



Plate Heat Exchanger

4 Plate Cleaning Manual

Introduction

About this document

- In addition to this document, the Manuals for HISAKA PHEs consist of the following six documents. Read them thoroughly and understand the precautions regarding the safety of the equipment and its functions before handling the equipment. 1 Installation Manual, 2 Operation and Maintenance Manual, 3 Gasketing Manual, 5 "Slit-In" Type Gasketing Manual, 6 Mixed Gasket Materials Manual, 7 Strainer Maintenance Manual.
You can also download these documents on our company website. <http://www.hisaka.co.jp/english/>
- This document is created for a person who fully understands the language it is written in. If a person, who is not able to understand the language written herein, will handle the equipment, please provide safety instructions to the personnel/operators.
- The PHE supplied may differ from the drawings and pictures in this document depending on the optional parts if any. Also, for the purpose of explanation, the drawings and pictures in these Manuals may omit the details, accessories, or the like.
- Changing the contents of these Manuals, in part or in whole, or using them for anything other than its intended purpose is prohibited.
- Keep these Manuals in hand.

About plate cleaning

- To prevent injury and damages, do not clean plate other than for their intended purpose and specifications. Also, during maintenance, follow the instructions of related documents.

About worker limitations

- Operation, maintenance/inspection, or installation of the equipment shall be performed by personnel/operators who have undergone training regarding safety and danger prevention drills.
- Work in high places should be carried out by a worker who fully understands the danger of the work and has received training in safety and danger prevention.

Disposal of the material

- Disposal method is different in its kind of material. Please dispose it according to a security data sheet (SDS) packed with a product. In addition, please follow the local law and regulations.

Disclaimer

- HISAKA accepts no liability for any failures in the function or performance of the equipment caused by use of any other than genuine parts.
- HISAKA accepts no liability for any injuries or damage borne by the user, caused by use of any other than genuine parts.
- HISAKA accepts no liability for any failures in the function or performance of the equipment caused by use of this equipment in a manner that does not adhere to the procedures indicated in this manual.

HISAKA Plate Heat Exchanger

Plate Cleaning Manual

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1 Safety Precautions

Read through this manual carefully before use, and use PHE properly.

If you have any questions, please inquire with our company.

- Precautions are categorized using the following symbols.



WARNING

This symbol indicates content where mishandling could result in death or severe injury.



CAUTION

This symbol indicates content where mishandling could result in injury or property damage.

NOTE

This symbol indicates important matters and/or useful information.

- Meanings of Symbols



Indicates items that are "prohibited (something that you must NOT do)".



Indicates items that are "mandatory (something that you must do)".



WARNING

Do NOT operate in excess of the design conditions (temperature, flow rate, pressure, etc.).

It may cause deformation of the heat transfer plates or leakage. Also, the required performance may not be achieved.



CAUTION

Do NOT touch the side of the heat exchanger element (edge of the heat transfer plates).

The edge of a heat transfer plate is very sharp and may cut you. Be sure to wear cut-resistant gloves whenever touching the heat transfer plates.



Do NOT place objects on the heat exchanger.

Doing so may cause deformation of heat transfer plate or a falling object may cause injury during operation.



Request an expert to perform piping work, and review the assembly drawings with them beforehand to ensure that connections are properly made.

Work performed by inexperienced personnel can result in a faulty or improper connection. An improper connection can result in failure to provide the specified performance or an equipment malfunction.

Do NOT touch anything the side of the heat exchanger element (edge of the heat transfer plates).

Deformation of the heat transfer plate may cause damage to the plate gasket and result in leakage.



Install sufficient support for piping connected to the PHE.

A large piping load to the PHE may cause the frame to become deformed or leakage.

Do NOT allow debris or foreign material to get inside the PHE.

The clearance of the PHE is quite narrow, such that it can be easily clogged by debris or foreign material. When flushing the piping, take measures such as installing a temporary strainer at the inlet piping or bypassing the PHE in order to prevent debris or foreign materials from entering the PHE.



Secure working space around the PHE.

Installation and piping design must take into account the working space required for using disassembly and installation tools.



