

# Waste Heat Evaporators

Innovative Comprehensive solution with waste heat utilization for ZLD and process applications.

Rochem was founded on the premise of minimizing energy usage, water consumption, and potentially harmful emissions.

At Rochem our approach is simple & sustainable with a focus on energy efficient ZLD for Industrial waste water and various other process application.

## WASTE HEAT EVAPORATORS (WHE) BASED ON MEMBRANE DISTILLATION

### What is Membrane Distillation (MD)?

Membrane Distillation is a process that utilizes differences in vapour pressure to permeate water through a hydrophobic membrane and reject other non-volatile constituents present in the feed.



### Waste Heat Evaporators



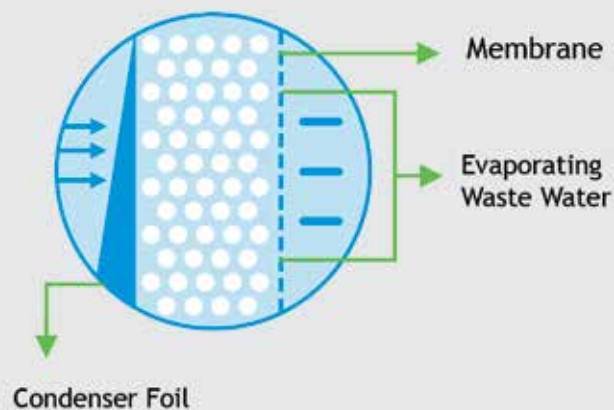
Waste Heat Evaporator works in an uncomplicated manner. The entire process can be summarized in four critical steps. These are –

STEP 1: Heat is transported from the bulk fluid to the waste water surface

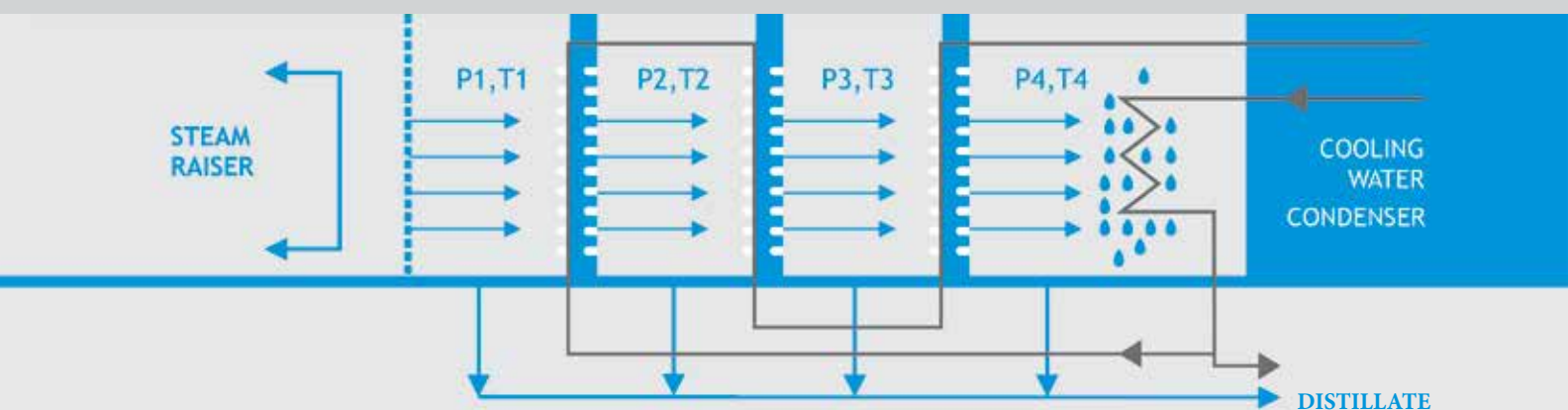
STEP 2: Waste water evaporates from the surface

STEP 3: Waste water vapour diffuses through the membrane

STEP 4: Waste water vapour condenses on the other side of the membrane



### Process Schematic of Multisage WHE based on Membrane Distillation



## WHY WASTE HEAT EVAPORATOR (WHE)

### Low Cost & Energy Saving

In attaining ZLD for Industrial waste water the end solution is Multieffect Evaporator (MEE). However small capacity MEE systems suffer due to limitations on no.of effects. WHE systems for smaller capacities can be of 6 or more effects, thus reducing energy costs. Also the utilization of waste heat such as engine cooling heat / exhaust heat can be more effective in such WHE systems.

### Advantages

- Separation of Volatile Component from the solutions
- Concentration of aqueous solution to produce fresh water from highly concentrated feeds
- Compact and Modular Design
- Low life cycle cost
- Safe Operations at Low temperature
- Lower electrical energy consumption
- Ease of maintenance as system is skid mounted at ground level
- Limits scaling and corrosion issues
- High quality of distillate (output)
- Reduction in non-condensable species in vapor phase

## INSTALLATIONS

### a) Automobile Ancillary Industry



### b) Food Industry



### Specifications

Feed flow	10 m3/day
Feed solids	7.5 % (w/v)
Distillate flow	8.2 m3/day
Distillate quality	<100 microS
Heating media (Hot water) demand	10 m3/hr @ 120 Deg C
Electrical load demand	5 KWH
Foot print	7 m x 7 m x 4.5 m

### Specifications

Feed flow	14.7 m3/day
Feed solids	8 % (w/v)
Distillate flow	12 m3/day
Distillate quality	<500 microS
Heating media (Hot water) demand	6 m3/hr @ 90 Deg C
Electrical load demand	5 KWH
Foot print	7 m x 4 x 4.5 m

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## **WHE vs. OTHER SEPARATION TECHNOLOGIES**

In any separation process, even the refined liquid may carry contaminants viz. particles, ion, bacteria, virus, pyrogens and the like, this is called entrainment. Even, though it is possible to minimize this entrainment, yet, it is theoretically impossible to reach an absolute separation. However, in WHE there are no theoretical restraints to total separation. Nothing is entrained with vapour (as in the case of distillation technology) and nothing is pressured through the membrane (as common in filter technology). The process of evaporation in the warm liquid is automated as a result of perpetual permeation.

## **LIST OF INDUSTRIES CATERED TO**

- Steel Industry
- Electroplating
- Textiles
- API & Formulations
- Food & Beverages
- Herbal
- Automotive
- Dyes & Intermediates
- Acid Washings and many more

## **APPLICATIONS**

- Waste Pickle Liquor treatment & recovery in Steel Industry
- Zero liquid discharge for Industrial waste water
- Concentration in API Industry
- Medicinal herbs & juice concentration
- Softener Rejects treatment
- Metal Recovery
- Non Volatile acid concentration