HISAKA

Plate Heat Exchanger

6 Mixed Gasket Materials 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, 5 “Slit-In” Type Gasketting Manual, 7 Strainer Maintenance Manual.

You can also download these documents on our company website. https://www.hisaka.co.jp/english/phe/

- In this manual, LX-10 is often used as an example for explanation. Please contact us if you have any questions, as the shape may differ from the model to be maintained.
- 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.

Mixed Gasket Materials 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 Storage / Preservation

Take care following four items when storing a spare gasket long term.

- Do not place any items on it to avoid gasket deformation.
- Store it in a black plastic bag or cardboard box to avoid ultraviolet exposure.
- Store in a cool place avoiding direct sunlight and high temperature, high humidity.
- Storage lifetime of new plate gasket is 3 years after the purchase.

Take care following three items when storing a spare adhesive long term.

- Store in a cool place avoiding direct sunlight and high temperature, high humidity.
- Storage lifetime of new adhesive is 2 years after the purchase in case of general application “S-1” .
- Mix it well before use because the solvent and solids may separate due to long-term storage.

3 Gasket material lineups

We have lineups of the following materials for gaskets.

NBR, EPDM, Silicon, FPM, PTFE encapsulated, and so on

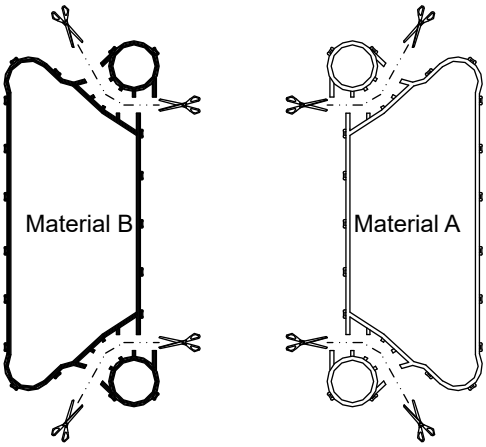
Check the gasket material described in the "Delivery Specifications" and "Element Configuration Diagram", and then select the correct gasket material.

In this manual, the A-side gasket material is referred to as "MATL A" and the B-side gasket material is referred to as "MATL B".

4 Channel-Plate Gasket Installation Procedures

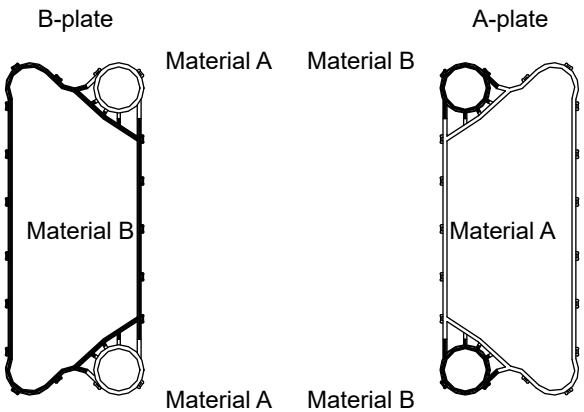
Models: UX-00,01,10,20,30,40,80,90,100,100R,110R,130,130R,160, RX-00,10,30,50,70,90
LX-00,10,20,30,40,50,50S,90,90D, SX-10,20,30,30S,41,43,71,73,80S,80M,80L,90S,90,90M,90L
FX-01,10,03,05, EX-11,15,16, CX-01,10, CXW-01

Preparation



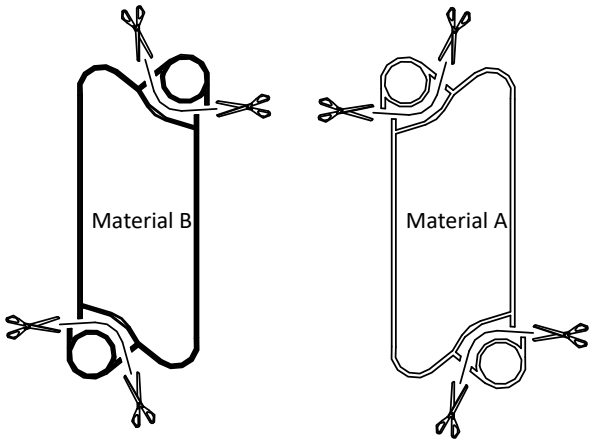
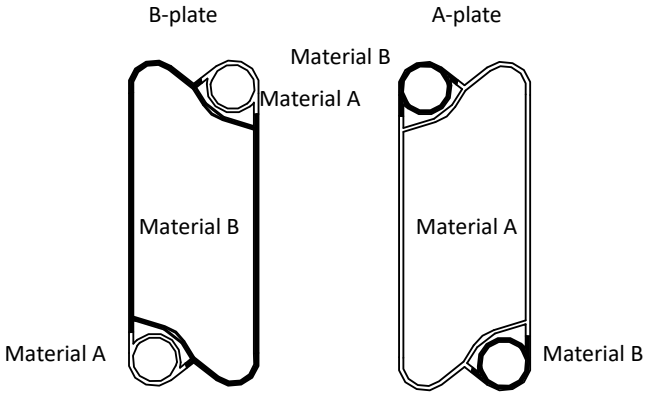
Cut off the port hole section and the heat transfer section for the channel gaskets of Material A and Material B.

