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# Beer Manufacturing Plants Plate Heat Exchanger



B27042015

**HISAKA**

# Great beer is created with barley, hops and water, with the process enhanced with HISAKA plate heat exchanger.

HISAKA Plate Heat Exchanger (PHE) has great industrial usage due to its high heat transfer efficiencies. This is especially the case in processes related to food industries, due to HISAKA PHE highest performance level and safety.

## Importance of HISAKA Plate Heat Exchanger in Beer Manufacturing

Beer manufacturing involves many rounds of heating and cooling processes to maintain the stability and quality of beers. Therefore, HISAKA Plate Heat Exchanger warrants excellent heat exchanging capacities while minimizing the possibility of liquid intermixing.

### Malting Process

- i. Moisture is added to the two rowed barleys for germination
- ii. Germination released glycation enzymes to convert starches (found in the barleys) into glucose
- iii. Glucose then act as a food source for the yeast during fermentation
- iv. Fermentation process will then release methanol, hence producing beer
- v. Yeast growth for normal beer is retarded at approximately 80°C and at 110°C to 130°C for black beer

### Preparation Process

This is the most important process in beer manufacturing process where it determines the quality of beer.

#### 1. Liquefaction and Glycation

- The cell membranes of barley, rice and corn starch are destroyed in a preparation kettle (or preparation tank) to increase glucose yield (by enzymatic glycation of starch), under a slow heated process.

#### 2. Filtering/Lautering

- Lautering is the step where the sugar-extracted solid remaining in the mash is separated from the liquid wort in the lauter tub. This filtration process is crucial to ensure that the end product has a pure and clear beer (with little to no sediments).

#### 3. Boiling

- Hops are boiled in the boiling kettle for approximately 1 hour to 1.5 hours to extract the bittering flavour and aroma of the hops, prior adding into the sweet wort to give beer its typical flavor.

#### 4. Dreg Separation

- The hopped wort will then be placed in a settling tank prior separating the spent hops and dregs from the solids.

#### 5. Wort Cooling and Fermentation

- The worts are cooled to the fermenting temperature of 5°C with a wort cooler in the fermentation tank. Yeast will then be added for fermentation to take place.

- Wort Preheater ●Wort Cooler ●Wort Pan Condenser ●Hot Water Manufacturing Machine for Wort Preheater

### Fermentation Process (Main Fermentation)

- Young beer is created in 1 to 2 weeks upon adding yeast to the cooled wort.
- Ale (top fermentation) occurs when foams formed on the surface of the fermenting beer, at a temperature of 15 to 20°C (microbrews)
- Lager (bottom fermentation) formed when the yeast settles at the bottom, at a temperature of 8 to 10°C

### Aging Process (Sub Fermentation)

Beer is further aged for 1 to 2 months in the storage tank to increase mellows and further smoothening its flavor

### Filtering Process

Fermentation is halted with the removal of beer yeast using diatomite and micro-filters.

- Beer Coolers ●CIP Liquid Heater

### Bottling Process

- Appropriately aged beers are filled into bottles, cans or kegs prior being shipped.
- Pre- and post-bottling inspections, such as strict sanitisation, bottles inspections, bottle surface cleansing and etc, are performed to ensure that the beers are hygienic and safe to be consumed.
- It is crucial to note that on the bottling temperature as it has a major effect on product stability:
- i. Low temperature will result in condensation, hence leading to problems such as falling off of bottling labels, wetting of cardboard cases and etc
- Therefore, beers are usually heated up to 20°C prior being filled into appropriate containers.
- Heated sterilization will also be conducted in addition to the filtered sterilization to ensure that the beer yeast are thoroughly deactivated.
- Water Heater (also serve the purpose of Beer Heating) ●Cleaning Hot Water Recovery ●Beer Heating Sterilizer

### Other Manufacturing Processes

#### CIP Facilities

- Hot water along with cleaning fluids are heated and supplied to the pipes and tanks for sterilization purposes.
- The sterilized equipment will then be cooled with cold water to prevent beer from becoming warm.
- Cleaning Hot Water Manufacturing Machine ●Cleaning Liquid Heater ●Cold Water Manufacturing Machine

