

FALLING FILM MVR EVAPORATORS



EPCON EVAPORATION TECHNOLOGY AS

EVAPORATORS - DRYERS - DISTILLATION & DEHYDRATION - HEAT RECOVERY SYSTEMS
ENGINEERING AND AFTERSALES SERVICES

EPCON falling film evaporator

Falling film evaporation is among the most cost-efficient and energy-saving evaporation methods. It is especially well suited to give low energy consumption when mechanical vapour recompression (MVR) is applied.

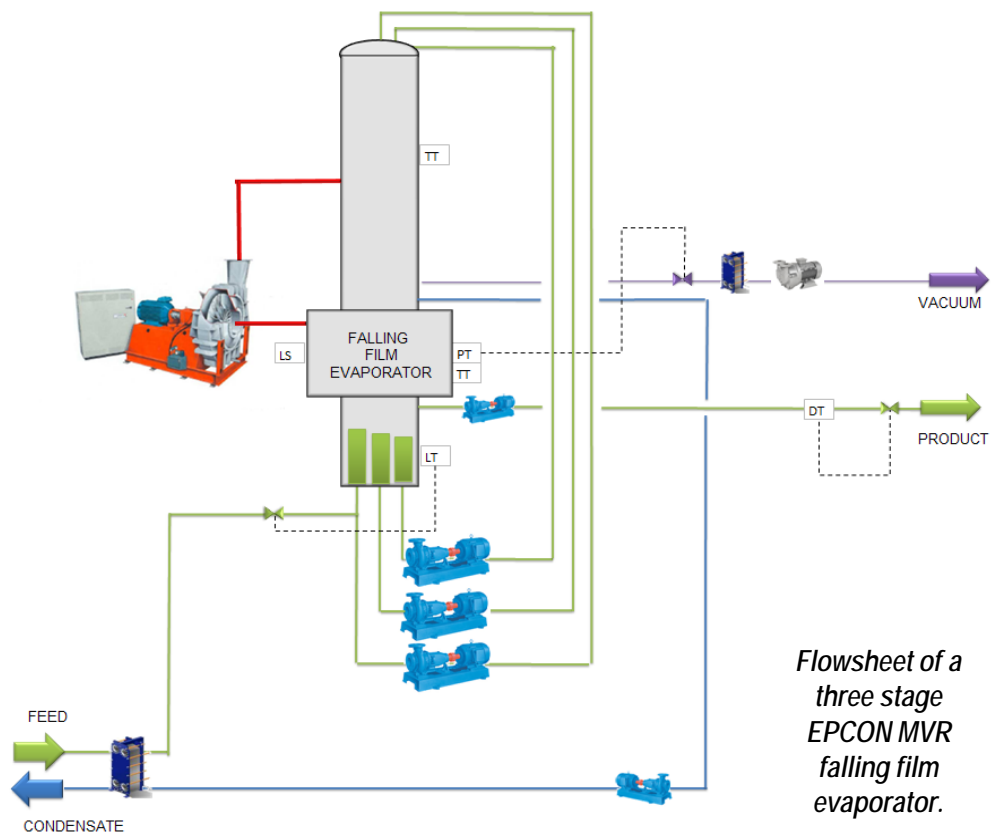
An EPCON falling film evaporator may consist of one or more liquid stages in a series. If a number of stages are used, the concentration of dry solids will be increased through the plant. This gives lower average concentration which reduces the need for heating surface, which in turn means lower energy consumption compared to a single liquid stage plant. A falling film evaporator may operate at various temperatures / pressures, the typical range for boiling temperatures being 30 to 100°C.

EPCON uses unique in-house developed software for the thermal and hydraulic design of the plants.

Applications

The EPCON falling film is a flexible evaporator system that can be used for a wide range of applications including:

- Biogas reject water treatment.
- Concentration of steep liquid from sweetener industry.
- Concentration of sweetener products.
- Concentration of stillage from biofuel industry.
- Concentration of marine protein extracts.
- Concentration of ingredients in food industry.
- Concentration of dairy products.
- Concentration of products from chemical and mineral industry.
- Dewatering of wastewater from different industries.
- Regeneration of MEG and PEG.

