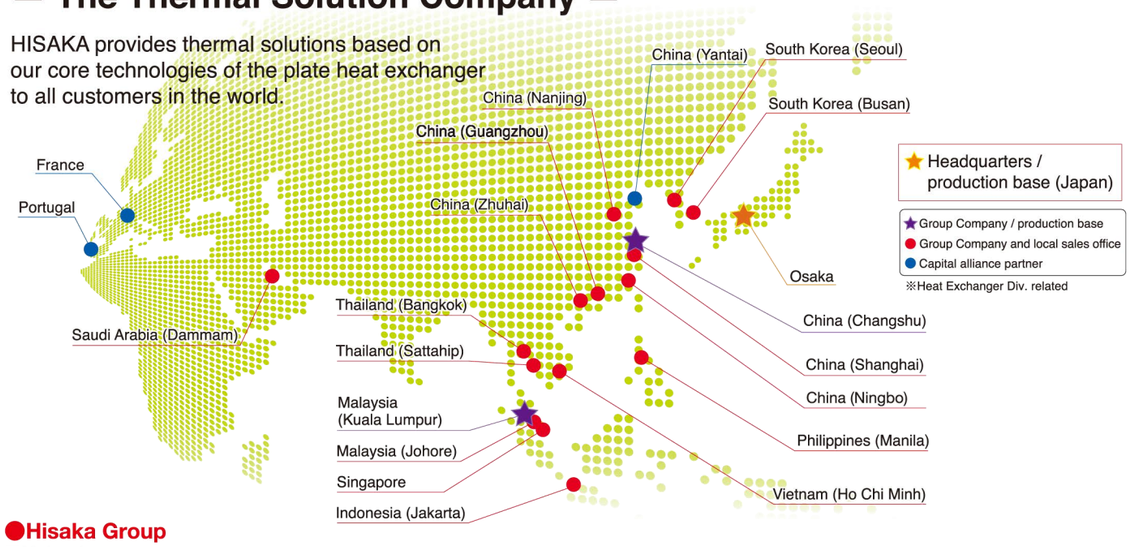
Global Network※

— The Thermal Solution Company —

HISAKA provides thermal solutions based on our core technologies of the plate heat exchanger to all customers in the world.



●Hisaka Group

■Malaysia
HISAKAWORKS S.E.A. SDN. BHD.
KUALA LUMPUR
TEL : +60-3-8081-4185 FAX : +60-3-8081-7185

JOHOR BRANCH
TEL : +60-16-228-4209

■Thailand
HISAKA WORKS (THAILAND) CO., LTD.
BANGKOK
TEL : +66-2-744-3287 FAX : +66-2-744-3286

SATTAHIP SALES OFFICE
TEL : +66-3-819-9819 FAX : +66-3-819-9820

■Singapore
HISAKAWORKS SINGAPORE PTE. LTD.
TEL : +65-6-897-8489 FAX : +65-6-686-4579

■Indonesia
PT. HISAKA WORKS INDONESIA
JAKARTA
TEL : +62-21-2931-9235

■Vietnam
HISAVINA Ho Chi Minh (Representative Office of HISAKAWORKS S.E.A. SDN. BHD.)
TEL : +84-8-3910-7355 FAX : +84-8-3910-7356

■Philippines
HISAPINO Manila (Representative Office of HISAKAWORKS S.E.A. SDN . BHD.)
TEL : +63-2-224-4129 FAX : +63-2-224-4130

■South Korea
HISAKA KOREA CO., LTD.
SEOUL
TEL : +82-2-739-8861 FAX : +82-2-739-8864