#### Waste Water Facilities

- The amount of water required for sanitization is approximately 8 times the amount of beer being produced.
- Waste water however, has to be treated (both aerobically and anaerobically) prior discarding from the manufacturing plant.
- Therefore, it is necessary to cool down waste water temperature for the treatment to be effective, especially during summer times where temperature can exceed the upper limit
- Waste Water Cooler

### Processing Facilities for Barley Husks and Beer Yeast

- Remaining barley husks (from wort extractions) along with yeast (from spent beer) will be dried and further processed into livestock feeds, seasoning and as anti-flatulent.
- Heat Recovery for Drying Air ●Beer Yeast Preheater ●Drying Air Scrubber Circulating Water Cooler



# HISAKA Plate Heat Exchanger in Beer Manufacturing

## Flow of Beer Manufacturing Facilities



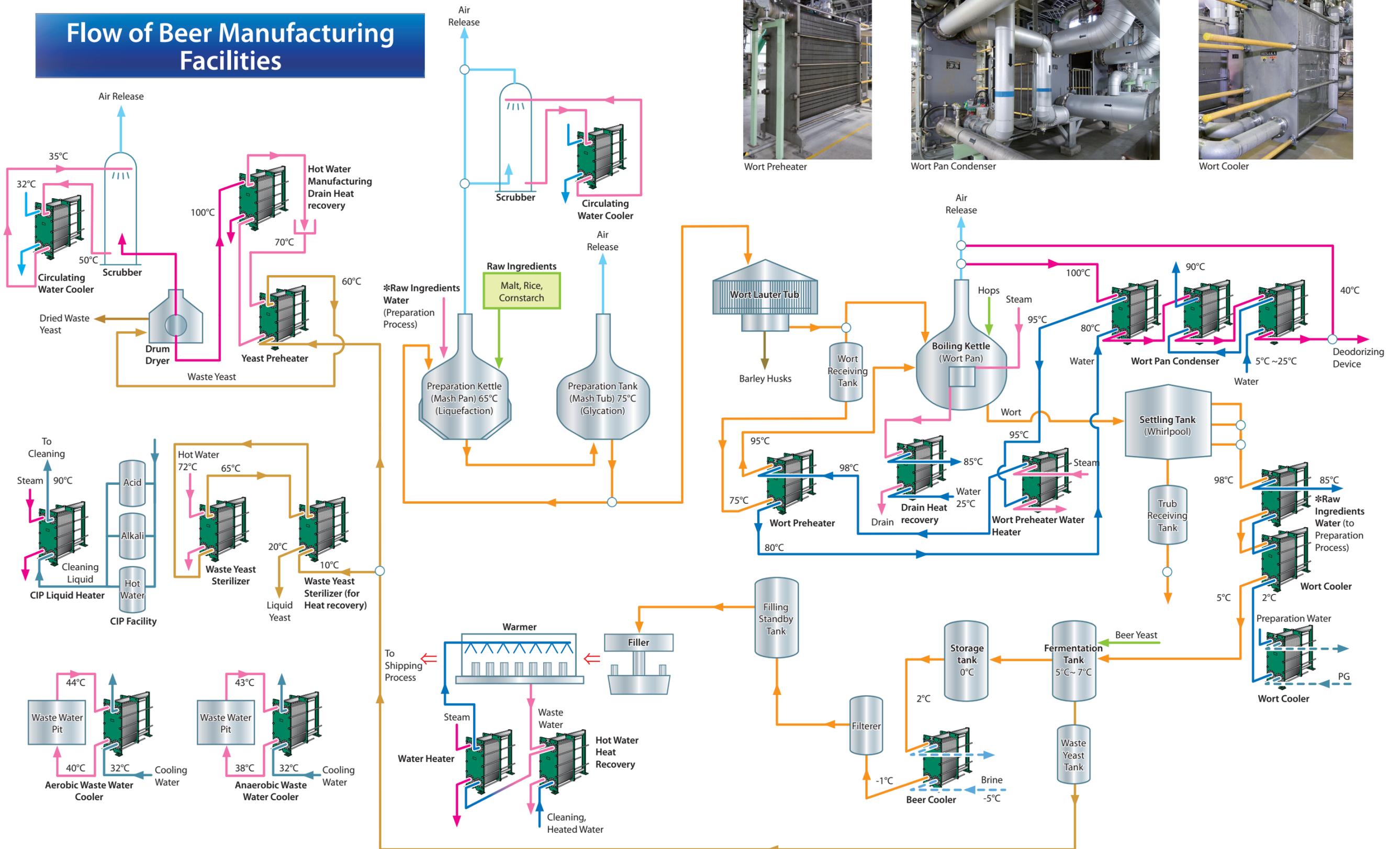
Wort Preheater



Wort Pan Condenser



Wort Cooler





# Advantages of Installing HISAKA Plate Heat Exchanger

## Model YX-80 Condenser

- Energy consumption in wort boiling process is the greatest in beer manufacturing; hence, heat/energy recovery from steam vapor emitted from the boiling kettle is crucial in energy conservations.

