Ultra-Pure Water Production

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Plate Heat Exchanger



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HISAKAWORKS S.E.A SDN BHD

Company No. 671059-K No 2, Jalan TP 2, Taman Perindustrian SIME UEP, 47600 Subang, Selangor Darul Ehsan, Malaysia Tel : +603 5880 4185 Fax +603 8081 7185 Email : heatexc@hisaka-asia.com

HISAKAWORKS THAILAND CO., LTD

BANGKOK OFFICE Phairojkijja Tower, 15th Floor Zone C, 825 Bangna-Trad Road, Kwang Bangna, Khet Bangna, Bangkok 10260 : +66 2744 3287-9 TEL : +66 2744 3286 FAX EMAIL : heatexc@hisaka-thai.com

RAYONG OFFICE

 \bigcirc

Eastiny Park 5 Village, 222/36, Moo 10 T., Bangsarey A. Sattahip, Chonbouri Province, 20250 : +66 3811 0795 Tel : +66 3811 0796 Fax Email : heatexc@hisaka-thai.com

HISAKAWORKS SINGAPORE PTE LTD

No. 18, Boon Lay Way, #02-118 Trade Hub 21 Singapore 609966 · : +65 6897 8489 Tel : +65 6686 4579 Fax Email : heatexc@hisaka-sing.com

HISAKAWORKS INDONESIA

Ruko Puri Botanical, Jl. Raya Joglo, Blok I 10 No 29, Kebun Jeruk, Jakarta Barat 11640, Indonesia : +62 051 5890 0090 - 1 Tel +62 021 586 0158, +68 12 8189 1880 Fax : +62 021 530 4380, +62 021 530 4885 Email : hisakindo@hisaka-asia.com

HISAVINA (Vietnam Representative Office) HO CHI MINH OFFICE

Hoang Dan Building, 47-49, Hoang Sa Street, Da Kao Ward, District 1, Ho Chi Minh City, Vietnam : +84 8 3910 7355 Tel : +84 8 3910 7356 Fax Email : hisavina@hisaka-asia.com

HANOI OFFICE

8[™] Floor, Sannam Building, 78 Duy Tan St., Dich Vong Hau Ward, Cau Giay Dist., Hanoi Tel : +84 4 3795 9900 : +84 4 3795 9911 Fax Email : hisapino@hisaka-asia.com

HISAPINO (Philippines Representative Office)

One Global Place, 20th Floor, Office Business Center, 25th Street & 5th Avenue, Bonifacio Global City, Taguig 1632, Philippines Tel : +632 224 4129 : +632 224 4130 Fax Email : hisapino@hisaka-asia.com





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challenge for innovation





HISAKA Plate Heat Exchangers Plays Crucial Roles in Revolutionary Water Producing Processes

In the production of semiconductors and LCD panels used in various electronic devices, various types of chemicals are required to be used throughout production. These residues however, needed to be removed prior proceeding to the next production line. Consequently, ultra-pure water which is produced by pretreatment of industrial water and subsystems is essential in removing the residues on the circuit board.

HISAKA PHEs offer excellent heat transfer performance, high operational responsiveness, compact in size and other various advantages to enhance productivity and efficiency of ultrapure water production line. With technology advancement, applications of ultra-pure water have become more sophisticated and versatile for industrial usage. As such, HISAKA's slogan of "Challenge for Innovation" will continue to strive in order to deliver the latest plate technology to the world.









2

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Structure of Plate Heat Exchanger

HISAKA PHEs are High Efficiency, Energy and Space Saving and Maintenance Ease

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Basic Structure

To make a heat transfer plate, thin sheets of corrosion resistant metals, such as stainless steel or titanium, are pressformed with corrugations for attaining higher heat transfer effects prior being sealed with gaskets. The required number of plates are put together and suspended between the fixed and moveable frames, and then tightened with bolts and nuts. A counter-current flow of high and low temperature fluids is generated in the flow channel created between the slits of each plate and compresses together as this high-performance heat exchanger.

Heat Transfer Plates

Each heat transfer plate is corrugated into various patterns to increase heat transfer area whilst creating high turbulence flow and ultimately achieving high heat transfer coefficient. The plate is provided with a port hole on each corner. Each plate is tight-sealed with a gasket fitted in its peripheral groove.





Flow Channel

Heat transfer plates are divided into A-plate and B-plate, creating a flow channel in between. High and low temperature fluids flow alternately and heat exchange takes place throughout the heat transfer plates. As shown by the arrow in the figure (front and side view), high and low temperature fluids flow counter-currently without intermixing. A- and B-plates are identical plates but reversed to change the orientation of gasket. E-plate is plates without port holes so that the fluid does not come into contact with E-frame.