BUSAN BRANCH
TEL : +82-51-747-0265 FAX : +82-51-747-0266

■China
HISAKA WORKS (CHINA) CO., LTD.
CHANGSHU
TEL : +86-512-5213-3000 FAX : +86-512-5213-3008

SHANGHAI BRANCH
TEL : +86-21-5211-0701 FAX : +86-21-5211-0720

GUANGZHOU BRANCH
TEL : +86-20-3810-5515 FAX : +86-20-3847-7539

NANJING SALES OFFICE

ZHUHAI SALES OFFICE

NINGBO SALES OFFICE

■Saudi Arabia
HISAKA MIDDLE EAST CO., LTD.
DAMMAM
TEL : +966-13-838-4700 FAX : +966-13-838-5800

●Capital alliance partner

ARSOPI THERMAL S.A. (Portugal)
TEL : +351-256-410-410 FAX : +351-256-410-411

Yantai Shinwa Joining Technology Co., Ltd. (China)
TEL : +86-535-643-3939 FAX : +86-535-643-3926

KAPP SAS (France)
TEL : +33-4-78-05-68-68

HISAKA WORKS, LTD. Heat Exchanger Division

Sales Department

Osaka: Sonezaki, Kita-ku, Osaka-shi, Osaka, 530-0057, Japan
TEL: +81-6-6363-0020 FAX: +81-6-6363-0161

Tokyo: Kyobashi, Chuo-ku, Tokyo, 104-0031, Japan
TEL: +81-03-5250-0760 FAX: +81-3-3562-2759

Hokkaido: 6-1-20, Higashisapporo 3jo, Shiroishi-ku, Sapporo City, Hokkaido 003-0003 Japan
TEL: +81-11-868-8010 FAX: +81-11-868-8011

Chiba: 1-23-6, Goichuonishi, Ichihara City, Chiba 290-0081 Japan
TEL: +81-436-24-3322 FAX: +81-436-24-3323

Nagoya: Sakae, Naka-ku, Nagoya-shi, Aichi, 460-0008, Japan
TEL: +81-52-217-2491 FAX: +81-52-217-2494

Customer Service: 2-1-48, Higashi-konoike-cho, Higashi-osaka-shi,Osaka, 578-0973, Japan
TEL: +81-72-966-9601 FAX: +81-72-966-8923

URL: https://www.hisaka.co.jp/english/phe/

Create the future with heat
The Thermal Solution Company

HISAKA provides thermal solutions based on our technologies of the plate heat exchanger to all HISAKA fans in the world.

HISAKA WORKS, LTD., Heat Exchanger Division is both ISO9001 and ISO14001 certified.

HISAKA WORKS, LTD., Konoike Plant is ISO45001 certified.

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Agent

HE-CE005507
22.03. YMZN

Create the future with heat
The Thermal Solution Company

FULL WELDED PLATE HEAT EXCHANGERS

HISAKA

Heat Exchanger Division

Welded Plate Heat Exchanger

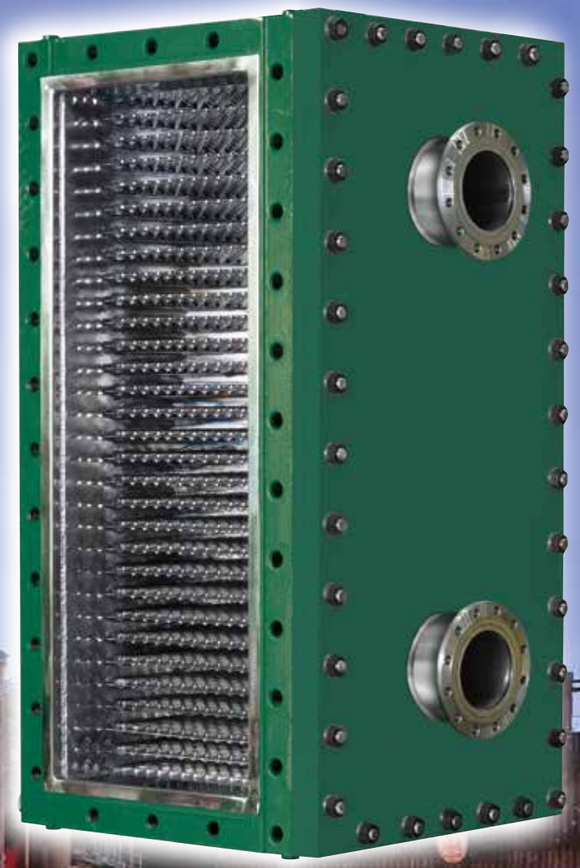
Welded plate pack in a cubic frame

Welded plates expand the limits of plate heat exchangers.

