



ITALSCHELL VACUUM EVAPORATORS

TECHNICAL INFORMATION AND PRESENTATION OF DOUBLE EFFECT WITH HEAT PUMP SYSTEM

THE OPERATION PRINCIPLE

As it's well known, the water boils at approx. 100°C; lower the atmospheric pressure is, earlier the water can boil and evaporate, since the air resistance is lower. Under a vacuum (residual pressure) of approx. 40 mbar, the water boiling point is only approx. 30°C.

Boiling temperature plays a major role in chemistry: the lower it is, the lower the decomposition risk is in the case of many products, so allowing the recuperation and the reuse. At the same time, encrustation is considerably cut back.

A liquid ring pump combined with a Venturi ejector provides to create the vacuum.

The required heat and cold are provided by the heat pump circuit.

The compressed overheated freon (Stream called "HP" in the PFD scheme) goes into the coil or into the heating jacket of the boiling chamber (Block called "E-01" in the PFD scheme).

This coil acts as heat exchanger. Since it's immersed in the liquid to be concentrated, it transmits the whole of the heat of steam to the liquid.

The liquid (contaminated water) in the boiling chamber begins to boil when the specified temperature and the vacuum are reached. This is the first distillation effect – water from a liquid to a steam condition.

For the first stage boiling chamber the absolute pressure is approx. 0,100 bar and the boiling temperature is approx 42 °C. After that almost all the heat has been conveyed into the boiling chamber, the hot freon goes ("HP-1") at the air condenser ("FAN").

The water steam ("STEAM-1"), which has formed in the first effect boiling chamber, now moves to the heating coil ("E-02") of the second effect boiling chamber.

The absolute pressure in the second effect boiling chamber is approx 0,060 bar and the boiling temperature is approx 32 °C.

The water steam ("STEAM-1") coming from the first effect boiling chamber condensates inside the coil ("E-02") of the second effect boiling chamber, transmitting the energy at the liquid (FEED-2) in the second boiling chamber.

The condensed steam ("COND-1") coming out from the second effect heating coil is pumped ("PUMP-03") to the tank ("COND-TANK") and collected as distilled water.

The water steam ("STEAM-2"), which has formed in the second effect boiling chamber, now moves to the condensation chamber, where are the condensation coil ("E-03").

Inside the condensation chamber becomes distilled water, when it touches the cold surface of the condensation coil.



The cold freon ("LP-1") gives the cold energy for the steam condensation, then comes back as overheated freon ("LP") to the heat pump compressor ("K-01").

