

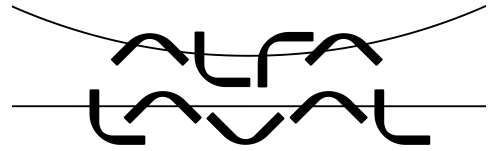


The Alfa Laval
Cleaning procedures
for
HeatExchangers.



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General

Environmental regulations and CIP

As a rule, cleaning solutions are strong alkaline or acidic liquids. Alkalinity or acidity of the cleaning solution is reduced during the cleaning process, but the solutions are still strong acids or alkalis.

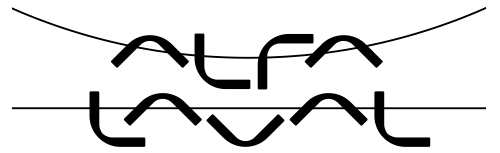
In several cases, industrial plants (particularly chemical plants) have waste treatment utilities that are capable of handling CIP effluent. This simplifies the CIP process since neutralization is not necessary.

However, the situation gets more complicated when waste treatment utilities are not available for treatment of CIP waste. In these cases, the used cleaning solution must be neutralized to a pH of 6-8 in the CIP equipment prior to the discharge.

This neutralization may be performed either directly in the circulation tank following each cleaning procedure with immediate discharge or in a separate storage tank.

After neutralization, most cleaning solutions may be released into public waters under the condition that the fouling deposits do not contain heavy metals or other toxic compounds. We recommend the neutralized chemicals be analysed for any type of hazardous compounds that were removed from the system prior to disposal.

Check with your local authority for regulation of waste water disposal.



Safety instructions

Warning !

Corrosive cleaning liquids. Can cause serious injuries to skin and eye!



Cleaning agents used for CIP are acid or strong alkaline liquids. They can cause serious injuries to skin and eyes.

Read instructions on the containers of the liquids on what actions to take if liquid has come into contact with skin or eye.

When using the CIP unit wear protective clothing:



Safety boots
must be worn



Safety gloves
must be worn



Eye protection
must be worn



Why use Alfa Laval Cleaning agents

- The liquids have carefully selected formulations
- They have been tested and approved by our laboratory
- The liquids are corrosion safe for all common metals if the procedures are followed
- They are compatible with gaskets and adhesives
- The solutions supplied are concentrated
- Alfa Laval guarantees that plates, gaskets or glue are not damaged if the procedures given and cleaning agents prescribed are followed

Warning: Chemicals NOT to be used !

- HCl - aggressive to the plate as well as personal safety
- H₂SO₄ - aggressive to plate & gasket as well as personal safety
- HNO₃ - aggressive to the gasket as well as personal safety

CIP program preparations ! ! !

- Agree with customer what to do with the used CIP waste
- Make sure the heat exchanger can be isolated from the system and the CIP unit connected!
- Make sure there is electricity available.
- Always wear your personal protective clothing !
- Follow the Generalised description of the CIP-procedure. See section *Operation in Manual for CIP unit*.
- **IMPORTANT !** Secure all Connections with bundle strap/duck tape in order for them not to be by accident open.
- Fill the CIP unit with hot water (max 90% of the liquid required, $V_{\text{Total}} = V_{\text{HE}} + V_{\text{hoses\&pipng}} + V_{\text{pump\&heater}}$) and test run the system, in order to spot leakages, before mixing the cleaning agents into the liquid.
- Make sure you do not leave the CIP unit without supervision during the whole cleaning operation.



CIP –program # 1

Task: Removal of Calcium carbonate scaling

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: AlfaPhos – AlfaNeutra – pH strips

Program:

- 1 Follow the Generalised description of the CIP-procedure.
See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle strap/duck tape in order for them not to be opened by accident.
- 3 Fill the CIP unit with water (max 90% of the liquid required) and test run the system in order to spot leakages before mixing the cleaning agents into the liquid.
- 4 Heat up the PHE to 50-60°C
- 5 Mix 1 part AlfaPhos with 10 parts of water.
- 6 The solution is entered into PHE until it is filled up. Now heat up the solution to 50-60°C.
- 7 The CIP unit is run for 2-4 hours, until the PHE is clean. The pH-value shall never exceed the value 2.5 during the cleaning. This is controlled by measuring the pH-value in equable periods during the cleaning. To lower the pH-value, add AlfaPhos to the solution.
- 8 When the cleaning is finished solution is being neutralized **by gently adding** AlfaNeutra or AlfaCaus until the pH-value reaches 6,5 - 7,5. The neutralization should be performed carefully and with continuous circulation for 30 min. (If the cleaning liquid should be reused do not neutralize it.)
- 9 Drain the PHE and tank from the liquid considering environmental and safety aspects as described on page 1.
- 10 Flush the CIP-unit and the heat exchanger with water for 15-20 minutes before being put into operation.

Contact Alfa Laval sales company if you have further questions and information on CIP-cleaning.



CIP –program # 2

Task: Removal of Calcium carbonate scaling (Re-usage)

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: AlfaPhos – AlfaNeutra – pH strips

Program:

- 1 Follow the Generalised description of the CIP-procedure. See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle strap/duck tape in order for them not to be accident open.
- 3 Fill the CIP unit with water (max 90% of the liquid required) and test run the system in order to spot leakages before mixing the cleaning agents into the liquid.
- 4 Heat up the PHE to 50-60°C
- 5 Mix 1 part AlfaPhos with 10 parts of water.
- 6 The solution is entered into PHE until it is filled up. Now heat up the solution to 50-60°C.
- 7 The CIP unit is run for 2-4 hours, until the PHE is clean. The pH-value shall never exceed the value 2.5 during the cleaning. This is controlled by measuring the pH-value in equable periods during the cleaning. To lower the pH-value, add AlfaPhos to the solution.
- 8 Drain the PHE on the AlfaPhos.
- 9 Mix 1 part AlfaNeutra with 40 parts of water.
- 10 The solution is entered into PHE until it is filled up. This solution should be circulated for 30 min.
- 11 Now the solution is being neutralized **by gently adding** AlfaPhos until the pH-value reaches 6,5 - 7,5.
- 12 Drain the PHE and tank from the liquid considering environmental and safety aspects as described on page 1.
- 13 Flush the CIP-unit and the heat exchanger with water for 15-20 minutes before being put into operation.

Contact Alfa Laval sales company if you have further questions and information on CIP-cleaning.



CIP –program # 3

Task: Removal of Calciumcarbonate scaling

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: Alfa P-Scale– Alfa P-Neutra – pH strips

Program:

- 1 Follow the Generalised description of the CIP-procedure.
See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle strap/duck tape in order for them not to by accident open.
- 3 Fill the CIP unit with water (max 90% of the liquid required) and test run the system in order to spot leakages before mixing the cleaning agents into the liquid.
- 4
- 5 Heat up the PHE to 50-60°C
- 6 Mixing of Alfa P-Scale
1 bag with 10-15 liters of water.
2 bags with 15-20 liters of water
- 7 The solution is entered into PHE until it is filled up. Now heat up the solution to 50-60°C.
- 8 The CIP unit is run for 2-4 hours, until the PHE is clean.
- 9 When the cleaning is finished solution is being neutralized by adding 1 bag Alfa P-Neutra per bag Alfa P-Scale until the pH-value reaches 6,5 - 7,5. The neutralization should be performed carefully and with continuous circulation for 30 min.
- 10 Drain the PHE and tank from the liquid considering environmental and safety aspects as described on page 1.
- 11 Flush the CIP-unit and the heat exchanger with water for 15-20 minutes before being put into operation.

Contact Alfa Laval sales company if you have further questions and information on CIP-cleaning.