Structure of Plate Heat Exchanger



High performance

High heat transfer coefficient can be achieved by creating high turbulence flow.

- High turbulence flow also prevents scaling on the plate surface, hence allowing a "self-cleaning" action for longer performance.

Light weight and compact

Compressed of thin heat transfer plates into compact size and light weight rendering saving on installation space and ease of maintenance.



Quick start-up

1/6 of the holding volume of Shell and Tube heat exchanger of the same performance. Consequently, this allows quick start up and high responsiveness to changes in operational conditions.

Easy maintenance

Maintenance and visual inspection can be conducted by simply loosening the bolts and nuts. Reassembly is equally easy as disassemble.

Pure Water Production Line

Pretreated raw water upon removal of suspended solids and turbidity is fed into the primary pure water system. Primary pure water system functions to adequately remove sales, organic compounds, dissolved gas and other participles. Various combinations of equipment/ processes are involved in order to produce ultra-pure water; and each process requires heating and stringent temperature control.

When steam is used as a heat source and heat exchanger is regulated as pressure vessels, HISAKA PHEs of small holding volume is advantageous in terms of regulatory compliance. As such, PHEs deliver significant advantages to enhanced efficiency of ultra-pure water systems.



PHE for recycling of OH tower

OH tower (anion exchange resin tower), which is used to remove anions in HCI-added raw water, tend to deteriorate with time due to clogging. Therefore, the resins can only be recycled upon cleaning with 5% NaOH Solution. PHE is then used to heat up this NaOH solution.

PHE for RO process

Temperature of raw water needs to be controlled at 20-25°C before being fed to reverse osmosis (RO) membranes to maximize water purification of RO system. HISAKA PHEs have outstanding track record especially in this application of the pure water system.

Primary pure water Subsystem

Ultra-Pure Water Production Line

Subsystem removes the trace amounts of impurities such as ions, TOC (Total Organic Carbon) and particles present in the pure water fed from the primary pure water system and it requires strict temperature control compared to the primary system. PHEs are used for heat recovery from the pure water returned from use point; heating of primary pure water prior being fed to ultrafiltration (UF) membrane; and lastly temperature control by the means of heating and/or cooling.



High Performance Options for Plate Heat Exchanger

Semi - Welded Plate Heat Exchanger (WX-Series)

Gasket-type PHEs that are sealed with synthetic rubber gaskets has the advantage of simple disassembly and easy maintenance. However, the downside of having gasketed plates is that the rubber compounds used in gaskets might interfere with the process fluids, hence affecting the medium properties. HISAKA semi-welded PHE (WX-Series) laser weld plates together, as oppose to gasket-sealed plates, thereby reduces interference of the rubber compounds with the process fluid.



NEW EPDMMore than the NEW EPDM

NEW EPDM is a new type of gasket equipped with extraordinary heat and chemical resistance than conventional EPDM. As opposed to conventional gaskets that will eventually have surface cracking due to oxidation and/or deterioration, new EPDM gaskets with enhanced heat resistance is able to deliver stable sealing performance even under harsh conditions without surface cracking caused by oxidation and/or deterioration.

Heat resistance comparison at 180°C
 100 (After lapse of 3000 hours)
 Sealing 60 ability 40 30%
 20 NEW-EPDM EPDM Heat impact is halved

NEW EPDM is an ideal gasket material for PHEs where long service lifespan is expected in high temperature process (eg: steam heater) or where process requires stable chemical resistance for a long period of time (eg: processes where sodium hydroxide is involved).

8

As shown in the figure, plates are laser-welded together and a ring gasket is used to seal plates at the port holes. As a result of laser welding:

Maximum operating temperature is 180°C (VS 150°C for rubber gasket-type PHE)
Able to withstand pressure up to 4.0PMaG (VS 3.0MPaG for gasket type PHE)

Rubber gaskets are used outside of the plates to ensure easy maintenance, disassembly and cleaning of the laser-welded PHEs. In addition to SUS316, titanium (Ti) can also be used as plate material.

