HISAKA

Plate Heat Exchanger

5 “Slit-In” & “Hook-Lock” Type Gasketting 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 Gasketting Manual, 4 Plate Cleaning Manual, 6 Mixed Gasket Materials Manual, 7 Strainer Maintenance Manual.
  You can also download these documents on our company website. https://www.hisaka.co.jp/english/
- This document is the operation and maintenance manual for “Slit-In” type plates of plate heat exchangers (PHE) to which gaskets are installed without adhesives. Refer to the separate operation and maintenance manual for food product PHE (FX-A Series).
- 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 this document may omit the details, accessories, or the like.
- Changing the contents of this document, in part or in whole, or using this document for anything other than its intended purpose is prohibited.

About gasket use

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

About worker limitations

- PHE maintenance should be carried out by a worker who has received training in safety and danger prevention.
- 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.

Export Regulations on the Equipment

- In case of export of HISAKA PHE and its component parts such as plate, gasket and so on, please follow the local law and regulations.

Disposal of the Equipment

- Do not incinerate gaskets. Incinerating gaskets releases toxic gas and is extremely dangerous.
- Any unnecessary gasket should be disposed as industrial waste in accordance with international, national, prefectural, and municipal 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.

“Slit-In” & “Hook-Lock” Manual

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1 Safety Precautions

Read through this manual carefully before use and use the PHE properly as indicated.
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 loosen PHE's tightening bolts/nuts except for maintenance work.** The PHE could come apart if tightening bolts/nuts are loosened before installation.	⃠ **Do NOT use tightening bolts with loosened bolt heads.** If the bolt head loosens and the bolt head (nut) comes off the bolt, it could fly off at high speed. This is dangerous and contact could cause serious injury or property damage.
⃠ **Do NOT use a flange gasket for the nozzle of heat exchangers with synthetic rubber covering.** Sealing performance could be decreased and it could be a cause of leaking. (Flange gaskets are required for nozzles with metal covering.)	⃠ **Do NOT incinerate gaskets.** Incinerating gaskets releases a toxic gas and is very dangerous. Any unnecessary gaskets should be disposed as industrial waste in accordance with international, national, prefectural, and municipal regulations. For the industrial waste treatment company, use a company that has received permission from the prefectural governor.
⃠ **In general, do NOT perform pneumatic test for medium and large size PHE. For small size PHE, do NOT perform pneumatic test at the same pressure as hydrostatic test pressure.** If a leak occurs during a pneumatic test using compressed air or nitrogen, it is extremely dangerous as, in addition to the test pressure, volume expansion causes an impact. In general, do NOT perform a pneumatic test in excess of 0.75 MPaG.	❗ **Install a protective cover on heat exchangers that handle high temperatures, high pressure, or dangerous fluids such as strong acids or strong alkalies.** If a dangerous fluid leaks, it could cause a serious accident.
⃠ **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.	❗ **Make sure that the operation is stopped, the internal pressure is "0", and the fluid temperature has sufficiently dropped before disassembling the PHE.** If a fluid sprays out from the heat exchanger interior during disassembly, it could cause burns or lacerations.
⃠ **Do NOT loosen the thermometer, pressure gauge, tightening bolts and nuts, or any other accessories during operation and when the PHE are pressurized.** If fluid splashes from the PHE during disassembly, it may cause burns or lacerations.	❗ **Perform gasket replacement in a well-ventilated area or area with ventilation equipment.** The gasket dedicated adhesives "S-1" contain organic solvents. Breathing the volatile ingredients for a long time may cause symptoms such as headache, dizziness, and nausea. Should these symptoms occur, move somewhere with fresh air and rest, stay calm and warm, and seek medical attention.
⃠ **Do NOT use tightening bolts with damage such as significant rust or cracks.** If a tightening bolt breaks during operation or during disassembly, not only will the fragments fly off, but there is also danger of the fluid in the heat exchanger interior spraying out.	