Clean the piping interior before connecting.

Clean piping thoroughly so that no debris enters the PHE.

Do NOT apply instantaneous negative pressure.

Drawdown may occur if instantaneous negative pressure is applied to PHE by pump stop or valve closing, or heat transfer plates deformation may also.



Ensure no pressure or fluid remaining inside before disassembling PHE and/or removing piping.

Blowing out of PHE may cause severe injuries.



Perform the thermometry of the cleaner at the point that temperature is the highest in including the heater exit.

Harmful gas is generated when I surpass maximum temperature depending on the kind of the cleaner. In addition, it might adversely affect an equipment of the use when temperature rises.

2 What is the Plate-Clean Series?

The Plate-Clean Series is designed for HISAKA PHE.

By circulating Plate-Clean in the PHE, hard scale can be cleaned away coming from the cooling water / warm water and steam, without disassembling the heat exchanger unit.

Three types are available, depending on the type of scales to be cleaned:

1. Plate-Clean C (For calcium)
2. Plate-Clean S (For silica, slime)
3. Plate-Clean F (For iron rust)

[NOTE]

Details such as the component of each cleaner in the Plate-Clean Series are indicated in the Safety Data Sheet (SDS) packed with the cleaner. Please check it before use.

3 How to Use

3-1 How to use Plate-Clean C

Please follow the below steps for using the Plate-Clean C.

- Do not apply to silicon gasket.
Gasket could be swelled.
- Use at the normal / room temperature.
Harmful gas could be occurred by heated product.
- Provide sufficient ventilation
Ventilate properly, especially when using in an underground room or pit.
- Wear personal protection.
For safety reasons, wear goggles, a mask, and chemical-resistant gloves.
- Volume of cleaning liquid
The volume of cleaning liquid should be 1.5 times the hold volume, or the hold volume plus 200 liters, whichever is less.
- Standard concentration
The standard concentration should be 15wt%. Dissolve the cleaner (85 liters of water to 15 kilograms (approx. 12 liters) of the cleaner) to reach nearly standard concentration.
Dissolution limit is 15wt%. Over 20wt%, part of the cleaner will not be dissolved and will remain to the bottom of the tank.
* wt% (Concentration as % of weight)
- Operation time
The standard operation time is 3 hours, and the maximum operation time is 12 hours.
Foaming is possible depending on the scales.

3-2 How to use Plate-Clean S

Please follow the below steps for using the Plate-Clean S.

- Do not apply to silicon gasket.
Gasket could be swelled.
- Use at the normal / room temperature.
Harmful gas could be occurred by heated product.
- Dilute Plate-Clean S with water in order to avoid heating. The concentration shall be less than below standard value.
- Provide sufficient ventilation
Ventilate properly, especially when using in an underground room or pit.
- Wear personal protection.
For safety reasons, wear goggles, a mask, and chemical-resistant gloves.
- Volume of cleaning liquid
The volume of cleaning liquid should be 1.5 times the hold volume, or the hold volume plus 200 liters, whichever is less.

- Standard concentration
The standard concentration should be 20wt%.
- Operation time
At room temperature, standard operation time is 5 hours, and the maximum operation time is 12 hours.
* Reaction may not occur immediately. Even if there is no reaction, carry out circulation cleaning for a minimum of 2 hours.
* Foaming is possible depending on the scales.

3-3 How to use Plate-Clean F

Please follow the below steps for using the Plate-Clean F

- Do not apply to nickel and copper alloy because it could be corroded by Plate-Clean F.
- Maximum allowable working temperature
The more temperature raise, the more washing effect.
However, Do not use over 65 degree Celsius due to its maximum temperature.
- Prevent air intake
During circulation, put the return piping which is inside of the tank into the lower level of liquid surface because air intake makes foam.
*The undiluted solution is clear and colorless. However, when it reacts with metallic ions, it turns purple. As the reaction proceeds, the liquid becomes black and more viscous.
- Wear personal protection.
For safety reasons, wear goggles, a mask, and chemical-resistant gloves.
- Cleaning liquid volume
The volume of cleaning liquid should be 1.5 times the hold volume, or the hold volume plus 200 liters, whichever is less.
- Standard concentration
The standard concentration should be 20w%.
- Standard Operation time
Room temperature : 24 hours
60°C : 4 hours