CIP –program # 4

**Task: Removal of Biological/Organic fouling
(without scaling)**

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: AlfaCaus – AlfaPhos – pH strips

Program:

- 1 Follow the Generalised description of the CIP-procedure.
See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle
strap/duck tape in order for them not to be accident open.
- 3 Fill the CIP unit with water (max 90% of the liquid required)
and test run the system in order to spot leakages before
mixing the cleaning agents into the liquid.
- 4 Heat up the PHE to 60-70°C.
Note! For Alfa CIP 20/40 units max liquid temp. is 60°C.
- 5 Mix 1 part AlfaCaus with 10 parts of water.
- 6 The solution is entered into PHE until it is filled up. Now heat
up the solution to 60-70°C.
- 7 The CIP unit is run for 2-4 hours, until the PHE is clean.
The pH-value shall never go below the value 12 during the
cleaning. This is controlled by measuring the pH-value in
equable periods during the cleaning. To rise the pH-value,
add AlfaCaus to the solution.
- 8 When the cleaning is finished solution is being neutralized
by gently adding AlfaPhos until the pH-value reaches 6,5 -
7,5. The neutralization should be performed carefully and
with continuous circulation for 30 min.
- 9 Drain the PHE and tank from the liquid considering
environmental and safety aspects as described on page 1.
- 10 Flush the CIP-unit and the heat exchanger with water for 15-
20 minutes before being put into operation.

**Contact Alfa Laval sales company if you have further questions
and information on CIP-cleaning.**



CIP –program # 5

**Task: Removal of Biological/Organic fouling
with scaling**

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: AlfaCaus – AlfaPhos – pH strips

Program:

- 1 Follow the Generalised description of the CIP-procedure.
See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle
strap/duck tape in order for them not to be accident open.
- 3 Fill the CIP unit with water (max 90% of the liquid required)
and test run the system in order to spot leakages before
mixing the cleaning agents into the liquid.
- 4 Heat up the PHE to 60-70°C.
Note! For Alfa CIP 20/40 units max liquid temp. is 60°C.
- 5 Mix 1 part AlfaCaus with 10 parts of water.
- 6 The solution is entered into PHE until it is filled up. Now heat
up the solution to 60-70°C.
- 7 The CIP unit is run for 2-4 hours, until the PHE is clean.
The pH-value shall never go below the value 12 during the
cleaning. This is controlled by measuring the pH-value in
equable periods during the cleaning. To rise the pH-value,
add AlfaCaus to the solution.
- 8 When the biological fouling is removed the solution shall be
neutralized **by gently adding** AlfaPhos until the pH-value
reaches 6,5 - 7,5.
- 9 Drain the PHE and tank from the liquid considering
environmental and safety aspects as described on page 1.
- 10 Now proceed with CIP –program # 1.
- 11 Flush the CIP-unit and the heat exchanger with water for 15-
20 minutes before being put into operation.

**Contact Alfa Laval sales company if you have further questions
and information on CIP-cleaning.**



CIP –program # 6

Task: Removal of Calcium carbonate scaling

Usage: Alfa Laval Plate Heat Exchangers (PHE)

**Products: Alpacon Descalent – AlfaNeutra – pH strips –
- Alpacon Degreaser**

Program:

- 1 Follow the Generalised description of the CIP-procedure.
See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle strap/duck tape in order for them not to be accident open.
- 3 Fill the CIP unit with water (max 90% of the liquid required) and test run the system in order to spot leakages before mixing the cleaning agents into the liquid.
- 4 Heat up the PHE to 50-70°C.
Note! For Alfa CIP 20/40 units max liquid temp. is 60°C.
- 5 Mix 1 part Alpacon Descalent with 7 parts of water.
Alpacon Descalent will create foam when getting in contact with calcium carbonate; to prevent this add 5% of Alpacon Degreaser. Mix thoroughly before use.
- 6 The solution is entered into PHE until it is filled up. Now heat up the solution to 50-70°C.
- 7 The CIP unit is run for 3-6 hours, until the PHE is clean.
The pH-value shall never exceed the value 2.5 during the cleaning. This is controlled by measuring the pH-value in equable periods during the cleaning. To lower the pH-value, add Alpacon Descalent to the solution.
- 8 When the cleaning is finished solution is being neutralized **by gently adding** AlfaNeutra until the pH-value reaches 6,5 - 7,5. The neutralization should be performed carefully and with continuous circulation for 30 min.
- 9 Drain the PHE and tank from the liquid considering environmental and safety aspects as described on page 1.
- 10 Flush the CIP-unit and the heat exchanger with water for 15-20 minutes before being put into operation.