⚠ 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.	❗ **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 place objects on the heat exchanger.** Doing so may cause deformation of heat transfer plate or a falling object may cause injury during operation.	
⃠ **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.	❗ **Secure working space around the PHE.** Installation and piping design must take into account the working space required for using disassembly and installation tools.
⃠ **In general, do NOT remove the stud bolts on the heat exchanger nozzles.** Removing the stud bolts may cause damage on the threads. If it is absolutely necessary to remove them, remove them carefully so as not to damage the screw threading on the stud bolt and the frame. Also, stud bolt removal shall be done at the customer's liability.	❗ **Clean the piping interior before connecting.** Clean piping thoroughly so that no debris enters the PHE.
	❗ **Select flange gasket material that is suitable for the fluid specifications.** Flange gaskets are required for tube flange and metal boot types.
⃠ **Do NOT weld or attach any piping support to the frame, guide bar, or guide bar support.** Such welding may cause thermal damage to gaskets, or the attached part may cause interference that prevents parts from fulfilling their function. Furthermore, the installed part will be an obstacle and will prevent disassembly.	❗ **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.	❗ **Perform maintenance of PHE that handle dangerous fluids, such as a strong acids or alkalies, in an environment that has wastewater treatment equipment.** Process waste fluid in accordance with the law and regulations. Be careful not to drain liquid into a river or ocean area. If untreated liquid leaks, take measures in accordance with the "Safety Data Sheet (SDS)" for the treatment liquid you used.
⃠ **Do NOT allow the fluid to freeze.** In cold areas, remove the fluid inside the heat exchanger and empty the equipment before storing it.	

2 “Slit-In” Plates and Gaskets

2-1 Plates

- “Slit-In” plates are indicated by the letter "A" at the end of the model number indication. (Examples: UX-016A and UX-216A)
- “Slit-In” plates have slits (holes) that are used for fixing gaskets to the plate.
- These slits (holes) are located on the outside of the plate gasket groove and in the port holes (excluding UX-005A and UX-01A).
- If it possesses the characteristics of both “Slit-In” and “Hook-Lock”, the model designation is “A”. (e.g. CX-01A)

2-2 Gaskets

- “Slit-In” gaskets are indicated by the letter "A" in front of the material indication. (Examples: A-NBR and A-EPDM)
- “Slit-In” gaskets have protrusions for fixing the gasket to a plate.
- Handle gaskets with care because a protrusion can be cut easily.
- If it possesses the characteristics of both “Slit-In” and “Hook-Lock”, the model designation is “A”.

3 “Hook-Lock” Plates and Gaskets

3-1 Plates

- “Hook-Lock” plates are indicated by the letter "F" at the end of the model number indication. (Examples: LX-916F and ZEX-216MF)
- “Hook-Lock” plates don’t have slits (holes) that are used for fixing gaskets to the plate.

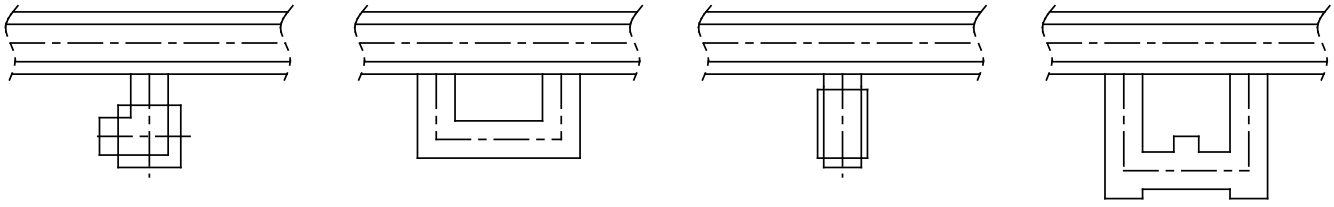
3-2 Gaskets

- “Hook-Lock” gaskets are indicated by the letter "F" in front of the material indication. (Examples: F-NBR and F-EPDM)
- “Hook-Lock” gaskets have protrusions for fixing the gasket to a plate.
- Handle gaskets with care because a protrusion can be cut easily.

4 Gasketting Procedures

4-1 Type of “Slit-In” and “Hook-Lock” Gasket Protrusions

- There are four type of protrusions depending on each PHE model (Fig.1).



L-type O-type I-type Hook-Lock type

Fig. 1 Type of Gasket-Fixing Protrusions

Table 1 Type of Gasket-Fixing Protrusions by Model

Model	L-type	O-type	I-type	Hook-Lock type
UX-005A RX-01A WX-10A CX-10A FX-01A, 03A, 10A, 30A	-	○	-	-
UX-01A, 20A, 40A	○	○	○	-
UX-10A, 30A, 30LA RX-10A, 30A, 50A SX-10A, 30A, 30SA, 40A, 70A LX-00A, 10A, 20A, 30A, 40A, 50A, 50SA GX-20A, 50A FX-05A	-	○	○	-
EX-11A, 15A	-	-	○	-
CX-01A	-	-	○	○
LX-90F、ZEX-20SF、ZEX-20MF	-	-	-	○

4-2 Procedures for Setting L-type Protrusions

1) Press the gasket protrusion at point A by hand for inserting into the slit (hole) on the plate as shown in Fig. 2.
2) Keep pressing at point A by hand, press point B to the plate surface.
   It is more effective and secure to use a flat-blade screwdriver or similar tool than by hand.