4 Cleaning Procedure

1. Applicable equipment
 - ① Cleaning tank: Resin (Heat resistant temperature : Plate-Clean F operation temperature) or stainless steel
 - ② Cleaning pump: Resin (Heat resistant temperature : Plate-Clean F operation temperature) or stainless steel
Flow rate: 100 liters/min, Pump head: Approx. 10 m
 - ③ Electric heater (for Plate-Clean F only)
Cleaning time could be reduced by using electric heater.
 - ④ Chemical hoses: Approx. 40A (Chemical resistant against acid and alkalis, Heat resistant temperature : Plate-Clean F operating temperature)
 - ⑤ Valves: Approx. 40A (Ball valves are recommended.)
 - ⑥ Recovery tank: 200 liters (Chemical resistant material such as polyethylene lined is recommended)
 - ⑦ Cleaner input port connection
 - ⑧ Compressor (if 0.5MPa clean air is not available)

* Do not apply to nickel and copper alloy because it could be corroded by Plate-Clean F.
2. Utilities to be prepared
 - ① Power source for the cleaning pump
 - ② Power source for the compressor, or 0.5 MPa clean air
 - ③ Power source for the electric heater
 - ④ Fresh water
3. Cleaning procedure (Refer to the flow sheet in Fig. 1.)

- ① The cleaner will be sent from us after confirmation of condition of PHE and type of fluid and scales.
Hisaka will inform the cleaning procedure such as cleaner type, concentration, time, and temperature.
 - ② Isolate the PHE from the fluid by using existing valves or close-off panel.
 - ③ Drain fluid of PHE.
 - ④ Connect the piping for cleaning. (Refer to Fig. 1 flow sheet.) The cleaner can be supplied and drained from the thermometer connection, pressure gauge connection, or drains. Please prepare a cleaner supply connection.
 - ⑤ Dilute cleaner in cleaning tank and make it to the specified concentration.
Read the Safety Data Sheet regarding for using cleaner.
 - ⑥ Open valve V1, open V2, close V3, and open V4 to make the circulation route.
 - ⑦ Start up the cleaning pump and supply cleaning fluid into PHE.
 - ⑧ Use electric heater depending on the cleaner.
 - ⑨ Carry out circulation cleaning as instructed. When cleaning is finished, turn off cleaning pump and close V1.
 - ⑩ Connect air piping to part X of the cleaner return hose V4.
 - ⑪ Put the hose through V3 into the collecting tank.
 - ⑫ Close V1, open V2, open V3, and open V4.
 - ⑬ Supply air from the top of the PHE and collect the used cleaner. Be careful to prevent cleaner from overflowing from the collecting tank.
- * Air pressure should be lower than the design pressure of PHE.
- * Keep the cleaner from blowing out and splashing.
- ⑭ After collection of cleaner, 1. Close V4 valve. 2. Shut off air supply. 3. Put washings return hose in a cleaning tank. 4. Check there is no residual air pressure.
 - ⑮ PHE rinsing procedure is as follows. 1. Put fresh water in the cleaning tank. 2. Open valve V. 3. Close V3. 4. Turn on the cleaning pump and rinse the PHE. 5. When finish rinsing, stop the cleaning pump.
 - ⑯ The rinse water shall be corrected after carrying out according ⑩ to ⑭.
 - ⑰ If necessary, carry out circulation cleaning with a different type of cleaner.
 - ⑱ Depending on the condition, neutralize the cleaner in the collecting tank.
 - ⑲ Disassemble the piping.
 - ⑳ Wash the cleaning tank, pump, and piping by fresh water and make sure there is no cleaner left.