### Why HISAKA YX-80 Condenser?

- Excellent heat transfer performance
- Compact, lightweight and easy to disassemble for inspections
- Ease and flexibility in modifying heat transfer area
- Able to efficiently cool and condense vapor containing non-condensable gases
- Unique plate patterns (on vapor side) allows quick discharge of condensed drain
- Wide flow paths (on vapor side) warrant low pressure loss even with large volumes of vapor or gas
- Large diameter nozzle is able to support high - flow gas fluids
- Possibility of heat recovery at lower temperature side (eg:water outlet temperature of 95°C when vapor temperature is at 100°C)

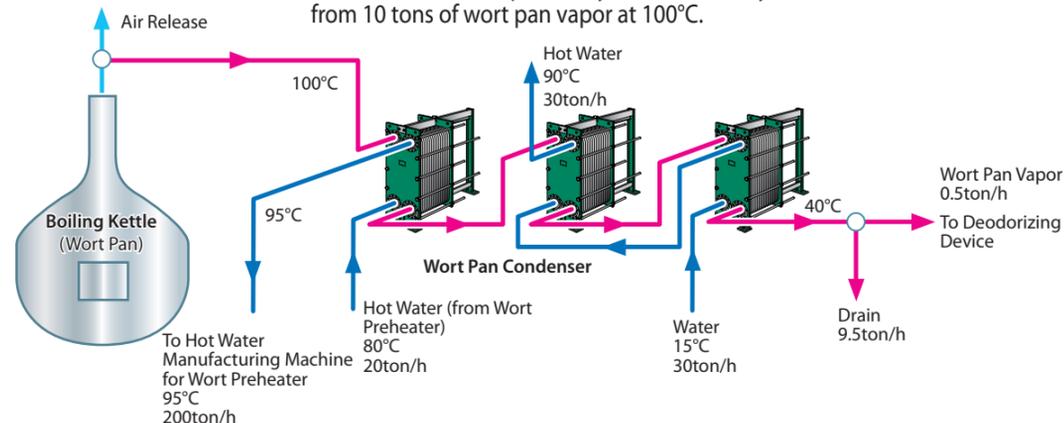


Model YX-80 Wort Pan Condenser

### Heat Recovery with the Wort Pan Condenser (Example)

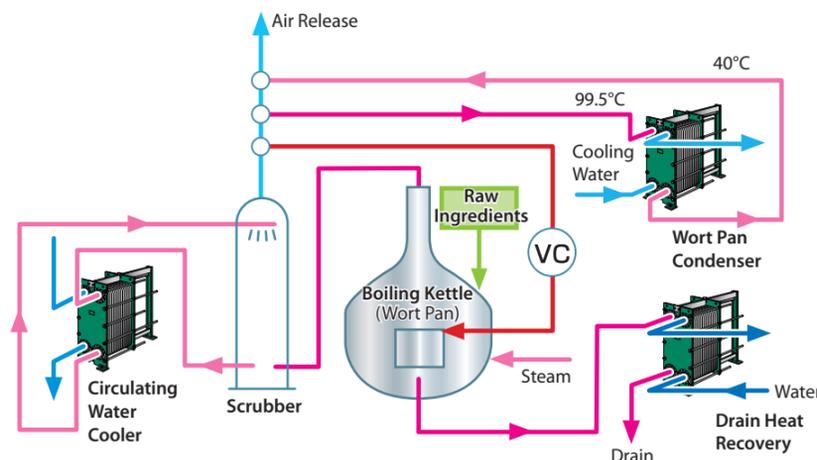
Effective energy conservation is still assured even when the boiling kettle (wort pan) drain tank is linked with a deodorizing device due to high energy released from the steam vapor (100°C). Furthermore, heat (and hence energy) recovery rate is expected to be high with full counter - current flow of fluids.

