation)

- **Check of panel bolt torques**
  Before start-up, make sure the unit is correctly installed and make a check of the tightening torques of the panel bolts as per the values in appendix 2. Values must be at least equal to nominal tightening forces. The retightening of bolts can be realized one panel after the other, taking one bolt next to the other, turning around the panel and starting at one bolt randomly.
  Panel loosening (with loose bolts consequently) may occur during transportation or storage. In case where the torque values are below the recommended ones, it is necessary to retighten the bolting with an appropriate torque wrench before starting up the unit.

Leaks due to not properly tightened panels is not covered by warranty.

- **Maximal differential pressure**
  Check if a maximal differential pressure is indicated on the nameplate (*see Appendix 3*). If it is the case and if the operating pressure of the cold side is higher than this maximal allowable pressure, start-up process as described in chapter 3.2 is not applicable.

If the operating pressure of the cold side is higher than the max allowed differential pressure (refer to the nameplate – Appendix 3), then both circuits must be started-up SIMULTANEOUSLY. Differential pressure must never exceed the max allowed differential pressure indicated on the nameplate.

- **Individual precautions**
  The heat exchanger operates with high temperatures, high pressure and aggressive media: it is necessary to provide personnel protection measures, in accordance with the applicable safety regulations and work safety codes at the customer site.

- **Personal protection**
  Make sure the unit has personal protection (a protection screen or a cover is generally enough) or the appropriate insulation so that nobody can be hurt or burnt by touching the panel surfaces.

3.2 - Start up

In order to extend lifetime of the unit, start up must be gradual and smooth. Flowrate adjustments should be done slowly in order to avoid the risk of water hammer.

Water hammer is a short pressure peak that can occur during start up or shut down of a system, causing liquid to travel along the pipe as a wave at the speed of sound. This may cause considerable damage to the equipment.

- Check that the Compabloc is correctly installed, with the cold circuit flowing upward (in case of gas/air release).
- Generally speaking, unless specifically recommended, the cold circuit must be filled and started first.
- Open the air vent (it concerns only models CP50, CP75 and CP120, other models are self venting).
- Open the outlet valve on the cold circuit.
- Start the pump for this circuit with the exchanger inlet valve still closed.
- Slowly open the inlet valve at the heat exchanger.
- When all the air is out, the vent can be closed (CP50, CP75 and CP120 only).
  Note: vent can remain open if connected to the pipeline.
- Once the cold circuit is running, apply for hot circuit the same procedure as per the cold circuit.

Start-up must be gradual and heat rate shall not exceed 60°C per hour to avoid thermal shocks or unnecessary stress on the unit. Pressure buildup rate must not exceed 1 bar/min.

3.3 - Unit in operation

General technical equipment operating rules should be observed. During operation, the following shall be checked:

- There is no leakage from the gaskets. Normally no retightening should be necessary. Nevertheless, should a leak be observed, do not hesitate to retighten the panels as per the torque indicated in appendix 2. Cold retightening is mandatory. The pressure must be released.

Never tighten or loosen panels under pressure and as long as their temperature is not at ambient temperature!

- The operating pressures and temperatures must not exceed the maximum design values stated on the name plate. Operating temperature must never go below the minimum design temperature specified on the name plate.
- Differential pressure must never exceed the max allowed differential pressure indicated on the nameplate (when indicated).
- Bolts and nuts are kept clean and greased (except if PTFE coating). Prevent damage on coating of bolts & nuts if they are coated.
- Avoid sudden changes in fluid flowrates, pressure and/or temperatures in order to reduce hydraulic shock and/or fatigue effects caused by thermal expansion and contraction.
- Maintain flow rates at the designed values as much as possible. Lower velocities reduce pressure drop and thermal efficiency. Flow rates much lower than design values may also result in accelerated fouling.
- For fluids containing solids, the tendency of settling and clogging increases if the flow rate is reduced.
- In installations with multiple units in parallel, variations in capacity are best handled by varying the number of units in operation rather than by major variations in flow per unit.

3.4 - Shut down

If the operating pressure of the cold side is higher than the max allowed differential pressure (refer to the nameplate – Appendix 3), then both circuits must be shutdown SIMULTANEOUSLY. Differential pressure must never exceed the max allowed differential pressure indicated on the nameplate.

In case of the warning just above is not applicable, then it is the reverse procedure of start up, with generally the hot circuit being closed first and the cold circuit still running.

In order to prevent possible injury to operators, never touch the unit as long as its external temperature is not ambient temperature!

- Slowly close the valve controlling the flowrate of the pump you are about to stop.
- When the valve is closed, stop the pump.

- If the Compabloc is shut down for several days, it must be drained.
  Draining must also be done if the process is shut down and the ambient temperature is below freezing temperature of the media. Draining is a simple operation because the lower nozzles allow a self draining for the CP15 to CP40, while for CP50 to CP120 models, flanged drains have to be used. They should be piped to the drain circuit or connected to an evacuation system.

- Depending on the process fluids used, it is also recommended to rinse and dry the unit if the shutdown is of longer duration.

If fluids are hot, allow the unit to cool down to ambient temperature before draining to prevent possible injury to operators.

Make sure toxic, hazardous, lethal vapors or liquids are NOT released to the atmosphere or to the ground. These could cause injury to people and/or damage to the environment.

After a long shut down (several months), check the tightening torque of all bolts and nuts, before re-starting.

4 - Maintenance

Please find below the preventive maintenance program recommended by Alfa Laval.
It is strongly recommended to always keep as spare parts a set of gaskets and 10% of bolting for preventive maintenance.

№	Recommended periodicity	Type of operation	Notes
1	Daily	Supervision of key process parameters including temperature, pressure drop and media composition	If a contamination of media is observed, it is necessary to carry out a detailed analysis to check for possible internal leakage in the plate pack Follow-up of pressure drop variation permits to anticipate a loss of performance (clean the heat exchanger to remove fouling)
2	Not less than once a week	External visual check	- state of flange connections - absence of external leak of the Compabloc - absence of leakage of installed valves - state of fixing elements and grounding - state of control and measuring devices - absence of vibration or pulsation in the pipelines - absence of abnormal sound or noise inside the unit
3	Once per 3 years up to once per 6 years (during scheduled shut-down)	External and internal visual control	External control concerns external elements of the heat exchanger, including panels, heads, girders, connections and bolting (deformation, corrosion), all welds (crack, defects, corrosion...) and painting (local absence of coating, blister…) Customer can decide to proceed an internal examination (depending of criticity of equipment or in case of suspicion of possible issue). Then, it is necessary to: - estimate state of internal elements of the heat exchanger, including baffles, panel lining (check lack of deformations, cracks, defects in welds and corrosion) - estimate state of the heat exchanger plate pack – check welds, lack of deformation of plate pack, erosion-corrosion penetration damages. Internal examination requires the disassembly of the panels (chapter 4.3). Alfa Laval can support you - contact your Alfa Laval representative
4		Mechanical and/or chemical cleaning	Procedure of cleaning according to chapter 4. Delaying cleaning makes the recovery of initial heat transfer performances more difficult.
5		Leak tests	Test pressure = design pressure (as indicated on the nameplate)

If a default is detected, necessary actions must be taken as soon as possible to fix the issue.

Alfa Laval is on your side to provide you a large offer of services related to the Maintenance of the Compabloc.
Please contact your Alfa Laval representative.

4.1 - Chemical cleaning

Chemical cleaning must be carried out by authorized and qualified personnel. Take all necessary protection & precautions for health, safety and environment regarding chemicals.

Chemical cleaning is the most efficient way to clean the unit. In general, inorganic deposits are cleaned with acidic cleaning solutions and organic deposits with alkaline cleaning solutions.

Proprietary cleaning agents should be used in accordance with the manufacturer's instructions. In this way, the compatibility with the materials of construction (metal and gaskets) is secured and warranties apply. The whole cleaning protocol (choice of cleaning agent, its concentration, temperature and time) must be related to the composition of the fouling species. Some guidelines are given in the Table below to clean various common fouling species.