Higher ▶ Higher heat resistance and pressure resistance to support under severe conditions of 350°C and 3.5 MPaG

Wider ▶ Variety of plate gaps to meet various applications and flexible design to support a wide range of applications

Plate heat exchangers perform heat exchanging through press-molded, thin metal heat transfer plates. As they are high performance, light, and compact, they are used in many industrial fields in place of Shell & Tube heat exchangers. Fully welded plate heat exchangers achieve even further heat and pressure resistance, further increase the variety of plate gap shapes, and can now even support the applications of Shell & Tube heat exchangers, which were previously impossible for plate heat exchangers.



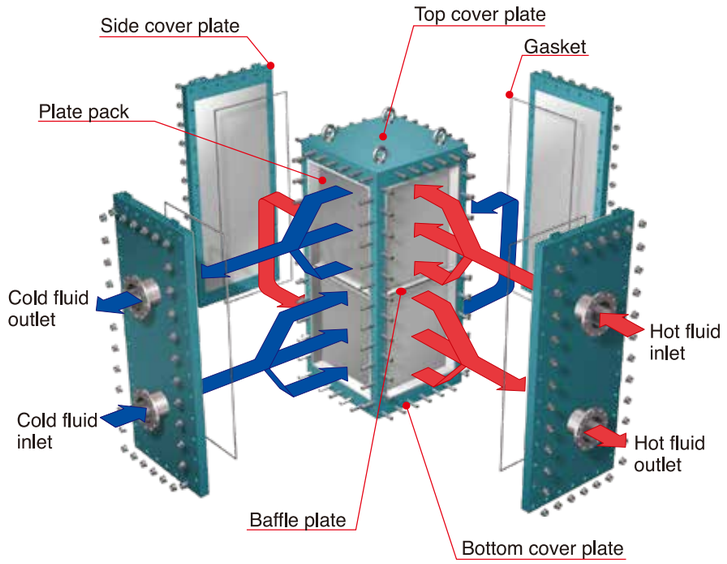
Welded plate heat exchanger

Welded shell and plate heat exchanger

Welded Plate Heat Exchanger

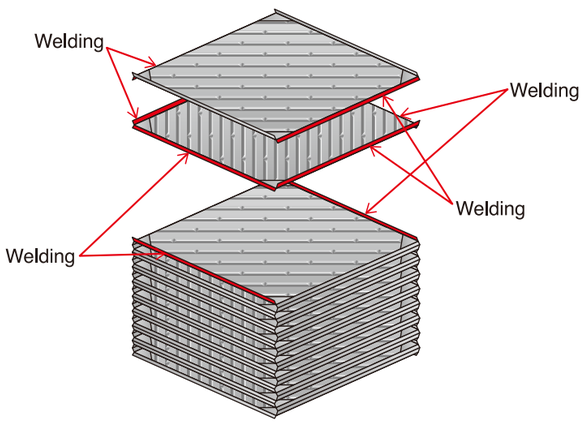
■Structure

Press-molded heat transfer plates are piled on top of each other to form the heat transfer section, and side cover plates are affixed to the four directions of this plate pack. The hot and cold fluids flow through the heat transfer section in a cross flow. Baffle plates can be positioned depending on the design conditions to make a multi-pass design for an optimal design. Fully welded PHE (WPHE) can flexibly support cases even in specifications where the flow rate of fluids have large differenced, and the nozzle bore can also be freely selected to match the operating conditions.