Setting

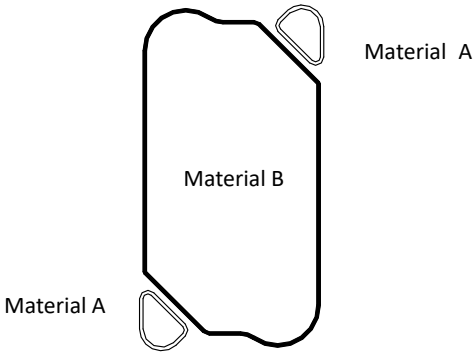
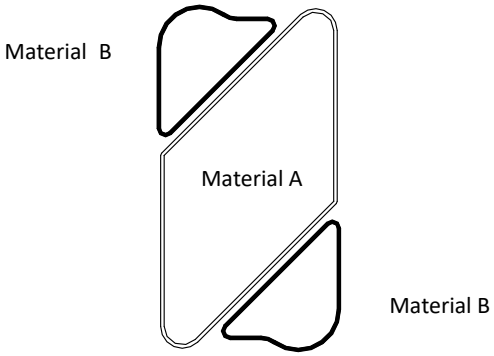


Switch the Material A and Material B of port hole section and heat transfer section, and set the gasket on the heat transfer plate. For a slit-in type, set the plate gasket using the slit, and for an adhesive type, set the plate gasket using specified adhesive.

Models： CX-01D, 10D

Preparation	Setting
	
Cut off the port hole section and the heat transfer section for the channel gaskets of Material A and Material B.	Switch the Material A and Material B of port hole section and heat transfer section, and set the gasket on the heat transfer plate. slit-in type is not included in our lineup, therefore set the plate gasket using specified adhesive.

Models： YX-80,83

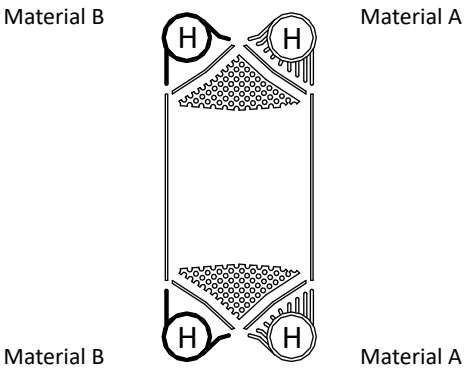
V PLATE GASKET（B-plate）	L PLATE GASKET（A-plate）
	

Prepare channel gasket of Material A and Material B. Switch the Material A and Material B of port hole section and heat transfer section, and set the gasket on the heat transfer plate. slit-in type is not included in our lineup, therefore set the plate gasket using specified adhesive.

5 D-Gasket Installation Procedures

Models： UX-01,20,40,80,90,100,100R,110R,130,130R,160, RX-10,30,50,70,90
LX-10,20,30,40,50,50S,90,90D SX-10,20,30,30S,73,80S,80M,80L,90S,90,90M,90L, FX-03,05, EX-11,15,16, CX-10,10D