Cleaning agents - Fouling

Type of deposit	Cleaning agent	Typical conditions
Organic (microbiological growth, algae, slime, proteins, grease…)	AlfaCaus	10 vol.%, 60ºC
Oil-related	Alpacon Multi CIP II AlfaCaus Alpacon Degreaser II	10 vol.%, 60ºC
Asphaltic, tar, hydrocarbon-based	Paraffin or naphtha-based solvents followed by AlfaCaus	
Calcium carbonate Calcium phosphate	Alpacon Descalent II	10 vol.%, 60ºC
Iron oxides	AlfaPhos	10-20 vol.%, 60ºC

Check suitability of the cleaning protocol with the materials of your Compabloc.

Never use hydrochloric acid or other cleaning substances containing chlorides as their presence will inevitably lead to corrosion of stainless-steel alloy components.

For optimal results, the flow direction should be in the opposite direction of normal flow ("back flushing" mode). The circulation of the cleaning solution must be upstream, if possible, with a flow of 50 % of the nominal flow.

It is strongly recommended to monitor the pressure drop through the unit and to carry out chemical cleaning once a set maximum pressure drop value has been reached.

After every chemical cleaning, rinse the exchanger thoroughly with hot water and drain it.

Always use the appropriate waste container to recover the spent cleaning solution.

For additional information on cleaning protocols, please contact your nearest Alfa Laval representative.

4.2 - Mechanical cleaning

If chemicals cannot be used for cleaning, the panels and possibly the baffle cage can be removed to permit access to the heat transfer surfaces.

Follow instruction as per chapter 4.3 for opening your Compabloc.

In most cases, it is not necessary to remove the baffle cage for cleaning the plate pack.
If needed, please follow instruction as per chapter 4.3.5.

Clean with high pressure water - High pressure water hydroblasting can be made up to 1000 barg (14500 psig).
Do not go above 1000 barg (14500 psig)!
As the corrugations are oriented at 45°, it is possible to have good access to the heat exchange surface by orienting the cleaning device at 45° (hydroblast gun or cleaning bar).

Before opening a Compabloc, make sure it is empty.
Collect the remaining fluid to avoid any pollution of the environment.

4.3 - Panels dismantling & re-assembly procedure

Panels need to be dismantled in case of mechanical cleaning and/or inspection of plate pack and/or panel linings.

It is forbidden to make any marking damaging the surface of the plate pack or the lining.

Girders and heads are fixed items and must never be disassembled from platepack.

- First, drain completely the 2 circuits.
- Mark the panels with identification symbols (to clarify for which circuit) prior to dismantling (so that they can be correctly re-installed later).
- Check that none of the two circuits are pressurized (and that drains are open).
- Check that the panel being dismantled is firmly secured and cannot fall once unscrewed (*see panel weight Appendix1*).

In order to avoid that the Compabloc tilts as long as all panels are not in place, make sure that the Compabloc is fixed to the floor during panels dismantling & re-assembly.

If not possible to fix Compabloc to the floor, use a crane to maintain the Compabloc in case of tilting during dismantling & re-assemblying panels.

4.3.1 - Dismantling procedure for one panel

Refer to Figure 6.
In order to avoid any twisting of the girder columns, first it is necessary to relax the nuts (marked 4) and then progressively loosen the bolts of the panel being dismantled, starting with the nuts of the girder (marked 3) then the nuts of the top and bottom heads (marked 1 & 2).

Use the welded or screwed lifting lugs located on the panels to lift the panels in a safe way.

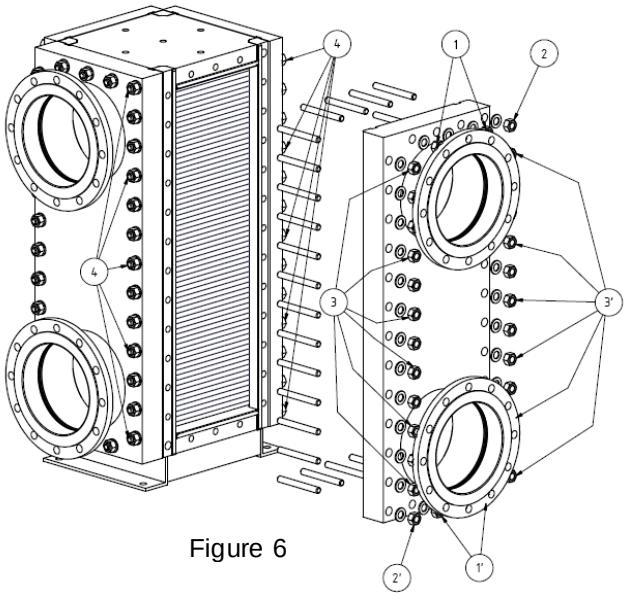


Figure 6

4.3.2 - Dismantling procedure for the 4 panels

Progressively loosen the nuts, one girder after the other. When all the nuts of the girders are relaxed, loosen the nuts of the bottom, one panel after the other.

For models CP15/CP20/CP30/CP40, never unscrew the stud bolts used for the girder assembling to the top and bottom heads.
For CP50/CP75/CP120, never unscrew nuts used for assembling the girder column to the top and bottom heads.

In order to avoid that the Compabloc tilts during disassembly, always remove first the panel with the highest weight and finish with the panel with the lowest weight.

Please find details of the panel weights in Appendix 1.

Use the welded or screwed lifting lugs located on the panels to lift the panels in a safe way.

4.3.3 - Panel re-assembly procedure

4.3.3.1 – Panel Gasket assembly

After reassembling the baffle plates using the procedure described in Section 4.3.5 above, clean the surface "receiving" the gasket thoroughly, taking care not to scratch the gasket's surface.

Put the gasket in place.
Gasket can be flat gasket or gasket with rectangular section.
In case of gasket with rectangular section, gasket must be placed into the groove provided for that purpose

Gaskets must be replaced with new ones after dismantling. You may have to replace an obsolete gasket model with a new model. Only use gaskets that have been supplied by Alfa Laval.

Depending on the Heat Exchanger duty, gasket material can be either Modified PTFE or Reinforced Graphite.

The large gaskets may be supplied in several pieces.

Compabloc sealing can be assured only with gaskets supplied by Alfa Laval.

Always put the old gaskets in an appropriate waste container.

4.3.3.2 - Panels re-assembly & pre-tightening

Pre-tightening must be realized at around 50%-60% of nominal torque values given in Appendix2.

- Re-place the panels on the threaded rods in accordance with general drawing.
- If visible, check interlocking of panels on girders is OK before going on (figure 14)

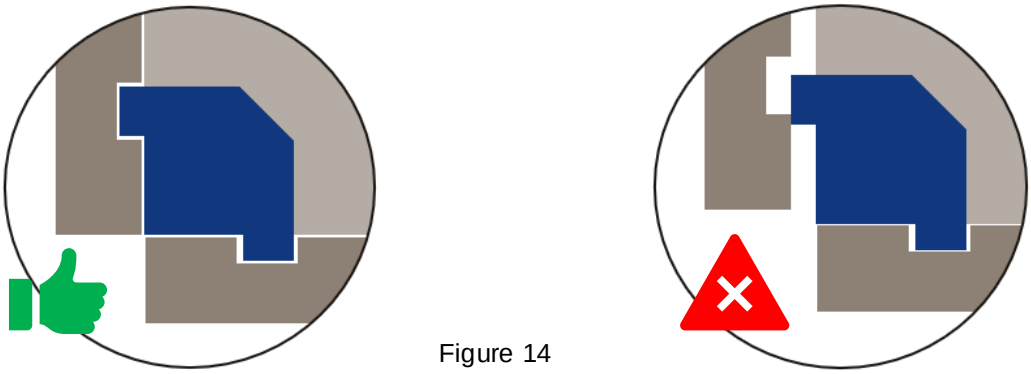


Figure 14

- Grease tips of threaded rods 1, 2, 3 and 4 (figure 15).
- Pre-tighten nuts 1, 2, 3 and 4 (in this order) with impact wrench.
- Repeat these 2 operations above for the other panels.
- Grease tips of threaded rods 5 (figure 16).
- Pre-tighten nuts 5 with impact wrench but turning around the unit.
- Grease tips of all resting threaded rods.