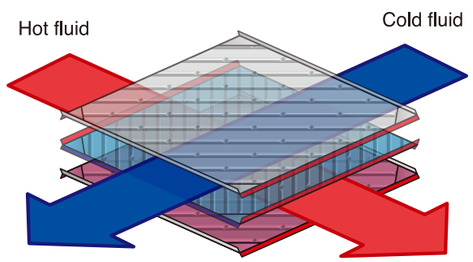
■Sealing of heat transfer plate

Press-molded plates are layered in an alternating pattern then welded on two edges to create the flow channel.



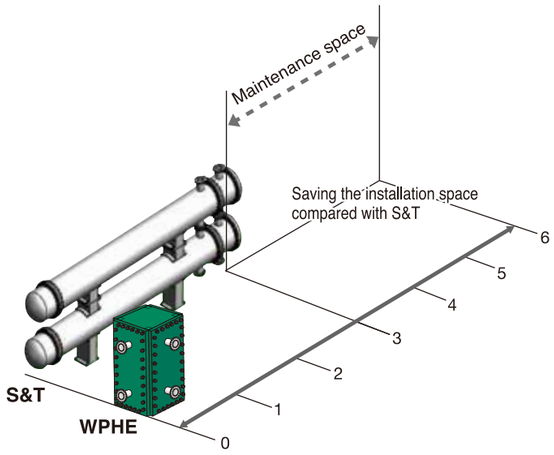
■Flow channel

The hot fluid and cold fluid flow through the respective flow channel in a cross flow.



■Features

(1)The press-molded plate is molded with a special corrugation pattern to ensure a high transfer coefficient. This allows for a smaller, more compact installation space compared to Shell & Tube heat exchangers(S&T)
(2)It supports high temperatures and high pressure, showing its performance in a wide range of fields.
(3)The seal gasket consists only of the side cover, so there are virtually no restrictions due to gasket materials.
(4)Baffles can be installed to enable a multi-pass design. This can ensure performance close to counter current flow from small to large flow rates.
(5)As the holding volume is small, the amount of fluid remaining in the device is also small and only a small amount of CIP detergent can be used, contributing to improved productivity and shortened maintenance time.
(6)Easy mechanical cleaning by the cross flow channel structure.



■Variety of plate gap

Select from a variety of plate gap depending on the fluid properties.

(1)HXC: Both sides corrugated channels
Both sides lightly charged fluid

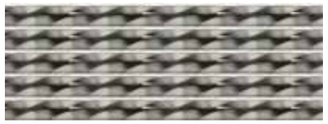
(2)HXC FF: One side corrugated free flow(FF) channels and the other side corrugated channels
One side charged fluid

(3)HXE: One side free flow channels and the other side dimpled channels.
One side highly charged fluid

(4)HXS: Both side rectangular free flow(FF) channels with studs.
Both sides dirty fluids

*Free flow channel: Plate channel with wide gap and no contact between the heat transfer plates

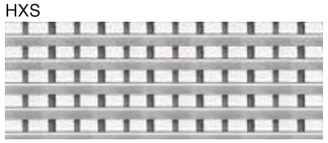
HXC



HXC FF

HXE

HXS



■Applications

- Heat transfer process for higher efficiency than Shell & Tube heat exchangers
- Heat recovery in high temperature / high pressure applications
- Condensers
- Vaporizers
- Heat transfer process where Gasketed PHE cannot be used
  They are also able to replace S&T in other cases as well.

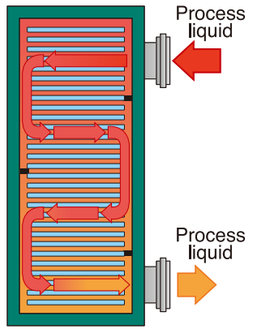
Operation pressure(MAX.)	3.5MPaG
Operation temperature(MAX.)	350°C
Heat transfer area(MAX.)	700 m^2 per unit
Plate material	stainless steel, duplex stainless steel, high nickel alloy, titanium

*The above mentioned varies depending on the operating conditions. Please inquire with our company when planning.