Setting

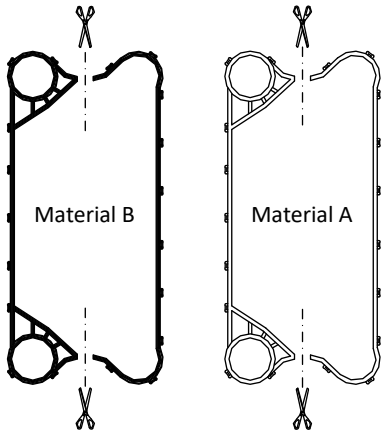
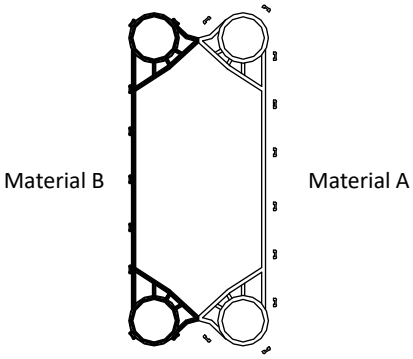
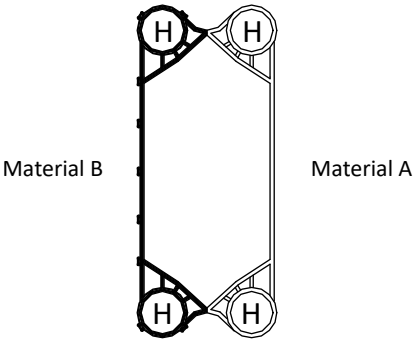


H:Hole (passage hole)

Combine the DA, DB or D gaskets of Material A and Material B, and together with S distance, set them to the heat transfer plate using the specified adhesive. For large plates or high-pressure applications, also attach the T distance.
For details, refer to "3 Gasketting Manual" for each model.

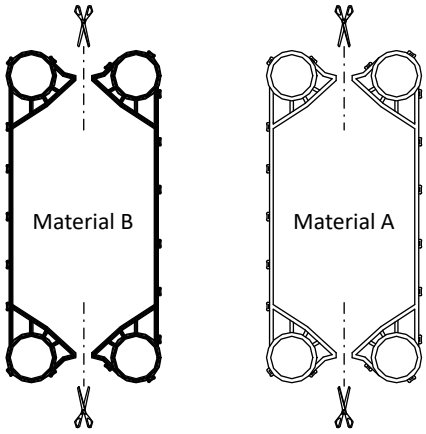
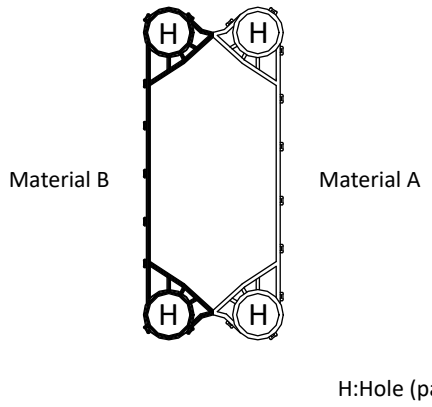
NOTE
1. Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.
2.D-gasket of SX-20,SX-73 cut channel gasket. For details, refer to "3 Gasketting Manual" for each model.
3.For SX-80,UX-90,UX-100,UX-130 series, P distance is required. For details, refer to "3 Gasketting Manual" for each model.

Models： UX-00,30, SX-41,43,71

Preparation-No.1	Preparation-No.2	Setting
		 H:Hole (passage hole)
Cut the channel gaskets of Material A and Material B in the center. Only use the side with the port holes.	Combine the Material A and Material B port hole sections, and cut off the slit sections which shall not be used for setting to the heat transfer plate (right side in the figure above).	When setting gasket to the port hole section without slit section of the heat transfer plate, (right side in the figure above) use the specified adhesive.

NOTE
1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.
2.For details, refer to "3 Gasketting Manual" for each model.

Models： RX-00, FX-01,10

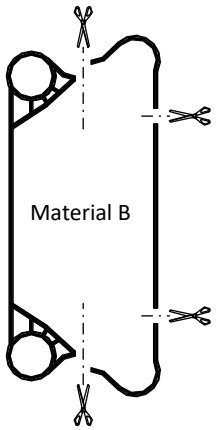
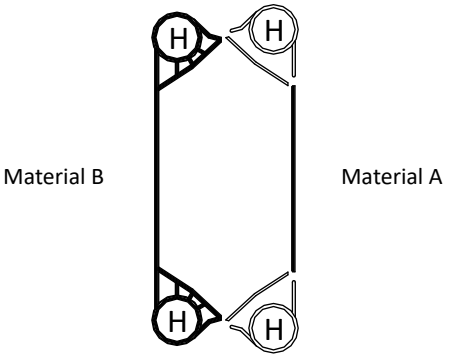
Preparation	Setting
	 H:Hole (passage hole)
Cut the D and E gaskets of Material A and Material B in the center.	Switch the Material A and Material B port holes section, and set to the heat transfer plate.