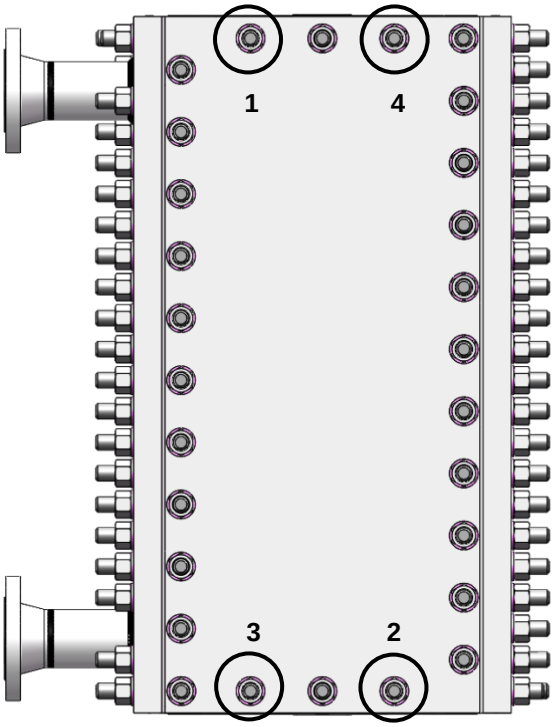


Figure 15

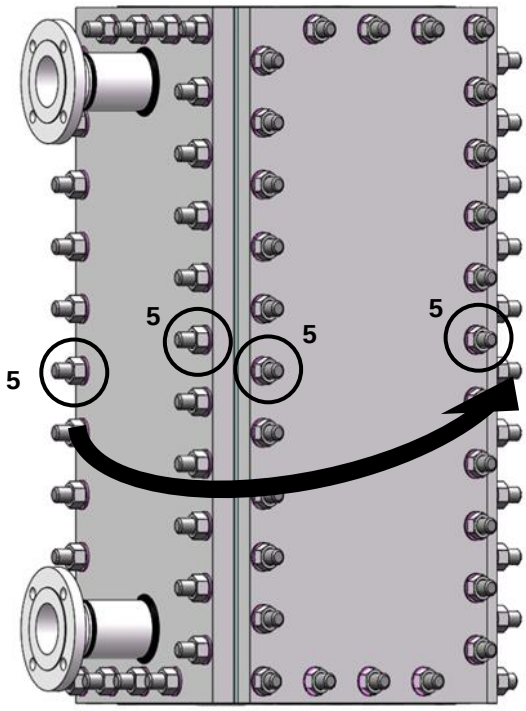


Figure 16

- Pre-tighten all nuts of “circling around the top of the unit” with impact wrench (figure 17 & 18).

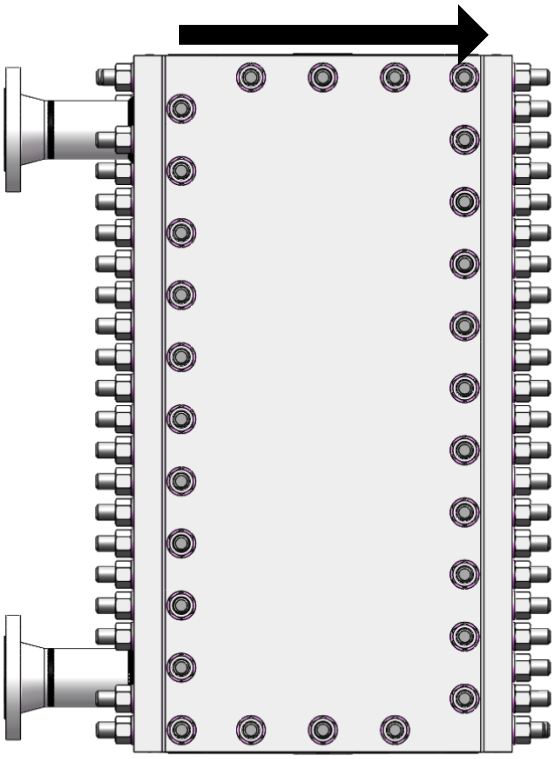


Figure 17

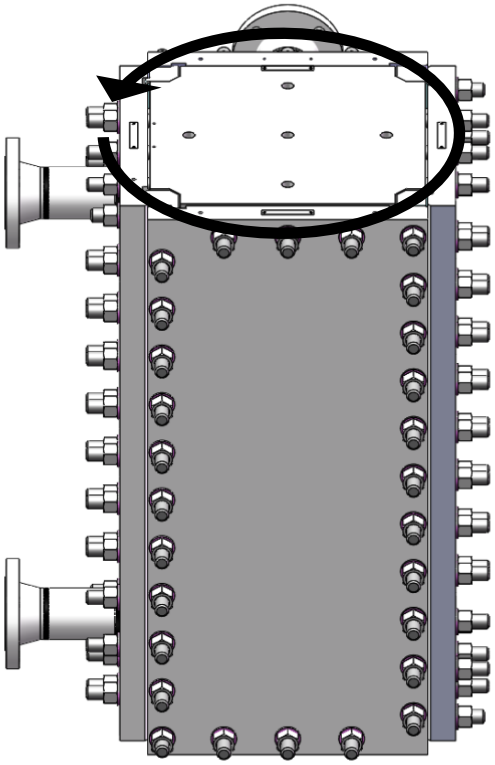


Figure 18

- Respect pre-tightening sense as on figure 18.
- Pre-tighten all nuts of “circling around the bottom” with impact wrench (figure 19 & 20).

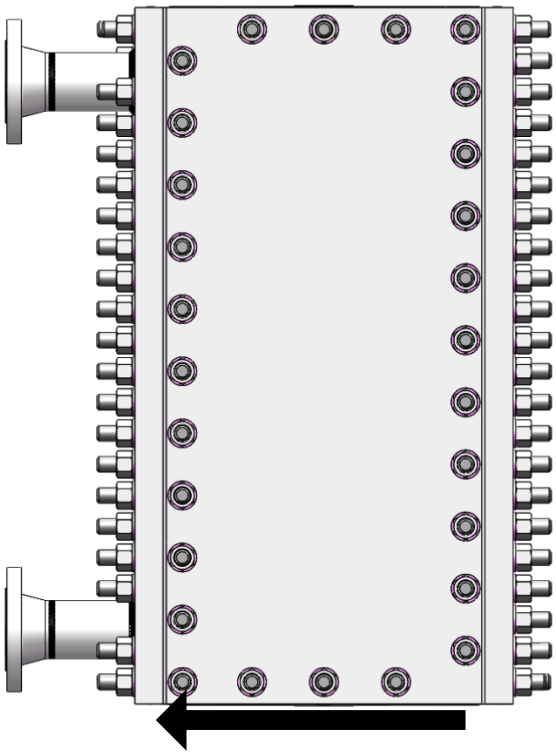


Figure 19

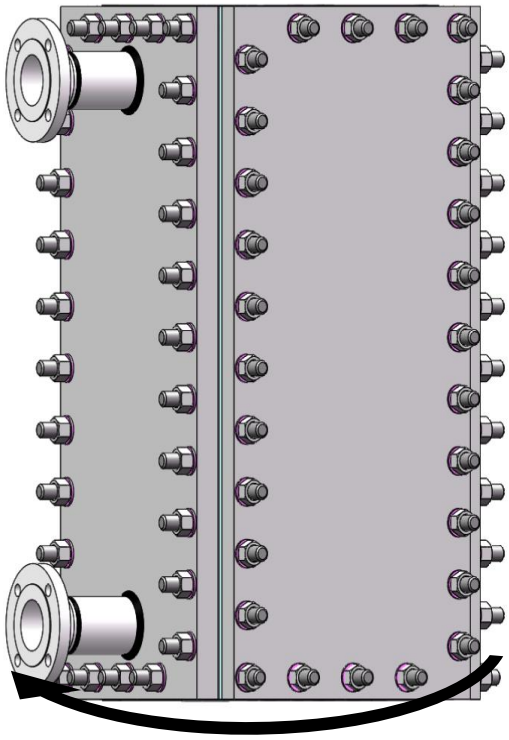


Figure 20

- Respect pre-tightening sense as on figure 20.

- Pre-tighten all nuts of girders with impact wrench from down to up or up to down (figure 21).