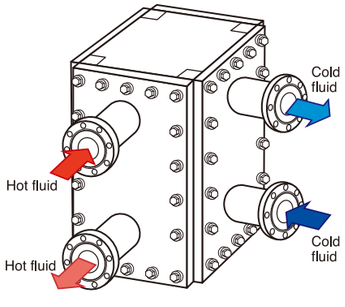
Installation

Full welded plate heat exchangers can employ flexible design and piping layouts depending on the usage conditions.
We meet our customers' needs with a variety of installations.

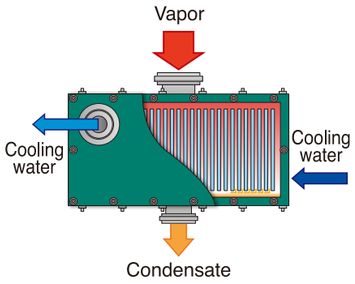
Liquid-liquid heatexchanger



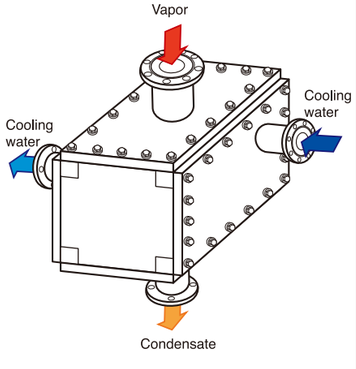
It can be installed for vertical use, like the figure above. Draining is performed from the nozzle on the bottom side of the cover panel or the bottom drainage nozzle. Air in the unit can be discharged from the nozzle on the upper side of the cover panel or the upper vent nozzle. This installation can even be used in cases for absorbent interchangers, and the case of gas vaporizing from the absorbent as well.



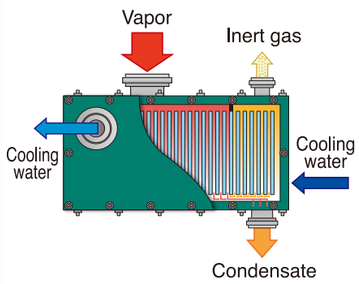
Condenser I



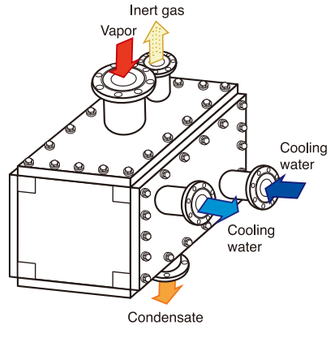
Condensers are usually used horizontally. If the vapor does not contain Inert gas, the vapor carried in from the top nozzle is condensed in the heat transfer section and discharged through the bottom nozzle. Cooling water comes out through the side nozzle. By using an even number of passes on the cooling water side, the nozzles can be placed only on one panel.



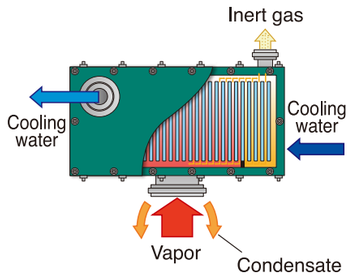
Condenser II



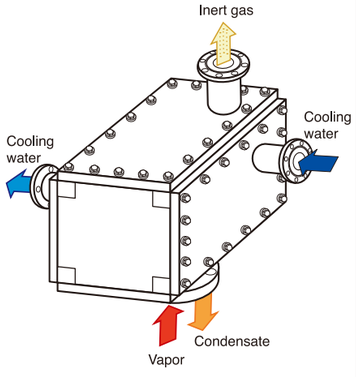
If the vapor contains inert gas, an outlet nozzle is installed to discharge the inert gas on the upper side cover plate. Vapor carried in from the inlet nozzle is mostly condensed as it falls through the heat transfer section. The remaining vapor and inert gas rises through the heat transfer section near the cooling water inlet, and part of the vapor condenses. The condensate is drained from the bottom nozzle.