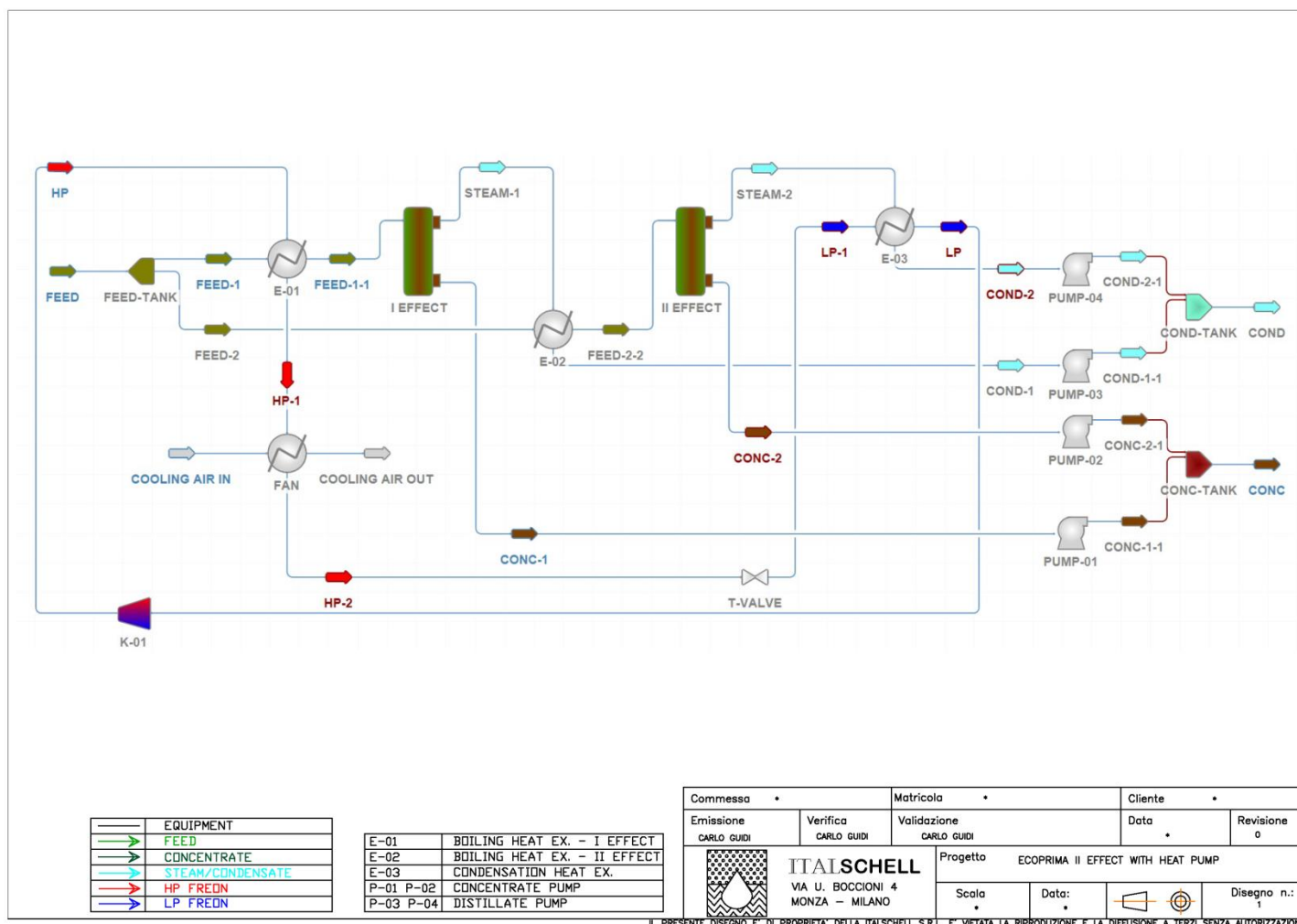
The condensed steam ("COND-2") coming out from the second effect heating coil is pumped ("PUMP-04") to the tank ("COND-TANK") and collected as distilled water.

This distillate is either returned to the process or fed to the sewers after final inspection.

The degree of concentration of the residues in the boiling chamber is determined by time or density measurement.

After the process is complete, the concentrate is removed from the machine automatically by a concentrate pumps ("P-01" for first effect and "P-02" for second effect).

This concentrate is either returned to the process or collected for the disposal ("CONC-TANK").



ITALSCHELL srl - Via Boccioni, 4 - I-20900 MONZA (Milano) - Italia

Tel. ++39 039 2848351 Fax ++39 039 2848350

e-mail : info@italschell.it - <http://www.schell-gmbh.com>



Figure 2 - ECOPRIMA® 6500K



Figure 3 - ECOPRIMA® 6500K



ITALSCHELL srl - Via Boccioni, 4 - I-20900 MONZA (Milano) - Italia
 Tel. ++39 039 2848351 Fax ++39 039 2848350
 e-mail : info@italschell.it - <http://www.schell-gmbh.com>



THE ADVANTAGES

Traditional efficient processing systems for the treatment and disposal of waste water are cost-intensive and not sufficiently effective.

The **ITALSCHELL** vacuum evaporators for waste water processing, show that it is possible to produce economical goods, because, practically, they allow a reduction of current or foresaw residual's disposal costs, and sometime they allow even to recover raw materials (i.e. like in galvanic processing), and at the

same time they are a concrete advantage for the environment, reducing the waste water quantity and so lightening the environment impact.

Vacuum evaporation technology is a process that has been used for decades by the chemical industry.

However, traditional distillation systems require extremely complex installations and very high energy costs, the reason for which the evaporation process is uneconomical in most cases.

The structure of the **ECOPRIMA** vacuum evaporators is based on the tried and tested technology of the heat pump combined with the vacuum, using an innovative arrangement on the boiling and condensation side to ensure an even more gentle distillation process, a higher yield from the water, a higher degree of concentration and a significantly lower consumption of energy compared with other products.

These evaporators can be used at continuous cycle without presence of operator, as they are equipped with a set of devices which ensure a completely autonomous and controlled operation.

The versatility, which, besides, marks the **ITALSCHELL** products, allows to personalise dimensions and equipment on the ground of effective operator's necessities.



ITALSCHELL srl - Via Boccioni, 4 - I-20900 MONZA (Milano) - Italia

Tel. ++39 039 2848351 Fax ++39 039 2848350

e-mail : info@italschell.it - <http://www.schell-gmbh.com>