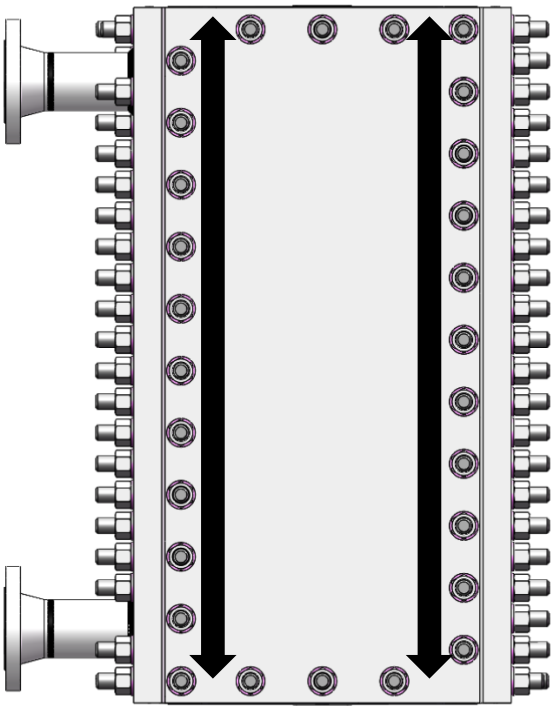


Figure 21

4.3.3.3 - Panel tightening

Then find the recommended tightening torque in Appendix 2 “Nominal tightening forces of threaded panels (Nm)”. We strongly recommend the use of a hydraulic torque wrench for final tightening

- Tighten “around the top” and proceed in same sense as during pre-tightening.
- Do the same operation for “around the bottom” (Figures 19 & 20).
- Always with the same torque, tighten all the nuts of each panel (Figure 23).
- Re-check interlocking of panels on girders is OK before going on (Figure 14).

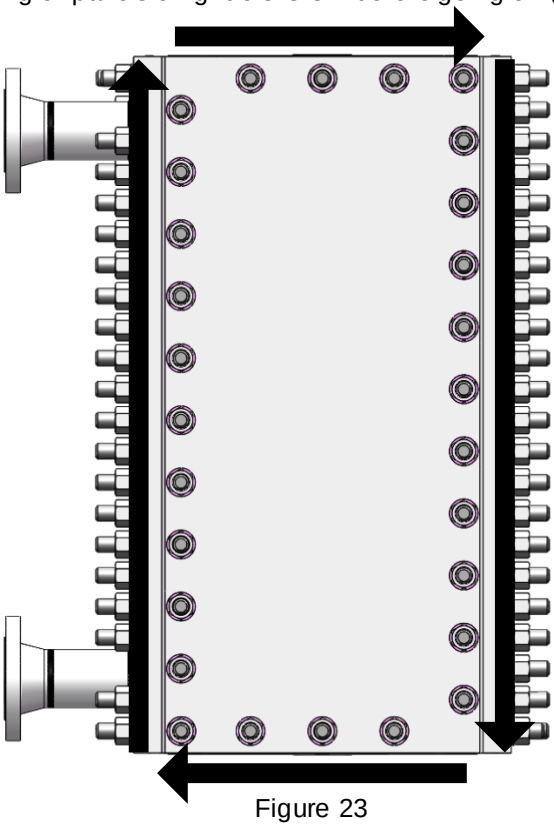


Figure 23

4.3.4 - Hydraulic test

After reassembly with original components, a hydraulic test at the design pressure indicated on the name plate is mandatory (unless local regulation says otherwise) as the design pressure is the maximal pressure that the unit must mechanically withstand.

Hydraulic test should be carried out with one circuit empty, the other circuit being full & pressurized at the design pressure.

If a max. allowed differential pressure is indicated on the nameplate (see Appendix 3), the differential pressure during the hydraulic test must never exceed this value. The second circuit must be pressurized to secure the differential pressure.

Always perform the hydraulic test with the 4 panels fully tightened in place.

The pressure of the circuit in test may decrease due to compression of trapped gases, or a slight plate adjustment. In that case, it does not mean that the heat exchanger is leaking, adjust pressure and check again. It should have stabilized after half an hour.

A heat exchanger is leaking when a leak is observed between 2 circuits or when it leaks externally.

If leakage occurs, retighten at nominal torque around the leak area. If leakage still occurs, please contact Alfa Laval Service Center or your Alfa Laval representative.

4.3.5 Baffle dismantling and reassembly procedure

It may be necessary to dismantle the baffle cage for inspecting the plate pack or for tough mechanical cleaning, once the panel are removed.

Prior to dismantling the baffles, locate their position in the block, in order to reassemble them in the correct position. It may be difficult to put back the baffle cage (baffles + their support) as one piece, as the platepack may have bent a little after use. The best is to put back the baffles one by one.

Dismantling

- Pull the ladder made by the two uprights (beams) and the baffle plates.
- Take the triangular PTFE Cord gaskets off the triangular part of the longitudinal girder lining.
- Take off the complete baffle cage.

Reassembly

- Clean the triangular groove of the longitudinal girder lining; remove any traces of grease.
- Put a new triangular PTFE Cord gasket in this groove if necessary and press it into its form.

There is no triangular PTFE cord gasket in the triangular part of the longitudinal girder lining for CP120 nor Hygienic CP.

- Put back the baffle cage.
- Install the vertical sheets (avoid mixing sheets and baffles between different sides).
- Bring the baffle plate progressively into the exchanger block.
- Ensure it is reassembled in accordance with the position noted before disassembling.

In case of very viscous fluids or in the risk of sudden high flowrate surges (water hammer), reinforced baffles must be used. In this case vertical tubes support the baffle, creating a baffle cage making the whole baffle construction stiffer.

5 - Trouble shooting

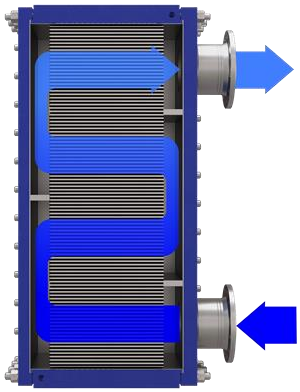
(*See the Trouble-shooting questionnaire in Appendix 4*).

Issue	Symptom	Possible Cause	Solution	Chapter
Poor thermal and/or hydraulic performance	Poor performance from start-up	Presence of air/gas/vapor pocket that is not vented during start-up	Vent the exchanger correctly	2.2
		Operating at different parameters compared to the design parameters	Operate the Compabloc at parameters as close as possible to the design parameters	1.2
		Clogging with carry over sludge or debris from the piping	Clean the Compabloc to remove the sludge and debris. Bypass the Compabloc when flushing the piping.	4 Contact Alfa Laval for assistance
		Wrong piping connection	Connect the inlet, outlet, vent and drain nozzles on both circuits correctly according to the drawing.	2.2
	Poor performance during operation	Fouling	Clean the Compabloc. Run the Compabloc with parameters as close as design case.	4 Contact Alfa Laval for assistance
		Clogging with debris or particles in the fluid	Clean the Compabloc and install an appropriate filter.	4 Contact Alfa Laval for assistance
		Changes in operating parameters	Check with Alfa Laval for the performance of the Compabloc at new operating parameters.	Contact Alfa Laval for assistance
		Internal leakage, cross contamination of the fluids	Further inspection is required. Repair or replace the platepack is based on the inspection result.	Contact Alfa Laval for assistance
External leakage	Fluid dripping from panels	Loose bolts	Retighten the bolts according to the torque value in appendix 2.	4.3.3
		Panel gasket damaged	If retightening bolts does not work, gasket might be damaged and need to be replaced.	4.3
	Fluid leaking from girders	Corrosion and/or cracks in the platepack	Perform a condition audit of the Compabloc. Solution will be based on the inspection result.	Contact Alfa Laval for assistance
	Fluid leaking from M6 hole of the nozzles (only for nozzles with lining)	Panel gasket damaged	Replace the gasket	4.3
		Crack or pinholes at panel and/or nozzle lining	Perform a dye penetrant test on the lining and contact Alfa Laval for decision and support	4.3 Contact Alfa Laval for assistance
		Crack or pinholes at the endplate of the platepack	Contact Alfa Laval for decision and support to perform a dye penetrant test on the endplate	Contact Alfa Laval for assistance
	Fluid leaking from the flange	Flange gasket damaged	Inspect the flange gasket condition and replace.	2.2
Internal leakage	Change in fluid properties	Corrosion and/or cracks in the platepack	Perform a condition audit of the Compabloc. Solution will be based on the inspection result.	Contact Alfa Laval for assistance
	Poor performance during operation	Corrosion and/or cracks in the platepack	Perform a condition audit of the Compabloc. Solution will be based on the inspection result.	Contact Alfa Laval for assistance