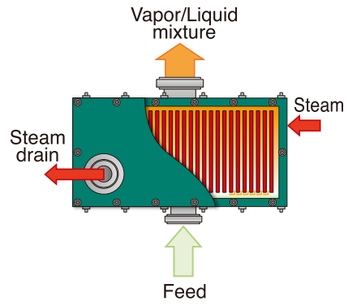
Condenser III



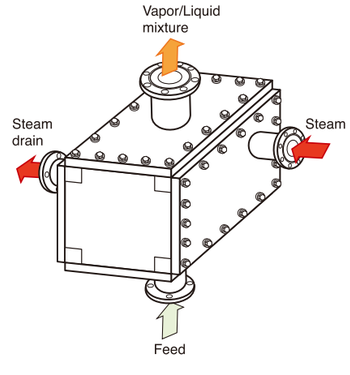
If using it as a reflux condenser like the overhead condenser of a reactor, the vapor inlet is installed on the bottom side cover plate. Condensate that condensed in the heat transfer section returns to the column or the reactor from the vapor inlet nozzle.
Inert gas is emitted outside from the upper nozzle.



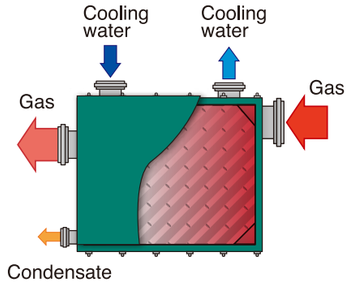
Reboiler



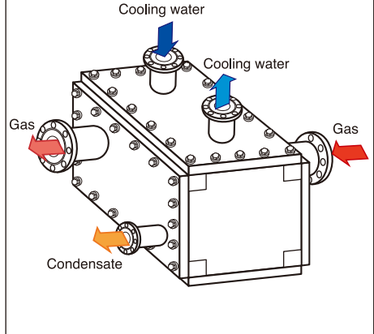
In reboiler applications, the feed enters from the bottom inlet nozzle. The is vaporized in the plate pack and the vapor/liquid mixture is sent to bottom of the tower through the top outlet nozzle. Steam is supplied from the side nozzle and drained out the opposite side nozzle. The pressure loss on the vaporized side is lower than S&T due to short plate length.



Gas cooler



This is used in cooling for large flow rate of gas including condensable vapor in inert gas. Designing the gas side with one pass allows for even large flow rate of gas to be efficiently cooled with low pressure drop. This is perfect as a gas cooler including solvents or for high temperature / high pressure gas that could not be used rubber gaskets. The cooled, condensable vapor is emitted from the condensate outlet.



Applications

"Kitto"*
Sure to fit your applications by excellent performance
"Motto"*
More applications by versatile products line up
"Zutto"*
Longer life time by high quality maintenance service

Providing reliable heat exchangers, HISAKA has delivered to numerous processes and plants, and has helped improve the profitability of customer plants. From those numerous experiences, here we introduce welded plate heat exchanger that can be used "Motto" applications.

*
"Kitto (きっと)" means "surely" in Japanese.
"Motto (もっと)" means "more" in Japanese.
"Zutto(ずっと)" means "long" in Japanese.

Steel (COG)

COG (Coke Oven Gas), a by-product made when carbonizing coal to create coke, contains many components and must be refined. A welded plate heat exchanger with high temperature and pressure resistance is perfect for each heat transfer process required in each step. By selecting from a variety of plate gaps to match the fluid's properties, even fluids containing slurry can be supported.