NOTE

1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.

2.For details, refer to "3 Gasketting Manual" for each model.

Models： UX-10

Preparation	Setting
	 H:Hole (passage hole)
Cut the channel gaskets of Material A and Material B in the center. Use port hole side and the straight section.	Combine DB gaskets of Material A and Material B, and together with S distance, set them to the heat transfer plate using the specified adhesive.

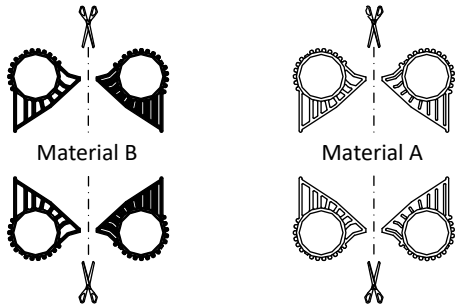
NOTE

1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.

2.For details, refer to "3 Gasketting Manual" for each model.

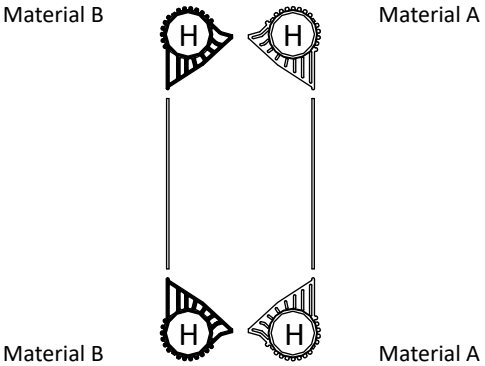
Models： LX-00

Preparation



Cut D-A gasket and D-B gasket of Material A and Material B in the center.

Setting



H:Hole (passage hole)

Combine D-A and D-B gaskets of Material A and Material B, and together with the S distance, set them to the heat transfer plate using specified adhesive.

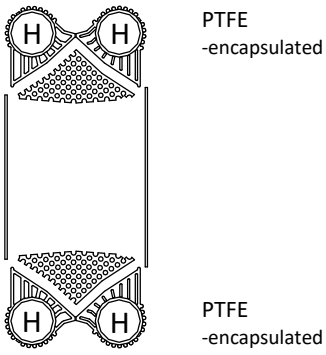
NOTE

1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.

2.For details, refer to "3 Gasketting Manual" for each model.

Models： LX-10（Only when installing PTFE）

Setting



H:Hole (passage hole)

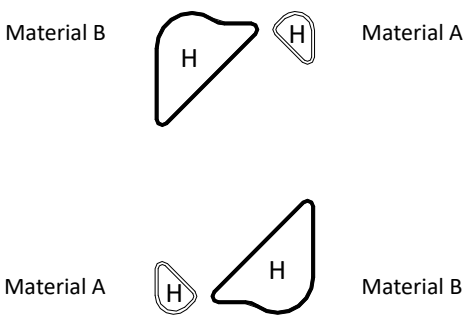
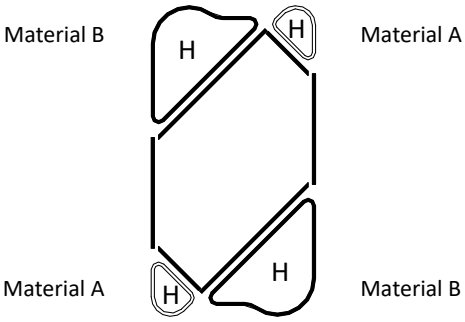
Even when sticking the material separately, the D plate sticks PTFE -encapsulated on both sides. PTFE-encapsulated D-A and D-B gaskets, and together with S distance and T distance, set them to the heat transfer plate using the specified adhesive.