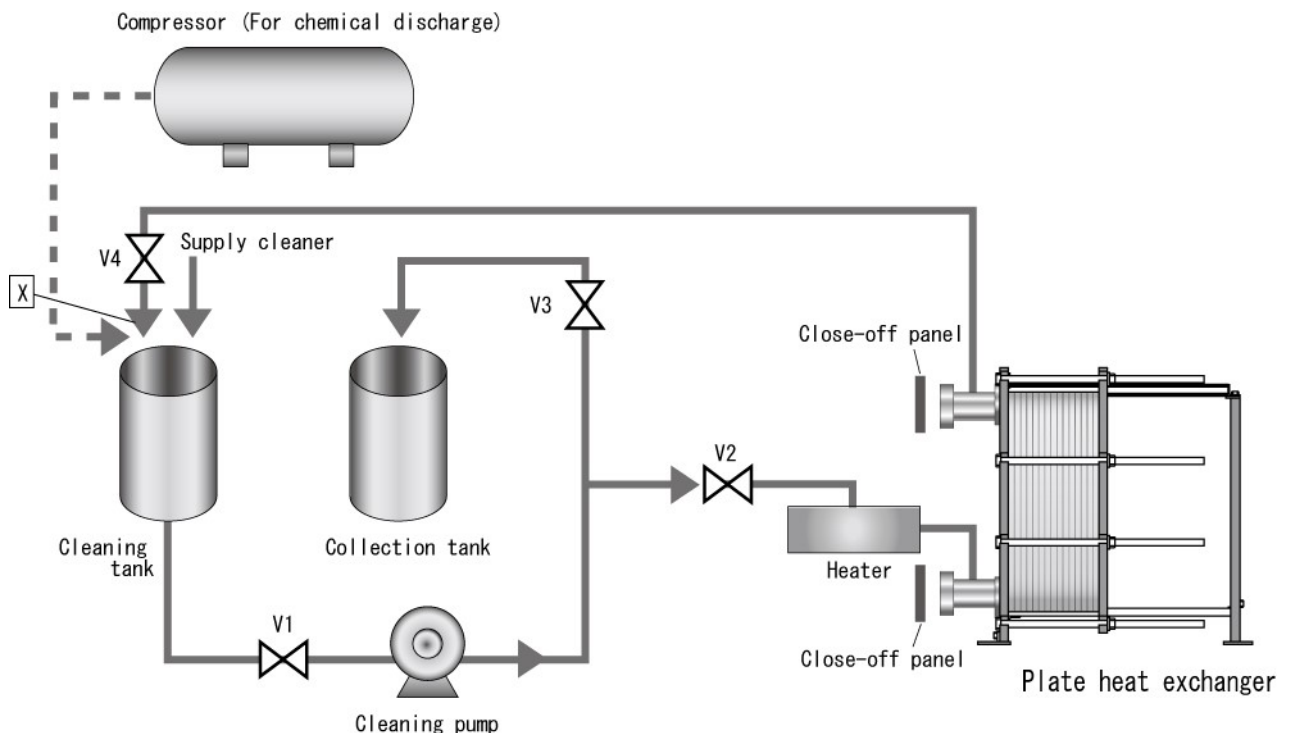


Fig.1-Flow Sheet

5 Other Precautions

- Do not use the cleaner for anything other than its intended purpose and specification.
- If case of accidental ingestion of the cleaner, get medical advice.
- Stop usage of the product immediately, if you feel irritation in your eyes or throat, or if you feel ill during use. If you do not feel better, get medical advice.
- If the product comes in contact with your skin or clothing, wash it off with fresh water for 15 minutes or more. If you experience any irregularities, get medical advice.

6 Inquiries

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[NOTE]

- Please inform us the "MFG. Number" and "Model" described on the nameplate or Plate Arrangement Drawing and Assembly Drawing.

- For more information

Hisaka Works, Ltd. official homepage (<http://www.hisaka.co.jp/english/>).

- Customer's memo

Please fill in the table below with PHE information.

Item Number		
MFG. Number		
Model		
Qty		
Date MFG.		
Maintenance records		
Memo		



HISAKA WORKS, LTD. HEAT EXCHANGER DIVISION

Hisaka Works, Ltd., Heat Exchanger Division acquires both ISO9001 and ISO14001 certification.

HE-ME003600R4