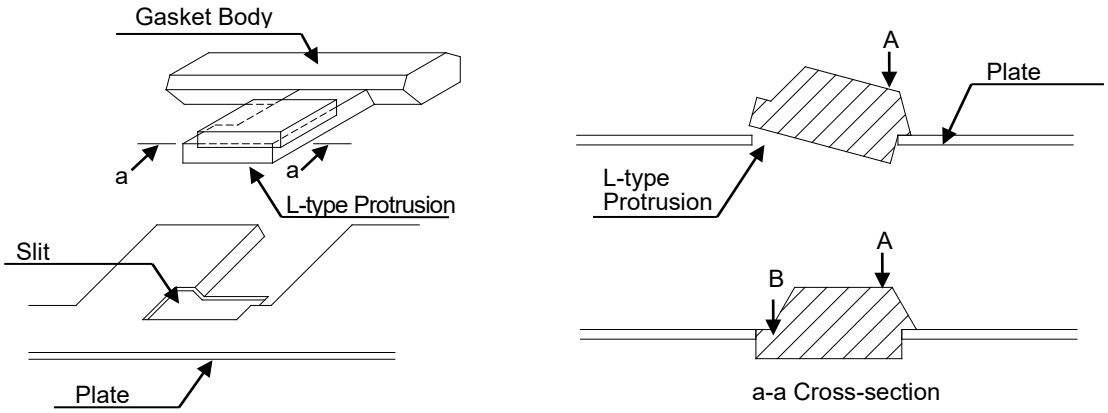


Fig. 2 Procedures for Setting L-type Protrusions

4-3 Procedures for Setting O-type/ I-type Protrusions

Set the gasket body into the plate groove properly. Press the gasket in point C as shown in Fig. 3 and 4 with pressing the protrusion in point A and B for O-type / point A for I-type.

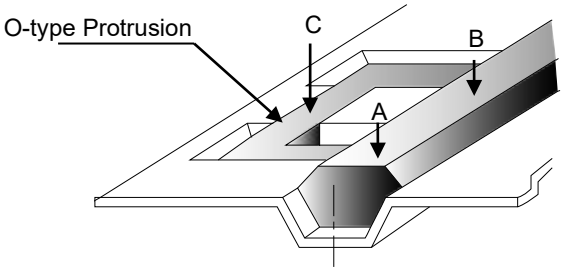


Fig. 3 O-type Protrusion Setting Procedures

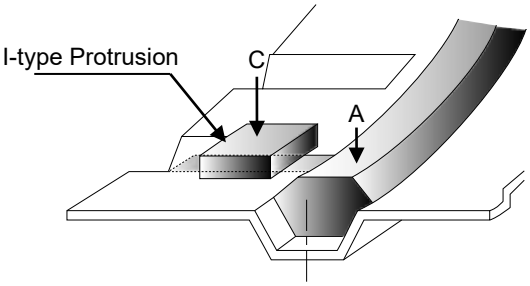


Fig. 4 I-type Protrusion Setting Procedures

4-4 Procedures for Setting Hook-Lock Type Protrusions

Set the gasket body into the plate groove properly. Press the gasket in point C as shown in Fig. 5 with pressing the protrusion in point A and B.

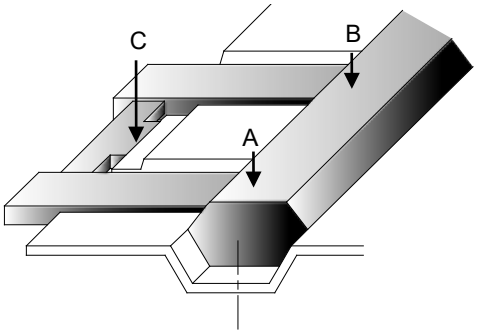


Fig. 5 Procedures for Setting Hook-Lock Type Protrusions

4-5 Procedures for Setting Gaskets without Port Hole (Excluding UX-005A and UX-01A)

1) In case of no slit on plate, cut the protrusion of Gasket (* part in Fig.6) with scissors as below Fig.6 and 7.