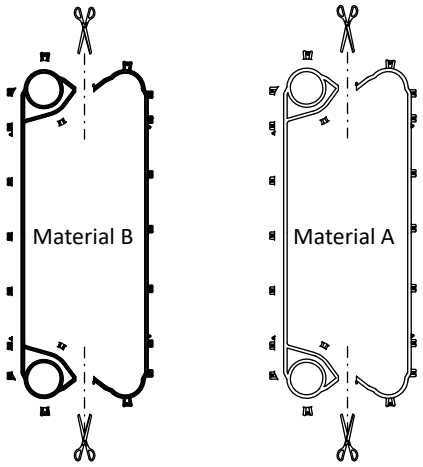
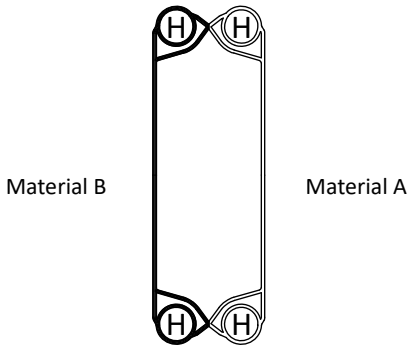
NOTE

1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.

2.For details, refer to "3 Gasketting Manual" for each model.

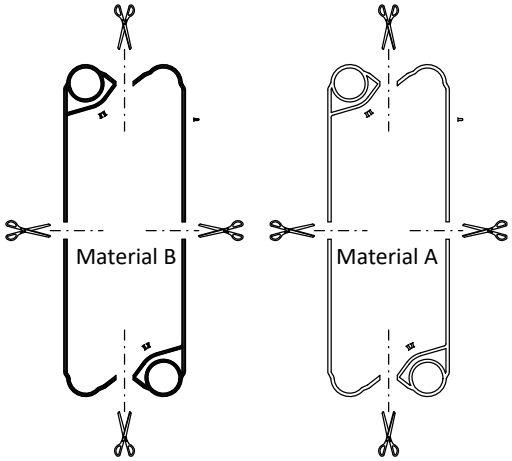
3.If the plate with port hole, a spacer of t 2 mm (only the same part as frame is perforated) is required between the D plate and the frame.

Models： YX-80	YX-83
	
H:Hole (passage hole)	H:Hole (passage hole)
Prepare channel gaskets of Material A and Material B.	Combine channel gaskets of Material A and Material B, and together with S distance, set them to the heat transfer plate using the specified adhesive.
NOTE 1.D-plate of YX-80,YX-83 is only B-plate(Vaper side). 2.For details, refer to "3 Gasketting Manual" for each model.	

Models： CX-01, CXW-01	
Preparation	Setting
	
	H:Hole (passage hole)
Cut the channel gaskets of Material A and Material B in the center. Cut off the slit sections which shall not be used for setting to the heat transfer plate (left side in the figure above).	Combine the Material A and Material B port hole sections, and set gasket using specified adhesive.
NOTE 1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down. 2.For details, refer to "3 Gasketting Manual" for each model.	

Models： CX-01D

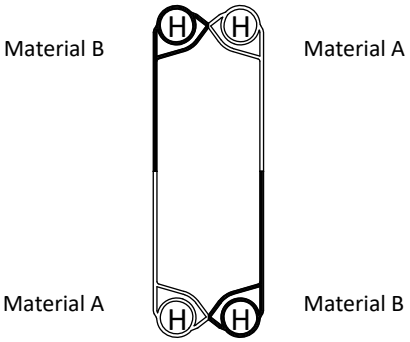
Preparation



Cut the channel gaskets of Material A and Material B in the natural centerline.

Cut off the protrusion of periphery and double seal part.

Setting



H:Hole (passage hole)

Combine the Material A and Material B port hole sections, and set gasket using specified adhesive.

NOTE

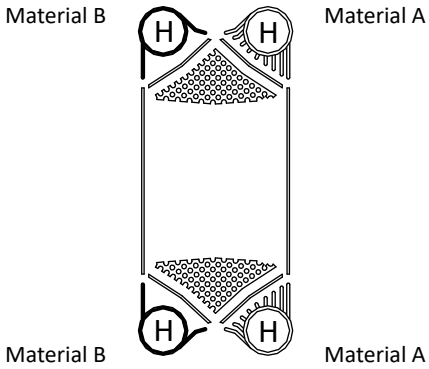
1.Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.

2.For details, refer to "3 Gasketting Manual" for each model.