More than double durability of conventional EPDM NEW EPDM features superior heat and chemical resistance



Full-Service Package for Trust and Peace of Mind

As a leading supplier of Plate Heat Exchanger (PHE) in the world, HISAKA offers professional maintenance service program that maintains the PHE performance over the product life cycle ensuring the satisfaction of our customers. Our core maintenance program, "Full Service Package", offers a comprehensive maintenance program to restore the original performance at HISAKA authorized service facilities. This program consists of overhaul, inspection and cleaning of plates, gasket replacement, pressure test, re-assembly and final inspection before the delivery to the customer. As a technical supporter having full knowledge on PHEs, HISAKA ensures your heat exchangers operate at the optimum condition for a long period of time. Containers exclusive for Full Service Package program are available for the customers who request for plate cleaning only or cannot move the unit.





service vehicle

Container exclusive for Full Service Package

We offer various other maintenance programs

Besides the comprehensive PHE maintenance program "Full Service Package", HISAKA also offers various after-sale services tailored to our customers' specific needs to ensure performance and safe use of PHEs.

Some examples of our after-sale services include the sale of spare parts such as gaskets and plates, onsite plate cleaning and gasket replacement, and disassembly-free cleaning of PHE using PHE-dedicated cleaner.

"Full Service Package" Network

In order to provide speedy and quality professional work to PHE users, HISAKA WORKS has established a network of service centers. Contact our nearest service center for professional maintenance service.

> Malaysia HQ No 2, Jalan TP 2, Taman Perindustrian SIME UEP, 47600 Subang jaya, Selangor, Malaysia

For maintenance, please contact:

Malaysia : TEL. +603 5880 4185 Thailand : TEL. +66 2744 3287-9 Singapore : TEL. +65 6897 8489 Indonesia : TEL. +62 51 5890 0090 Vietnam : TEL. +84 8 3910 7355 Philippines: TEL. +63 2224 4129 Please inform us of manufacturing number of your unit.

Thailand Eastiny Park 5 Village, 222/36, Moo 10., T. Bangsarey, A. Sattahip, Chonbouri Province, 20250

Global Network

HISAKA – Where latest thermal technologies are sincerely delivered



Hisaka Group

Malavsia HISAKAWORKS S.E.A. SDN. BHD. (Malaysia) **KUALA LUMPUR** TEL:+60-3-5880-4185 FAX:+60-3-8081-7185 E-mail : heatexc@hisaka-asia.com

PENANG BRANCH TEL:+60-1-6203-2527

E-mail:cyyap@hisaka-asia.com JOHOR BRANCH TEL:+60-12-227-4882 E-mail : cswong@hisaka asia.com

Thailand

HISAKA WORKS (THAILAND) CO., LTD. BANGKOK TEL:+66-2744-3287-9 FAX:+66-2744-3286 E-mail : heatexc@hisaka-thai.com **RAYONG BRANCH** TEL:+66-3-811-0795 FAX:+66-3-811-0796 E-mail:heatexc@hisaka-thai.com

Singapore

HISAKAWORKS SINGAPORE PTE. LTD. TEL: +65-6897-8489 FAX : +65-6686-4579 E-mail:heatexc@hisaka-sing.com

Indonesia

PT HISAKA WORKS INDONESIA TEL: +62-51-5890-0090 FAX: +62-051-5890-0091 E-mail : hisakindo@hisaka-asia.com

Vietnam

HISAVINA (Representative Office) TEL:+84-8-3910-7355 FAX:+84-8-3910-7356 E-mail: hisavina@hisaka-asia.com HANOI OFFICE TEL:+84-4-3795-9900 FAX:+84-4-3795-9911 E-mail: hisapino@hisaka-asia.com

Indonesia Jl. Industri Selatan 8, Blok EE - 8E, Kawasan Industri Jababeka 2, Cikarang Bekasi 17550, West Java

Singapore

629474

26, Gul Drive, Jurong

Town, Singapore

10

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Philippines HISAPINO

TEL:+63-2224-4129 FAX:+63-2224-4130 E-mail: hisapino@hisaka-asia.com

Korea HISAKA KOREA CO., LTD. (South Korea) SFOUL TEL:+82-2-739-8861 FAX:+82-2-739-8864

E-mail: heatexc@hisakakorea.com

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 E-mail: hisaka-sha@hisaka.co.ip Beijing Branch TEL:+86-10-6461-2411 FAX:+86-10-6461-2571 Guangzhou Branch TEL:+86-20-3810-5515 FAX:+86-20-3847-7539

Saudi Arabia HISAKA MIDDLE EAST CO., LTD. (Saudi Arabia) DAMMAM

TEL: +966-3-833-1473 FAX: +966-3-833-1471 E-mail: info@hisaka-me.com

Technoloav Licensee

ARSOPI THERMAL S.A. (Portugal) TEL:+351-256-410-410 FAX:+351-256-410-411 YANTAISHINWA JOINT TECHNOLOGY CO., LTD. (China) TEL:+86-535-643-3939 FAX:+86-535-643-3926