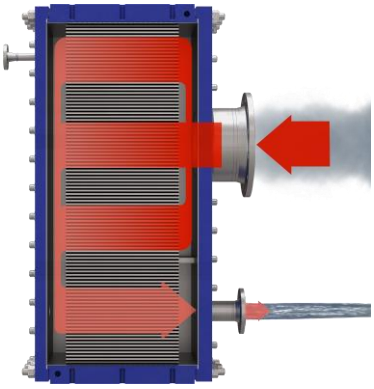
6 - Duty summary for Compabloc

Compabloc Vertical position duties :

Liquid/liquid duty

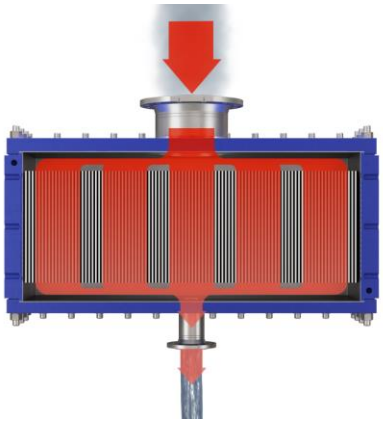


Condensation with subcooling

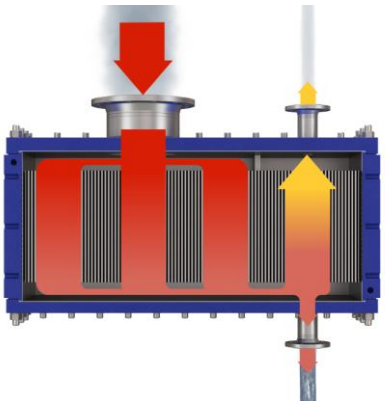


Compabloc Horizontal position duties :

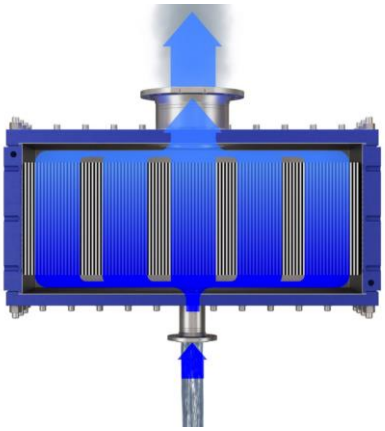
Horizontal one pass condenser



Horizontal two pass condenser



Horizontal reboiler



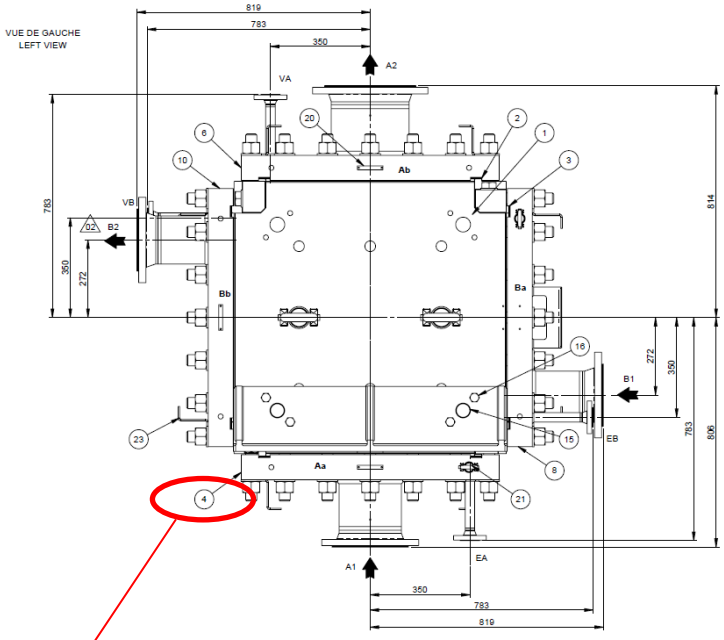
7 - Waste management and scrapping

Throughout the lifecycle of the Compabloc, the owner is responsible for managing the waste related to any equipment or material delivered by Alfa Laval (e.g. packing material of the delivered Compabloc, packaging of spare parts, used spare parts like gaskets, etc.) according to the applicable local regulations regarding the protection of the environment.

The Compabloc can be subject to scrapping if, according to results of a technical inspection, the end of life of the Compabloc is confirmed. The owner is responsible for carrying out the disposal of the scrap-metal in accordance with the applicable local legislation and regulations regarding protection of the environment.

Appendix 1: Panel weights (kg (lbs))

The weight of each panel may be indicated on the GA drawing provided by Alfa Laval:



ITEM NO.	QTY	PART NO	DESIGNATION	DESCRIPTION
1	1	DWG-CP19-21173-03	ASSEMBLAGE DU BLOC - CPX75 200 PLAQUES	BLOCK ASSEMBLY - CPX75 200 PLATES
1.1	1	-	COEUR D'ECHANGE 200 PLAQUES	HEAT TRANSFER PLATE PACK 200 PLATES
1.2	2	3350010365	FOND USINE CP75 Ep.nominale=150mm, mini=147mm	MACHINED HEAD CP75 Th.nominal=5.9055in, mini=5.7874in
1.3	4	3350010380	LONGERON 200 PLAQUES Ep.=130mm Ep.usi=119.5mm Lg.=1447mm	COLUMN 200 PLATES Th.=5.1181in Th.mach=4.7047in Lgth.=56.9685in
1.5	1	-	CHICANAGE EMBOUTI 5 PASSES (CIRCUIT B)	STAMPED BAFFLE 5 PASSES (SIDE B)
2	2	3350031636	JOINT DE PANNEAU Ep.=3mm CIRCUIT A	PANEL GASKET Th.=0.1181in SIDE A
3	2	3350031636	JOINT DE PANNEAU Ep.=3mm CIRCUIT B	PANEL GASKET Th.=0.1181in SIDE B
4	1	DWG-CP19-21173-04	PANNEAU ASSEMBLE Aa - CPX75 200 PLAQUES	PANEL ASSEMBLY Aa - CPX75 200 PLATES
4.1	1	DWG-CP19-21173-01-41	PANNEAU USINE Ep.nominale=90mm	MACHINED PANEL Th.nominal=3.5433in
4.2	1	DWG-CP19-21173-01-51	REVETEMENT DE PANNEAU Ep.=3mm	PANEL LINING Th.=0.1181in
4.3	1	34503722-08	BRIDE A COLLERETTE DN200 PN16 SCH80	WELDING NECK FLANGE NPS8" PN16 SCH80

Dye penetrant test: 100% on plate pack and on linings welds

INDICE *REVIEW*	DATE *DATE*	NOM *AUTHOR*	VERIFIE *CHECKED*	APPROUVE *APPROVED*	
02	11/07/2019	NRL	FFO	TSZ	-
01	25/03/2019	AML	FFO	TSZ	-
00	11/03/2019	AML	FFO	TSZ	-

SOUS ASSEMBLAGE *SUB ASSEMBLY*
(for internal use only)

DWG-CP19-21173-02
DWG-CP19-21173-03 (3372kg)
DWG-CP19-21173-04 (752kg)
DWG-CP19-21173-05 (751kg)
DWG-CP19-21173-06 (758kg)
DWG-CP19-21173-07 (756kg)

ECHANGEUR TYPE COMPABL
CPX75-H-200 Plaques
HEAT EXCHANGER TYPE COMP
CPX75-H-200 Plates

1-9 RUE DU RIF TRONCHARD
38120 LE FONTANIL CORNILLON - FRANCE
TEL: (33) 04 76 56 50 50 FAX: (33) 04 76 75 79 09

NO. SERIE CP7
REPERE 356

You can also use the following tables with the maximum estimated weight (kgs(lbs)) for each panel depending on number of plates and thickness.

Remark: Cell in grey = obsolete models (not available for Capital Sales anymore).