6 E-Gasket Installation Procedures

Models： UX-90,100,100R,110R,130,130R,160, RX-10,30,50,70,90
LX-20,30,40,50,50S,90,90D SX-10,20,30,30S,73,80S,80M,80L,90M,90L, FX-03,05, CX-10,10D

Setting（E-plate back side）



H:Hole (passage hole)

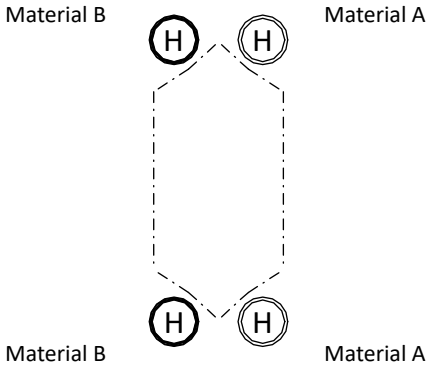
Combine DA, DB or D gaskets of Material A and Material B, and together with S distance, set them to the heat transfer plate using the specified adhesive. For large plates or high-pressure applications, set T distance.

NOTE

1. Above figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.
2.D-gasket of SX-73 cut channel gasket. For details, refer to "3 Gasketting Manual" for each model.
3. Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.
4.For SX-80,UX-90,UX-100,UX-130 series, P distance is required. For details, refer to "3 Gasketting Manual" for each model.

Models： UX-00,01,10,20,30,40,80
SX-41,43,71,90S,90, EX-11,15,16

Setting（Nozzle groove on E-frame）



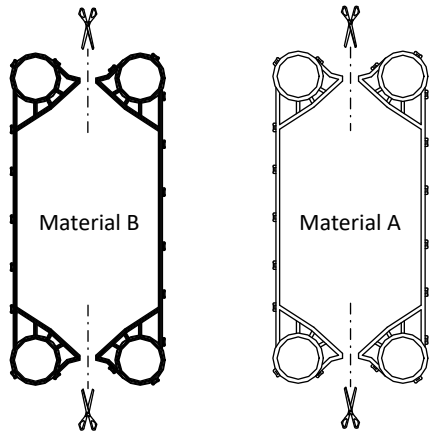
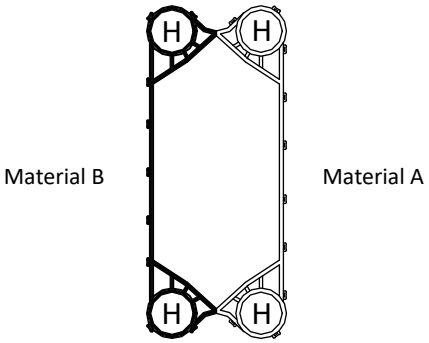
H:Hole (passage hole)

Combine E nozzle gaskets of Material A and Material B and set them to the nozzle groove on E-frame.

NOTE

1.For details, refer to "3 Gasketting Manual" for each model.
2.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.
3.E nozzle gasket shall not to be set to the back side of E-plate but shall be set to the nozzle groove of E-frame.

Models： RX-00, FX-01,10

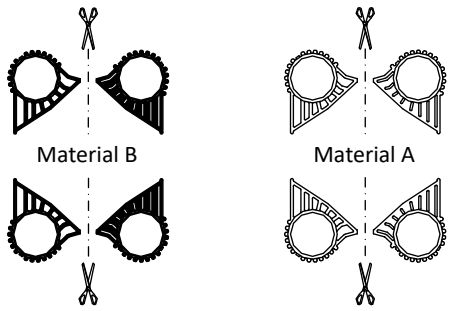
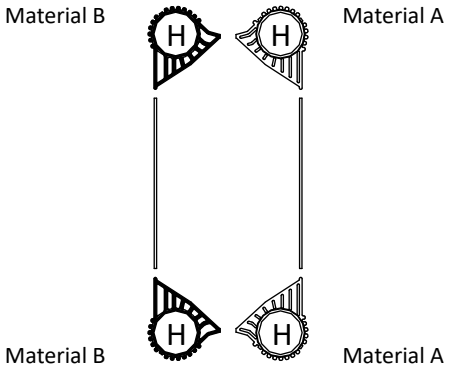
Preparation	Setting（E-plate back side）
	 H:Hole (passage hole)
Cut the D-plate gaskets of Material A and Material B in the center.	Switch Material A and Material B port hole sections, and set to the heat transfer plate.

NOTE

1.For details, refer to "3 Gasketting Manual" for each model.

2.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.

Models： LX-00

Preparation	Setting（E-plate back side）
	 H:Hole (passage hole)
Cut a D-A gasket and D-B gasket of Material A and Material B in the center.	Combine D-A and D-B gaskets of Material A and Material B, and together with S distance, set them to the heat transfer plate using the specified adhesive.