Below illustrates the possibility of heat recovery from 9.5 tons worth of steam vapor from 10 tons of wort pan vapor at 100°C.



### VRC Method

Steam emitted from the boiling kettle is condensed with HISAKA YX-80 plate condenser until the electric vapor compressor is activated. The compressed steam then act as heat source steam to recover 100% of energy in a close circuit. Furthermore, HISAKA YX-80 plate condenser is also involved in heat recovery from the compressed steam drain.



# Maintenance of HISAKA Plate Heat Exchanger

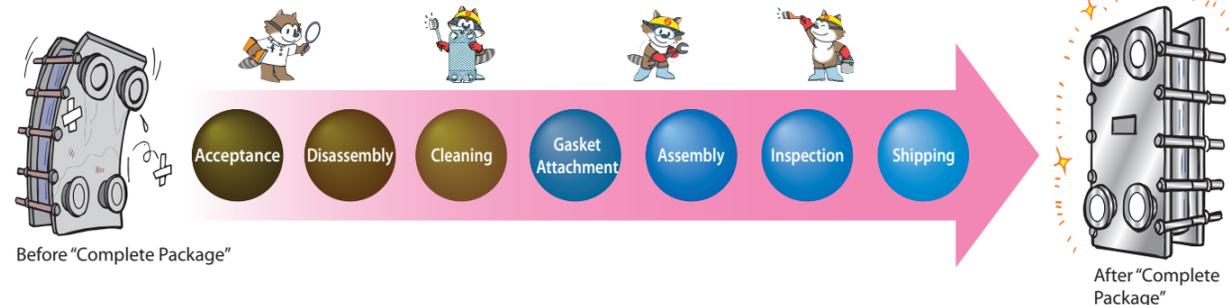
## PHE Total Maintenance [Complete Package]

From pick-up to disassembly, inspection, cleaning, and re-assembly, leave the work to professionals

The food and beverage (F&B) industries have strict regulations to ensure that the products being manufactured are sanitised and safe to be consumed by end consumers as machineries involved in the F&B industries often have high fouling rate. Therefore, it is crucial to ensure that the machineries are frequently service by professionals who have strong industrial and technical knowledge of the product. Consequently, frequent servicing and maintenance does not only able to promote product quality assurance, it is also able to extend the life-span of the machineries, hence, saving cost in the long run. At HISAKA, we offered the complete package of serving from pick-up to inspection and maintenance, and lastly sending the plate heat exchanger unit back in its best performing condition.



Image Character "Arrataro"



Before "Complete Package"

After "Complete Package"

## Other Maintenance Services

### On-Site

Dispatch service of veteran maintenance partners for on - site maintenance services.



On-Site Maintenance

### High Temperature and High Pressure Cleaning

Specific request on using food additives as cleaning solution is also made possible to ensure thorough cleansing of the plates in the cleaning device of high temperature and high pressure. The purpose of employing the high temperature and high pressure cleaning device is to warrant cleaning process, especially on electropolished plates as compared to normal plates.



High Temperature and High Pressure Cleaning Device

### Plate Disassembly and Pick-Up Service

Plates alone can be cleaned even when the device is localized or located at a difficult to be reached place. Furthermore, HISAKA provides disassembly and transportation services to our customers by providing a perfectly fit crate to store and ship, especially when the customers have difficulties in packaging and sending the unit to our servicing plant. The plates will then be shipped back to the customers after the maintenance.



"Plate Disassembly and Pick-Up Service" Dedicated Crates

For inquiries regarding maintenance...

SEA TEL: +603 5880 4185

FAX: +603 8081 7185

Please be sure to communicate the serial number of the plate heat exchanger or product when making an inquiry. The details of our maintenance service can also be viewed on our dedicated website.

<http://hisaka-asia.com/our-products/plate-heat-exchanger/maintenance/>