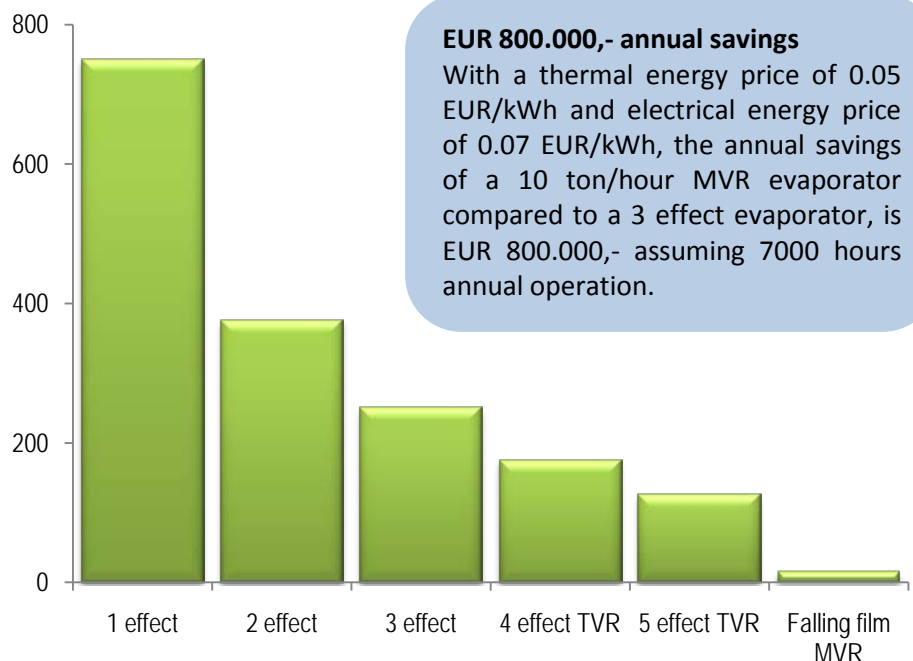


Flowsheet of a three stage EPCON MVR falling film evaporator.

MVR

MVR means Mechanical Vapour Recompression. The vapour from the evaporator is transported with one or two MVR fans, where it is compressed to a higher temperature and pressure. The recompressed vapour is used as a heat source for the evaporation process instead of boiler steam, and will condense on the outside of the vertical tubes in the evaporator. The MVR recompression reduces the energy consumption by 90-98% compared to a one effect evaporator.

Evaporator energy consumption: "kWh/ton evaporated mass".



EUR 800.000,- annual savings

With a thermal energy price of 0.05 EUR/kWh and electrical energy price of 0.07 EUR/kWh, the annual savings of a 10 ton/hour MVR evaporator compared to a 3 effect evaporator, is EUR 800.000,- assuming 7000 hours annual operation.

Technology

At the top of the vertical tube bundle in each stage, a distribution system distributes the liquid as a film on the inner tube walls. This film boils on the tube wall, and both the liquid and the vapour flow is taken out from the bottom of the tubes.

Some of the liquid is pumped out as finished concentrate, while the remainder is mixed with liquid that is added and then pumped back to the top of the distribution system. The distribution of liquid on the heating surface is vital for the successful design of a falling film evaporator. The film must be distributed completely homogeneously into all the tubes. It is particularly important to avoid areas with small amounts of liquid, as this may cause more rapid formation of precipitates and the need for frequent cleaning. EPCONs falling film evaporators can be designed with various types of liquid-distribution systems to provide optimal conditions for liquids with different concentrations and properties.

The volume of liquid in a falling film evaporator is normally small. This ensures short start-up time and the retention time for the medium is low. This may be important for sensitive media.

Turnkey plant

EPCON can offer a wide range in scope of supply. Ranging from engineering and main component delivery to turnkey plants.

Application adaption

Each evaporator is tailor-made to the customer specification with regards to operating temperature, capacity etc. A wide range of materials and piping standards can be delivered. EPCONs falling film evaporators can be manufactured in all sizes. We have designed plants to handle from 10 kg/hour to 200.000 kg/hour evaporated mass.

EPCON falling film pilot evaporators

EPCON has a wide range of pilot evaporation plants including mobile falling film evaporator pilot units. These pilot units allow our customers to document and verify the product quality using an EPCON falling film evaporator. The units operate from 40 to 100°C.



Compact design with integrated cyclone

The EPCON falling film has a unique design with an integrated cyclone that requires a small footprint and a minimum of structural installation or changes to existing buildings.

The picture above show a 3 stage EPCON MVR falling film evaporator within the sweetener industry, with an evaporation capacity of 10 tons per hour water evaporation. The evaporation temperature is 58°C.

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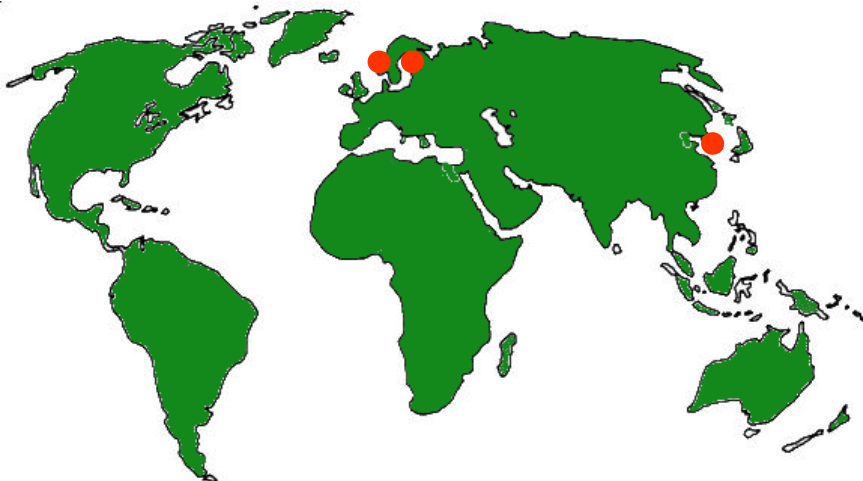
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