Contact Alfa Laval sales company if you have further questions and information on CIP-cleaning.



CIP –program # 7

Task: Removal of Organic fouling

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: Alpacon Degreaser – pH strips-

Program:

- 1 Follow the Generalised description of the CIP-procedure.
See section *Operation in Manual for CIP unit*.
- 2 **IMPORTANT !** Secure all Connections with bundle strap/duck tape in order for them not to be accident open.
- 3 Fill the CIP unit with water (max 90% of the liquid required) and test run the system in order to spot leakages before mixing the cleaning agents into the liquid.
- 4 Heat up the PHE to 40-60°C.
- 5 Mix 1 part Alpacon Degreaser with 10 parts of water.
- 6 The solution is entered into PHE until it is filled up. Now heat up the solution to 40-60°C.
- 7 The CIP unit is run for 3-6 hours, until the PHE is clean..
- 8 Drain the PHE and tank from the liquid considering environmental and safety aspects as described on page 1.
- 9 Flush the CIP-unit and the heat exchanger with water for 15-20 minutes before being put into operation.

Contact Alfa Laval sales company if you have further questions and information on CIP-cleaning.



Cleaning of Opened PHE

Task: Removal of deposits

Usage: Alfa Laval Plate Heat Exchangers (PHE)

**Products: AlfaPhos – Alfa P-Scale – Alpacon Descalent –
AlfaCaus – Alpacon Degreaser**

Program:

1. Follow the **General** description as above.
2. Start cleaning when heating surface is still wet and plates are hanging in the frame.
3. Use fibre brush and preferably hot water jet to start with.
4. If necessary, put the plates in a suitable tank and use one of the following chemicals to remove deposits:

Oxides, Carbonates	AlfaPhos, Alfa P-Scale, Alpacon Descalent
Organics, Proteins	AlfaCaus,
Fats, Oils	Kerosene, AlfaCaus, Alpacon Degreaser

5. Flush the plates with clear preferably hot water.

WARNING! AlfaCaus is based on caustic soda and can cause serious injuries by skin contact and have to be handled with great care.

6. Avoid to clean CB units with iron connections (or other iron part) by simple immersion to the acidic bath.



Cleaning of Twin-plates of Opened PHE

Task: Cleaning of welded channels before opening of unit

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: Fresh water – AlfaPhos – Alfa P-Scale – Alpacon Descalent – AlfaCaus – Alpacon Degreaser

- 1 Follow the **General** description as above.
- 2 As the welded channels normally contain an aggressive liquid which has to be removed from the unit, it is wise to arrange connections for fresh water between the unit and the in- and outlet valves making it possible to flush out the aggressive liquid with hot fresh water or other for the purpose suitable cleaning agent.
- 3 The inlet for the cleaning liquid shall be at the lower connection of the unit.
- 4 After opening of the unit the cleaning of the gasket channels may proceed according to current instruction with the plates still hanging in the frame
- 5 Clean with appropriate chemical as the recommended cleaning method describes to remove fouling on the welded side.
- 6 Flush the plates with clear preferably hot water.

WARNING! AlfaCaus is based on caustic soda and can cause serious injuries by skin contact and have to be handled with great care.



Cleaning loose Twin-plates of Opened PHE

Task: Cleaning of loose twin-plates

Usage: Alfa Laval Plate Heat Exchangers (PHE)

Products: AlfaPhos – Alfa P-Scale – Alpacon Descalent –
AlfaCaus – Alpacon Degreaser – Fresh water

1. Follow the **General** description as above.
2. It is difficult to clean the inside of twin-plates.
3. There must be a flow in the welded channel to transport the dirt out of the cassette.
4. Leaving twin-plates in a chemical bath will **NOT** clean the welded channel. **NEITHER** will dipping plates with the long side into a bath. This will only result in an air pocket for dirt.
5. This will only result in an air pocket for dirt. Twin-plates should be dipped with the short side into a bath to allow a flow through the channel.
6. Neutralise the surfaces and rinse thoroughly with clear preferably hot water.

WARNING! AlfaCaus is based on caustic soda and can cause serious injuries by skin contact and have to be handled with great care.