■Applications
- Circulated water cooler for direct cooler or primary cooler
- Circulated water cooler for final cooler
- Heat recovery for debenzolized oil / benzolized oil
- Rich / lean heat exchanger for desulfurization plant.
- Heater for ammonium sulfate mother liquid

Petrochemical industry

There are many heat transfer processes in the separation and refining or chemical reaction processes at petrochemical plants, and there is demand for efficient heat exchange. That's why a compact, high performance welded plate heat exchanger with high temperature and pressure resistance is perfect for effective energy usage.

■Applications
- Liquid-liquid applications
  PCW cooler, rich / lean amine heat exchanger for gas sweeting process, heater for chemical processing liquid, cooler and heat recovery
- Vapor condensation, gas cooling applications
  Vacuum vapor condenser, organic solvent vapor condenser, overhead condenser, cooler condenser for gas with condensable vapor

Pharmaceutical / Fine chemical

Due to the compact structure with no dead space, it is used in various kinds of vapor recovery from reactors for pharmaceuticals or fine chemicals and water treatment plants.

■Applications
- Vapor condenser from reactors
- Vapor condenser for solvent recovery
- Vacuum steam condenser

Environment

Select from a variety of plate gap depending on the fluid properties. At water treatment plants for effluent or sewage, there are often foreign materials such as fluids with powder or slurry. Perfect solution will be given those applications by flexible flow channel section.

■Applications
- Sludge cooling / heating at sewage plants
- Cooling / heating of industrial effluent
- Cooling / heating of factory waste liquid including metal particle or fiber material

Sugar refining

The sugar refining process requires many heat transfer process to turn raw juice extracted from cane or beets into sugar. In order to effectively utilize the heat energy used in the sugar refining process without waste, a welded plate heat exchanger with outstanding performance is perfect for the heat exchanging of sugar liquid including fiber content.

■Applications
- Heating / cooling raw juice
- Heat recovery from processing effluent
- Processing steam condenser

Maintenance

■Disassembly cleaning

Removing the side cover plates allows for easy cleaning. After disassembling, the water jet cleaning can remove the scales and the internal foreign material affixed to the heat transfer plates, restoring performance to almost that of a new product.
As the plate pack consists of heat transfer plates welded on two sides in an alternating pattern for a cross flow structure, cleaning fluid can flow through the plate gaps open on both sides to wash away scales inside the plate gaps and affixed foreign material.
Also, as an option, using the hinge for side cover plate makes maintenance even easier.

Jet cleaning

Hinge for side cover plate(Option)

Sight Glass(Option)

■Cleaning in place (CIP)

HISAKA offers CIP using Plate-Clean at the customer's site, if disassembly and cleaning are not possible.
Before scaling, CIP with Plate-Clean can restore performance by removing scale through washing and dissoloving. This is effective in prolonging the maintenance period of the PHE.

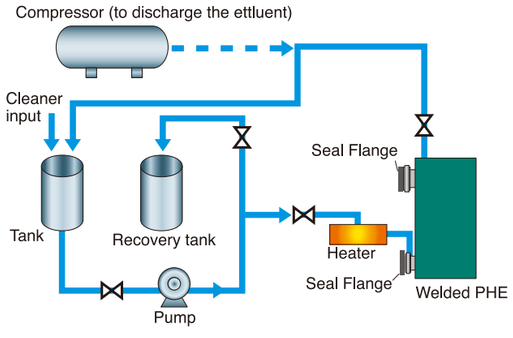
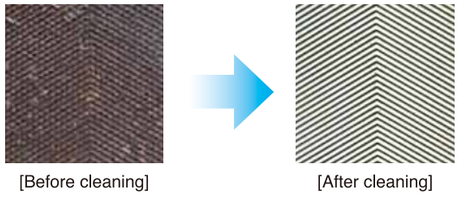


Plate-Clean C
(For Calcium scale)

Plate-Clean S
(For Slime)

Plate-Clean F
(For iron rust)