CP15 MODEL				
PANEL Thickness	NUMBER OF PLATES			
	30	50	70	90
30 mm (1" 1/4")	9 (20)	13,5 (30)	18 (40)	22,5 (50)
40 mm (1" 1/2")	12,5 (28)	18,5 (41)	24,5 (54)	30,5 (67)
50 mm (2")	16 (35)	24 (53)	32 (71)	40 (88)

CP20 MODEL					
PANEL Thickness	NUMBER OF PLATES				
	25	40	60	80	100
40 mm (1" 1/2")	22 (49)	29,5 (65)	39 (86)	49 (108)	59 (130)
60 mm (2" 3/8")	34,5 (76)	46 (101)	61,5 (136)	77 (170)	92,5 (204)

CP30 MODEL							
PANEL Thickness	NUMBER OF PLATES						
	60	80	100	130	160	200	240
40 mm (1" 1/2")	48 (106)	60,5 (133)	72,5 (160)	91 (201)	109 (240)	134 (295)	158 (348)
60 mm (2" 3/8")	75,5 (166)	95 (209)	114,5 (252)	143,5 (316)	173 (381)	212 (467)	250 (551)
80 mm (3" 1/8")	103,5 (228)	130 (287)	156,5 (345)	196 (432)	236 (520)	290 (639)	343 (756)

CP40 MODEL			
PANEL Thickness	NUMBER OF PLATES		
	120	160	200
60 mm (2” 3/8”)	171 (377)	218 (481)	265 (584)
80 mm (3” 1/8”)	235 (518)	299 (659)	364 (802)
100 mm (4”)	297 (655)	380 (838)	462 (1019)

CP50 MODEL					
PANEL Thickness	NUMBER OF PLATES				
	100	150	200	250	300
60 mm (2” 3/8”)	189 (417)	265 (584)	340 (750)	416 (917)	492 (1085)
80 mm (3” 1/8”)	260 (573)	363 (800)	467 (1030)	571 (1259)	675 (1488)
100 mm (4”)	330 (728)	462 (1019)	594 (1310)	726 (1601)	859 (1894)
120 mm (4” 3/4")	400 (882)	560 (1235)	721 (1590)	882 (1944)	1042 (2297)

CP75 MODEL								
PANEL Thickness	NUMBER OF PLATES							
	150	200	250	300	350	400	450	500
60 mm (2” 3/8”)	443 (977)	567 (1250)	690 (1521)	814 (1795)	937 (2066)	1061 (2339)	1174 (2588)	1308 (2884)
80 mm (3” 1/8”)	596 (1314)	762 (1680)	928 (2046)	1094 (2412)	1260 (2778)	1427 (3146)	1593 (3512)	1759 (3878)
100 mm (4”)	748 (1649)	957 (2110)	1166 (2571)	1375 (3031)	1583 (3490)	1792 (3951)	2001 (4411)	2210 (4872)
120 mm (4” 3/4")	901 (1986)	1152 (2540)	1404 (3095)	1655 (3649)	1907 (4204)	2158 (4758)	2409 (5311)	2661 (5866)
140 mm (5” 1/2")	1053 (2321)	1347 (2970)	1642 (3620)	1936 (4268)	2230 (4916)	2524 (5564)	2818 (6213)	3112 (6861)
160 mm (6” 1/4")	1206 (2659)	1543 (3402)	1879 (4142)	2216 (4885)	2553 (5628)	2890 (6371)	3226 (7112)	3563 (7855)
180 mm (7")	1359 (2996)	1738 (3832)	2117 (4667)	2497 (5505)	2876 (6340)	3255 (7176)	3635 (8014)	4014 (8849)

CP120 MODEL							
PANEL Thickness	NUMBER OF PLATES						
	200	250	300	350	400	450	500
90 mm (3 ½")	1429 (3150)	1733 (3821)	2098 (4625)	2342 (5163)	2646 (5833)	2949 (6501)	3252 (7169)
100 mm (4")	1585 (3494)	1924 (4242)	2263 (4989)	2601 (5734)	2938 (6477)	3275 (7220)	3611 (7961)
110 mm (4 ½ ")	1897 (4182)	2118 (4669)	2491 (5492)	2864 (6314)	3235 (7132)	3606 (7950)	3978 (8770)
120 mm (4 ¾")	2060 (4542)	2486 (5481)	2716 (5988)	3122 (6883)	3528 (7778)	3932 (8669)	4377 (9650)
130 mm (5")	2223 (4901)	2684 (5917)	3144 (6931)	3592 (7919)	3819 (8419)	4259 (9389)	4698 (10357)
140 mm (5 ½")	2387 (5262)	2881 (6352)	3376 (7443)	3857 (8503)	4338 (9564)	4819 (10624)	5300 (11684)
150 mm (6")	2550 (5622)	3080 (6790)	3607 (7952)	4123 (9090)	4638 (10225)	5153 (11360)	5668 (12496)
170 mm (7")	2876 (6340)	3473 (7657)	4070 (8973)	4653 (10258)	5237 (11546)	5821 (12833)	6404 (14118)
190 mm (7 ½")	3203 (7061)	3868 (8527)	4537 (10002)	5185 (11431)	5838 (12871)	6488 (14304)	7140 (15741)
210 mm (8 ¼")		4262 (9396)	4995 (11012)	5716 (12602)	6436 (14189)	7156 (15776)	7877 (17366)
230 mm (9")			5458 (12033)	6247 (13772)	7035 (15510)	7823 (17247)	8612 (18986)
240 mm (9 ½")							8980 (19798)

Appendix 2: Nominal tightening forces of threaded panels (Nm)

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The torques values given in the table below are applicable for standard gaskets for retightening Compabloc before initial start-up and after re-assembly of panels after maintenance.

Please refer to Bill of Material on General Drawing

Nominal tightening forces in Nm *Applicable on Compabloc at room temperature and at atmospheric pressure on both sides*				**Reinforced Graphite Gasket**		**PTFE Gasket**		
Ø BOLTING		**BOLTING COATING**		**BOLTING MATERIAL**		**BOLTING MATERIAL**		**Use grease* for tightening?**
ISO	**UNC**	**No coating - Galvanized - Electrogalvanized Sherardizing - Stainless steel**	**PTFE (Xylan, Xylar, ...)**	**SA193 gr B7 SA320 gr L7 SA193 gr B16 SA540 gr B21 42CrMo4**	**SA193 gr B7M SA320 gr L7M**	**SA193 gr B7 SA320 gr L7 SA193 gr B16 SA540 gr B21 42CrMo4**	**SA193 gr B7M SA320 gr L7M**	**Yes if ticked**
M16	5/8''	X		150	110	70		X
			X	90	70	40		
M20	3/4''	X		290	220	150		X
			X	170	130	80		
M24	7/8''	X		500	380	210		X
			X	300	230	120		
M30	1''1/8	X		1 000	770	400		X
			X	610	460	220		
M33	1''1/4	X		1 300	1 000	430		X
			X	820	620	240		
M36	1''7/16	X		2 000	1 500	Not applicable		X
			X	1 000	800	Not applicable		
M39	1''1/2	X		2 000	1 700	910		X
			X	1 300	1 000	500		
M42	1''5/8	X		2 800	2 100	980		X
			X	1 600	1 200	540		
M48	1''3/4 - 2''	X		4 700	3 600	Not applicable		X
			X	2 500	1 900	Not applicable		
M56	2''1/8 - 2''1/4	X		6 400	5 200	2700		X
			X	4 000	3 000	1100		
M60	2''1/4 - 2''1/2	X		8 500	7 500	Not applicable		X
			X	5 000	3 700	Not applicable		

**we recommend using a high temperature lubricant (or equivalent)*

Undertightening may cause leaks and overtightening may cause mechanical strain in the sealing surface and damage the gaskets and the bolting.

In case of leakage once panels are tightened at nominal force given above, please re-tighten at nominal force +15 **%** tolerance (maximal tightening force – never exceed it). We recommend reaching this maximal value in 2 times (one retightening at nominal force +7.5% on all panels and a last retightening at nominal force +15%)

For bolting features (material,coating and or diameters) or gasket material not mentionned in this table, please contact your AL representative.