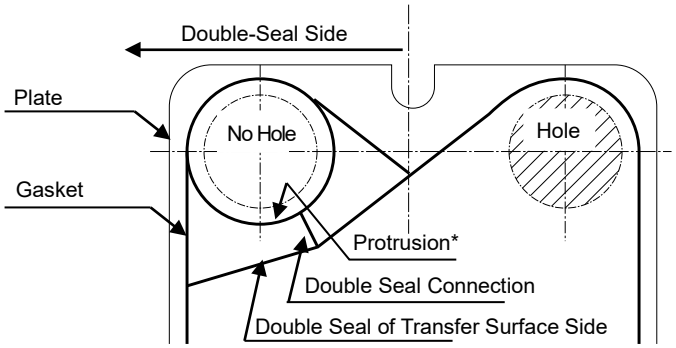


Fig. 6 Part Names

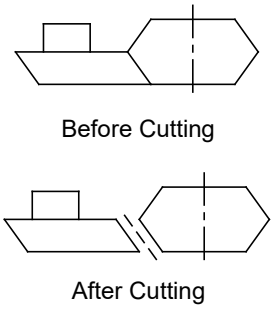


Fig. 7 Cutting Procedures

2) After cutting the protrusion of the port hole, Fix double seal connection to the plate by adhesives "S-1" in case of generic. In case of food applications, Peel back one side only of Double-Faced Tape. Fix double seal connection to the plate by the tape. Refer to below Fig. 8.

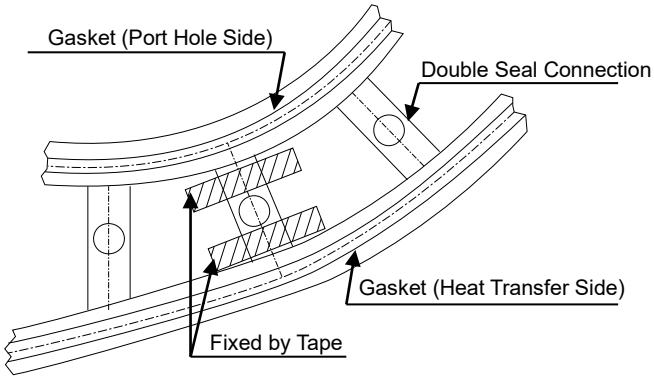


Fig. 8 Procedures for fixing by Tape

4-6 Set Checking

Check the setting of all gasket protrusions properly.

5 Gasket Removal Procedures

Push up gasket protrusion from the backside of the plate. Pay attention not to cut protrusions. For the "Hook-Lock" type, disengage the protrusion that is hooked onto the plate. Wear cut-resistant gloves while working this procedure to prevent injury.

6 Plate Disassembly and Assembly

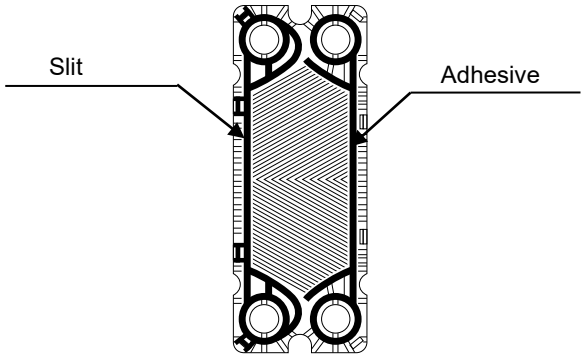
When disassembling plates, some gasket protrusions might slip out of the plates. Reset the slipped out protrusions into their plates before assembly and tighten frame.

7 D-Plate Gasketting Procedures

Each model has different gasketting procedures. Refer to "3. Gasketting Manual" of your PHE model for gasket names and installation positions.

This section indicates the gasketting procedures for D-gasket, “Slit-In” type. Models not indicated in table-2 are regardless of “Slit-In” type, adhesive is necessary for D-gasket setting. Refer to "3. Gasketting Manual" for gasketting by adhesive.

Table 2 D-Plate Gasketting Procedures for “Slit-In” type

Models: UX-005A, UX-30A, SX-40A and SX-70A	
	**[NOTE]** ● The figure shows model UX-005A. Plate type and protrusion position are different depending PHE model. ● Refer to "3. Gasketting Manual" of your PHE for gasket names and type.

8 Other Precautions

1) Wash and remove solid scales and/or other foreign material before assembly.
2) Long period use make double seal of transfer surface side (refer to Fig. 6) insufficient fit to plate groove. Existing gasket still can be re-used. Fix it as same procedure as 3-5 2)

9 Inquiries

Contact info for inquiries

HISAKA WORKS, LTD., Heat Exchanger Div., Sales Department *8-1

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Tokyo Branch office: 1-19-8, Kyobashi, Chuo-ku, Tokyo 104-0031 Japan	Tel : +81-3-5250-0760 Fax : +81-3-3562-2760	

*8-1. Other Japan locations can be referred QR code.

URL: https://www.hisaka.co.jp/english/company_info/access.html

Global Network

Overseas locations can be referred QR code. URL : https://www.hisaka.co.jp/english/company_info/access_world.html	Overseas locations

[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 (https://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-ME0037R8