*Each type of plate-Clean is sold separately



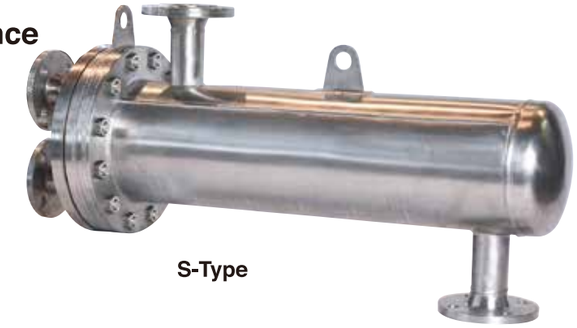
[Before cleaning] [After cleaning]

Welded Shell and Plate Heat Exchanger

Welded Plate Pack in a Cylindrical Shell
S-Type

Simple structure with high performance

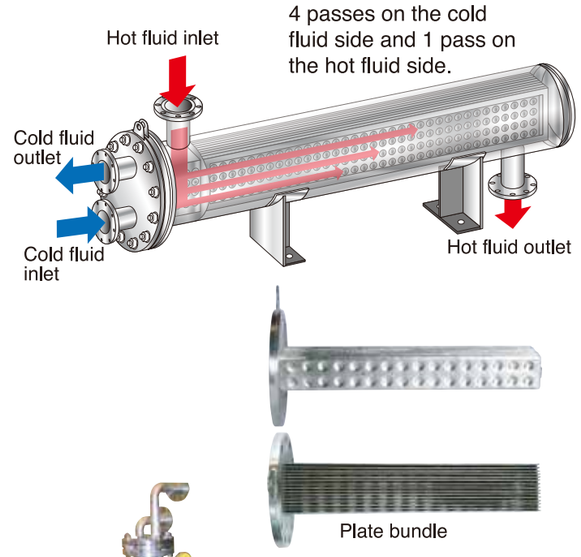
Shell and plate heat exchangers are fully welded heat exchangers where the plate bundle of welded dimple plates is inserted into a cylindrical shell.
The plate bundle and the shell are connected with tube sheets, like in a Shell & Tube heat exchanger.



S-Type

Fit for a wide range of applications

This heat exchanger can be used for a wide range of applications with a flexible design to meet the conditions of the fluid undergoing heat exchanging; for example, you can insert baffle plates on the shell side to promote turbulence like Shell & Tube heat exchangers, or insert partition plates along the plate bundle to be a multi-pass design.



■Feature

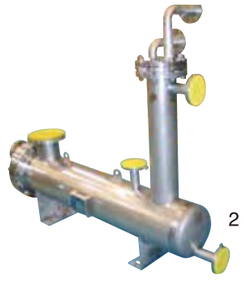
(1)Removing the cover on the plate bundle opens the plate bundle side, allowing for easy maintenance of the bundle exterior.
(2)The plate bundle unified with the tube sheets can be completely removed from the shell.
(3)The shell can be opened for easy maintenance.
(4)The plate bundle can be replaced.

■Applications

- ●Solvent condenser
- ●Vacuum steam condenser
- ●Processing vapor condenser
- ●Overhead condenser
- ●2 step condenser(2in1)

They are also perfect for replacing Shell & Tube heat exchangers in other cases as well.

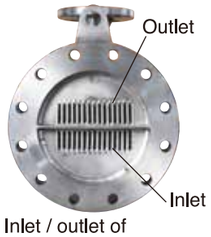
Plate bundle



2 step condenser(2in1)

Operation pressure(MAX.)	2.5MPaG
Operation temperature(MAX.)	350°C
Heat transfer area(MAX.)	600 m^2 per unit
Plate material	stainless steel, high nickel alloy, duplex stainless steel

*The above mentioned varies depending on the operating conditions. Please inquire with our company when planning.



Inlet / outlet of Plate bundle

Inlet port for Plate bundle