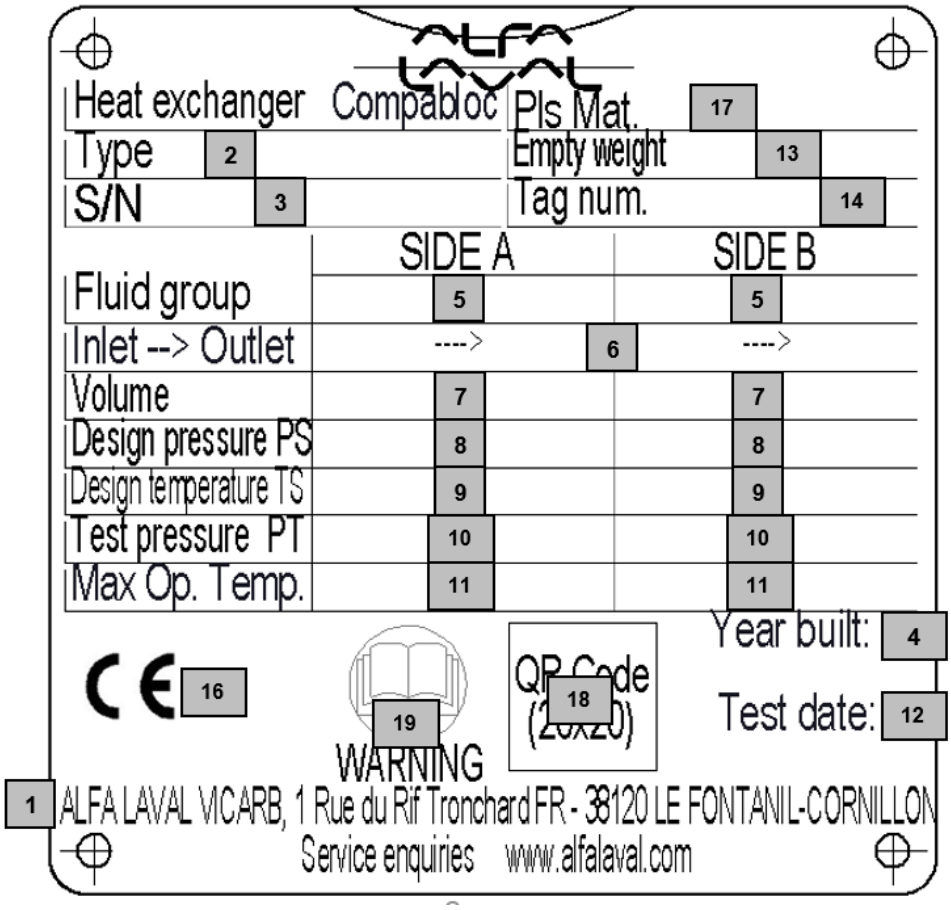
If leakage occurs after tightening at the above nominal torques + 15%, please contact your Alfa Laval representative.

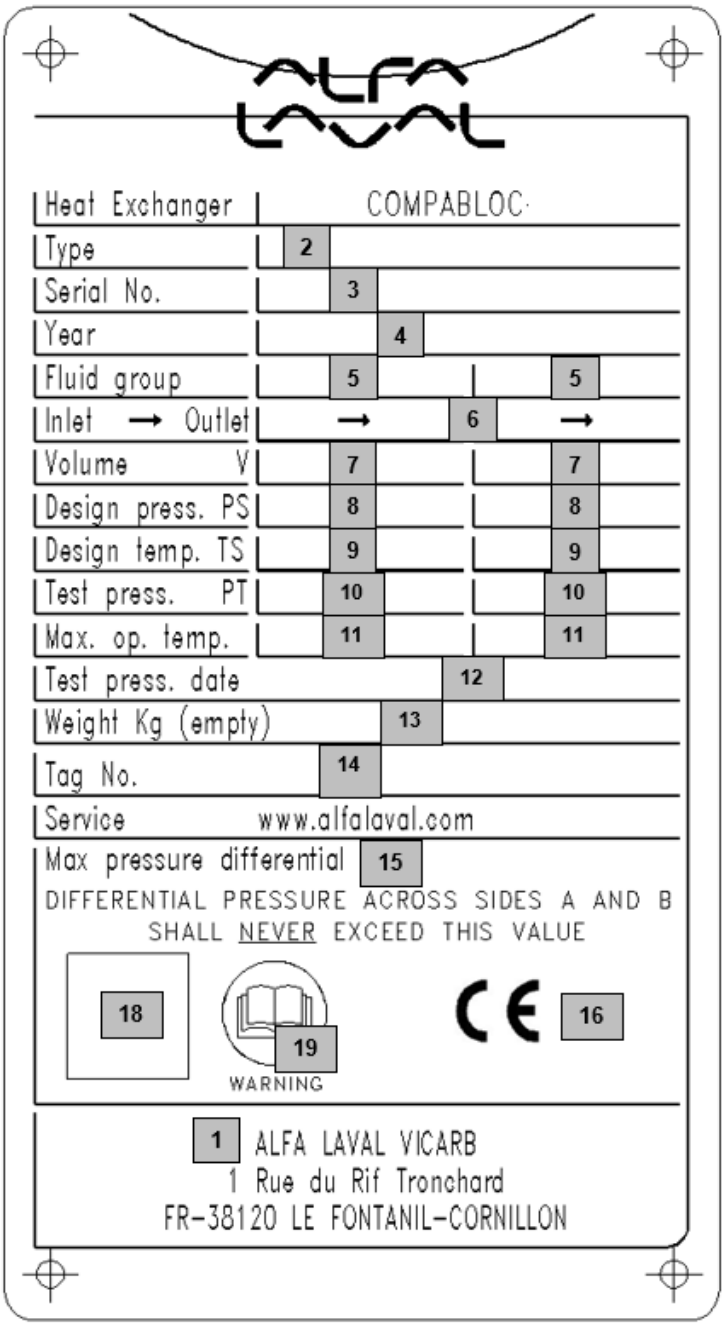
Appendix 3: Compabloc nameplate

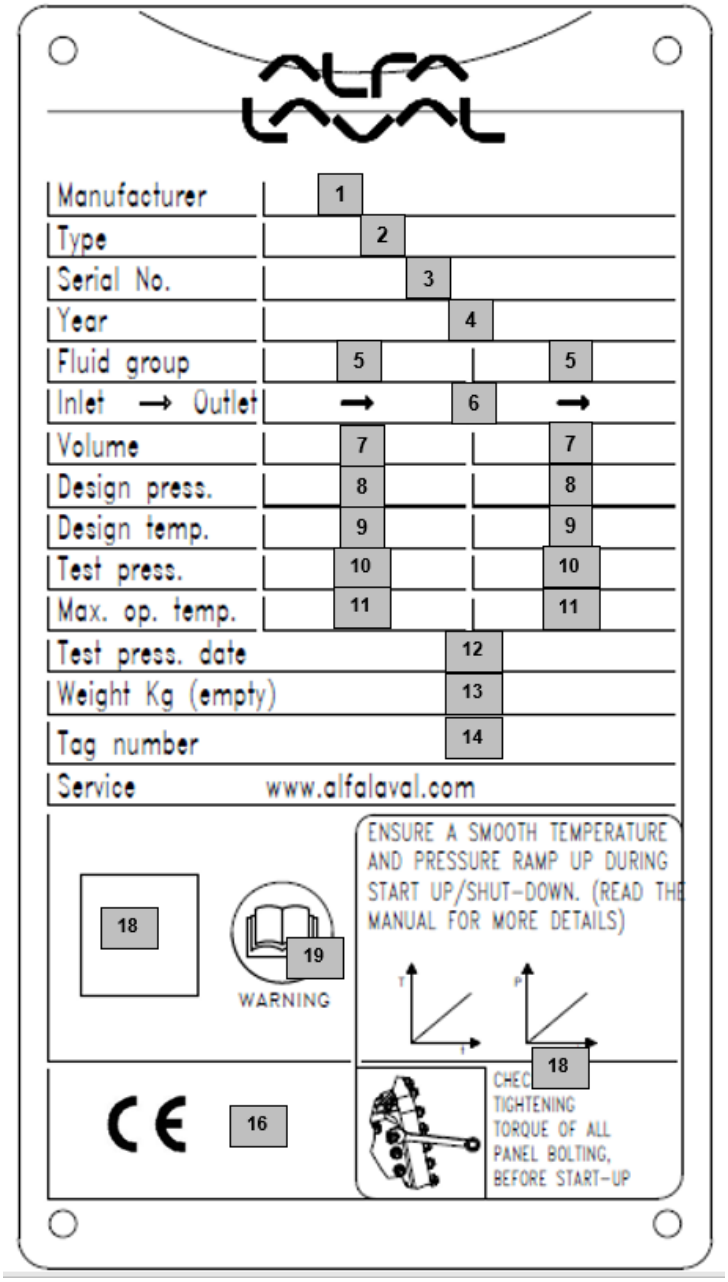
A nameplate is fixed to the frame of the heat exchanger with the following data:

- 1: manufacturer
- 2: type of Compabloc
- 3: serial number
- 4: year of built
- 5: fluid group
  - 1 for dangerous fluid and 2 for non-dangerous fluid
  - This field is related to PED regulation and is filled only for units submitted to PED (=installed in Europe Union)
- 6: identification of nozzle (please refer to General arrangement drawing)
- 7: volume per side including nozzles
- 8: design pressure for both media (maximum pressure for which the equipment is designed (FV = Full Vacuum))
- 9: design temperatures for both media (maximum and minimum temperatures for which the equipment is designed)
- 10: differential / simultaneous test pressure per side
- 11: maximum operating temperature per side
- 12: date of pressure test
- 13: weight of empty unit
- 14: Tag Number or other customer identification information (if specified and required by customer)
- 15: maximum differential pressure between both sides
  Please notice that this information is only indicated when this restriction is applicable
  Differential pressure across sides A and B shall never exceed this value when this value is specified!
- 16: “CE” tag
  When required by PED2014/68UE.
  A paper copy of filled nameplate is attached to documentation accompanying physically the Compabloc.
  Customer’s values are engraved on the nameplate of each Compabloc.
- 17: platepack material (when indicated)
- 18: other information (like QR code for example…)
- 19: warning reminder: always read Instruction Manual before any activity regarding installation, operation and maintenance of the Compabloc!

Examples of Compabloc nameplates:




Heat Exchanger
COMPABLOC
Type
2
Serial No.
3
Year
4
Fluid group
5
5
Inlet → Outlet
6
Volume V
7
7
Design press. PS
8
8
Design temp. TS
9
9
Test press. PT
10
10
Max. op. temp.
11
11
Test press. date
12
Weight Kg (empty)
13
Tag No.
14
Service
www.alfalaval.com
Max pressure differential
15
DIFFERENTIAL PRESSURE ACROSS SIDES A AND B SHALL NEVER EXCEED THIS VALUE
18
19
WARNING
CE
16
1
ALFA LAVAL VICARB
1 Rue du Rif Tronchard
FR-38120 LE FONTANIL-CORNILLON


Manufacturer
1
Type
2
Serial No.
3
Year
4
Fluid group
5
5
Inlet → Outlet
6
Volume
7
7
Design press.
8
8
Design temp.
9
9
Test press.
10
10
Max. op. temp.
11
11
Test press. date
12
Weight Kg (empty)
13
Tag number
14
Service
www.alfalaval.com
18
19
WARNING
ENSURE A SMOOTH TEMPERATURE AND PRESSURE RAMP UP DURING START UP/SHUT-DOWN. (READ THE MANUAL FOR MORE DETAILS)
18
CE
16
CHEC
TIGHTENING
TORQUE OF ALL
PANEL BOLTING,
BEFORE START-UP

Appendix 4: Compabloc Troubleshooting questionnaire

If the Compabloc fails, following documents are requested for analysis/ expertise:

- ✓Trouble shooting questionnaire / GEFA1090
- ✓Process Flow Diagram
- ✓Design Datasheet (CAS print out)
- ✓Pictures of the failures

Thank you in advance for sending these as soon as possible, in order for us to have as many details as possible to handle the problem and help you out.

Troubleshooting Questionnaire GEFA 1090:

1 – Customer Information

Company Name		Contractor (if applicable)	
Contact Name		Contact Name	
Email/Tel		Email/Tel	

2 – Exchanger Information

Exchanger Type [1]		Serial No. [2]	
GA Drawing No.		Delivery Date	
Platepack material		Lining material	
Start-up Date		Failure Date	
First Time Failure	☐ Yes ☐ No	Serviced by Alfa Laval	☐ Yes ☐ No
Manufacturing Site	☐ Fontanil ☐ Nevers ☐ Lykens ☐ Richmond ☐ JiangYin ☐ Satara		

3 – Actual Operating Data

	Circuit A			Circuit B		
Fluid						
Actual Flowrate (kg/h)						
Actual Operating Pressure	barG	→	barG	barG	→	barG
Actual Operating Temperature	°C	→	°C	°C	→	°C
Actual Heat Duty (kW)						
No. of passes						

4 – Process Description

Cyclic Duty (if applicable)	☐ Pressure	☐ Temperature		
Operation	☐ Steady	☐ Unsteady		
Frequency	_____ cycles/week		Amplitude	_____ bar/min or °C/min
Start-up ramp	_____ bar/h		_____	°C/h
Shut down ramp	_____ bar/h		_____	°C/h
Control system	☐ Manual	☐ Automatic		
Vent/drain connected	☐ Yes	☐ No		
Pump/compressor location	☐ Upstream	☐ Downstream		
→ Specify type of pump and/or compressor	_____			
Risk of full vacuum	☐ Yes	☐ No		
→ Specify the scenario that would cause it	_____			
Control valve position for steam heater, reboiler and condenser	☐ Steam inlet	☐ Condensate outlet		
For reboiler	☐ Once through	☐ Circulating		

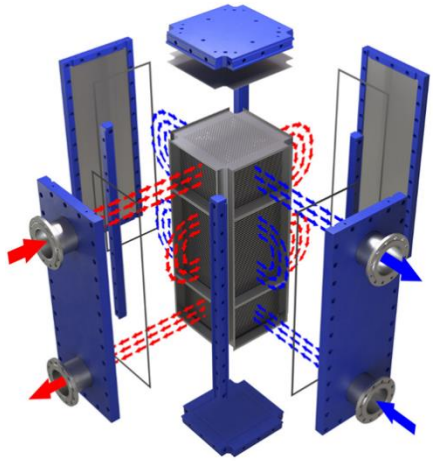
5 – Exchanger Problems and Observations

Problem detection	☐ During operation	☐ During service/maintenance	
External leakage	☐ From panels	☐ From girders	
	☐ From nozzle M6	☐ Other	_____
Internal leakage	☐ Yes ☐ No	Detection method:	_____
Performance	☐ Thermal	If yes, provide details:	_____
	☐ High pressure	Actual pressure drop:	_____

6 – Other Required Information (tick if provided together with this questionnaire)

- ☐ P&ID
- ☐ Original datasheet and fluid properties
- ☐ Operating data - temperature, pressure and flowrate (minute-data in an excel file preferred)
- ☐ Pictures of the leakage or damages
- ☐ Operational history - shutdown, service, cleaning, inspection, etc.

Note:
Please provide as much information as possible.
We will get in contact with you if more information is required.
[1] – Exchanger type: Compabloc / Spiral/ DuroShell
[2] – Serial number can be found on the GA drawing and the exchanger's nameplate

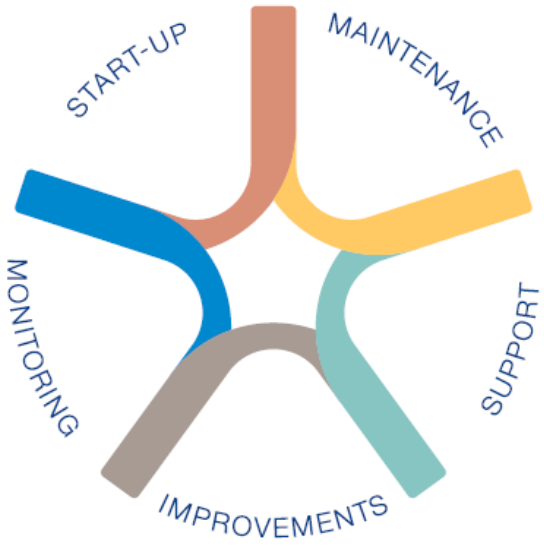


From day 1, Alfa Laval is here with service to keep you growing.

Please discover our unique Service program composed of both preventive and reactive services to keep your equipment performing and your business increasing.

- ✓ Commissioning supervision
- ✓ Installation supervision

- ✓ Cleaning
- ✓ Spare parts
- ✓ Repairs



- ✓ Performance audit
- ✓ Condition audit

- ✓ Training
- ✓ Troubleshooting
- ✓ Technical support
- ✓ Emergency stock
- ✓ Exclusive stock

- ✓ Redesign
- ✓ Equipment upgrade

Please contact your local Alfa Laval representative for extending your performance.

Visit our website at www.alfalaval.com

or click on the QR Code just on the right