NOTE

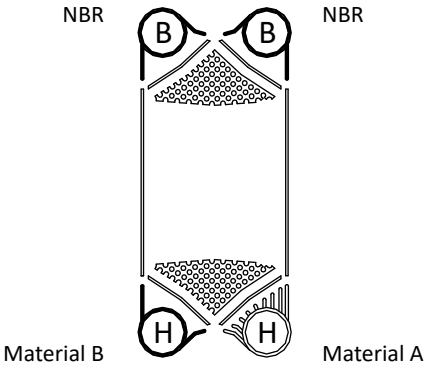
1.Above E-plate figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.

2.For details, refer to each model's appendix, "3 Gasketting Manual."

3.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.

Models： LX-10

Setting（E-plate back side）



H:Hole (passage hole) B:Blind

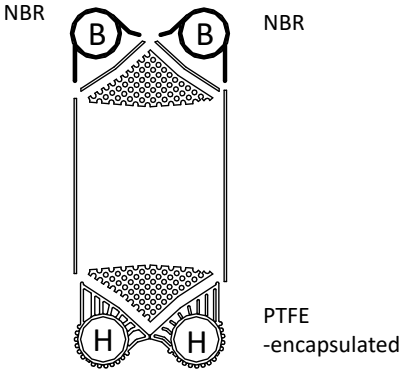
Combine DA and DB gaskets of Material A and Material B, and together with S distance, set them to the heat transfer plate using the specified adhesive. For large plates or high-pressure applications, set T distance.

NOTE

1.LX-10A E-plate upper port holes (E1 and E2) must be closed for all products.
2.Above E-plate figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.
3.For details, refer to each model's appendix, "3 Gasketting Manual."
4.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.

Models： LX-10（Only for PTFE-encapsulated gasket）

Setting（E-plate back side）



H:Hole (passage hole) B:Blind

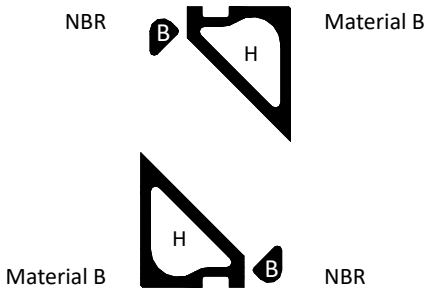
Combine PTFE-encapsulated and NBR DA gaskets, and together with S distance and T distance, set them to the heat transfer plate using the specified adhesive.

NOTE

1.LX-10A E-plate upper port holes (E1 and E2) must be closed for all products.
2.Above E-plate figure is sample of setting of A-plate. In case of B-plate, move the plate upside-down.
3.For details, refer to each model's appendix, "3 Gasketting Manual."
4.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.
5.If the plate with port hole, a spacer of t 2 mm (only the same part as frame is perforated) is required between the D plate and the frame.

Models： YX-80

Setting （In case of E-plate contact with port hole opened E-frame）



H:Hole (passage hole) B:Blind

Set E nozzle gasket(V) of Material B to E-frame.

Set B distance to E-plate back side.

Liquid-side E2 and E3 nozzles must be closed for all products.

NOTE

1.E-plate of YX-80 is only A-plate(Liquid-saide).

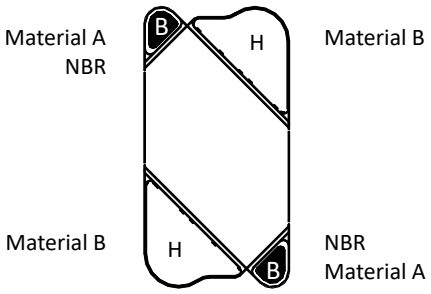
2.For details, refer to each model's appendix, "3 Gasketting Manual."

3.For B distance, use generic synthetic rubber (NBR).

4.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.

Models： YX-83

Setting （In case of E-plate contact with port hole opened E-frame）



H:Hole (passage hole) B:Blind

Set DA gasket of Material A, B distance and S distance to E-plate back side.

Set EB1 and EB2 gasket of Material B to E-plate back side.

Liquid-side E2 and E3 nozzles must be closed for all products.

NOTE

1.E-plate of YX-83 is only A-plate(Liquid-saide).

2.For details, refer to each model's appendix, "3 Gasketting Manual."

3.For B distance, use generic synthetic rubber (NBR).

4.Set channel gasket to the front side of E-plate. For details, refer to Chapter 4.

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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. (https://www.hisaka.co.jp/english/phe/)

- 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-ME003800R5