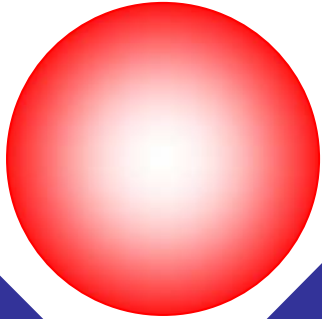


A Second life for Water



EVAPORATORS

More than a machine, a solution

CONCEPTION
CONSTRUCTION
SALE
RENT
EXPLOITATION

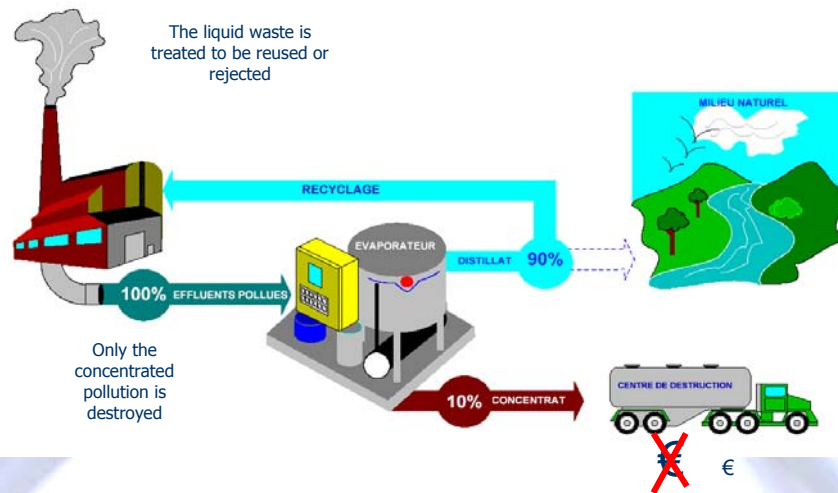


Waste water treatment

What is the Evaporation ?

The evaporation is a thermal process which, from a solution, allows separating two liquid phases: a distillate and a concentrate.

Applied to the treatment, this technique is used to reduce the volume of the liquid waste or to recycle baths of treatment.



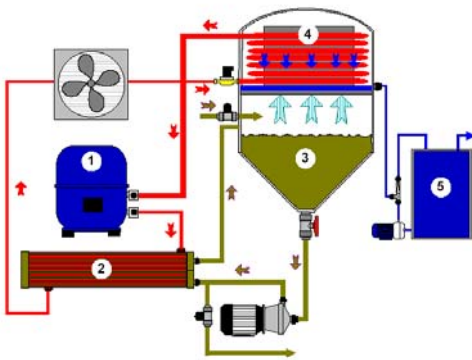
THE PURPOSE OF the SYSTEM

The evaporator is a system conceived for the treatment of the aqueous solutions coming from various industrial processes and aims of:

- Reduce the volumes of industrial waste containing some water.
- Separate a liquid of its dissolved substances
- Concentrate at most an aqueous solution by extraction of water.
- Allow the **zero Discharge**, the recycling in process
- Reject the distilled water.
- Reduce the costs of destruction of the liquid waste.
- To Reduce the DCO
- To Allow the total separation of metals
- The system with scraper allows concentrations pushed of about 700 g/l

Principles

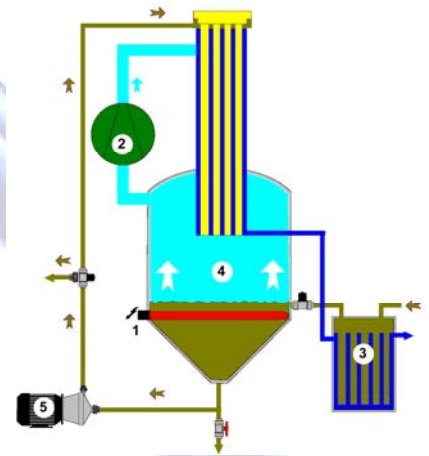
HEAT PUMP



MECHANICAL COMPRESSION OF VAPOURS

In this type of evaporator, the effluent, in the starting up of the installation, is warmed by an electric heating of supplement ① and the formed vapour is compressed by a compressor ② and reintroduced in the tubes of the heat exchanger to allow the heating of the effluent to be treated (90°C) which is brought at the head of the heat exchanger by the feed pump ⑤. Obtained vapours pass around the colder inner surface of the heat exchanger where they condense ④ and also they are used for preheating the entering effluent ③.

A refrigerated gas is compressed by a compressor ①, and then conveyed in the serpentine of the heat exchanger ②. It gives up then its energy to the effluent to be treated, what allows this last one to vaporize in the chamber of boiling ③ in a temperature of 35°C. The gas is generally precooled by a heat exchanger with air, then relaxed in the serpentine of the chamber of condensation ④, giving up its frigories and provoking the condensation of the dry vapours which are inhaled by the system of vacuum and collected in the tank of distillate ⑤.



Technologies implemented



■ PAC : Heat pump

- EE : External exchanger
- EI : Internal exchanger
- R : Scraper

- Consumption : de 60 à 130 Wh/l
- Capacity 240 à 50 000 l/d



■ CMV : Mechanical Compression of Vapours

- Consumption : 80 Wh/l
- Capacity 2 000 à 8 000 l/d



■ TC : Thermo Compression

- Capacity 240 à 48 000 l/d

■ EC : Hot water

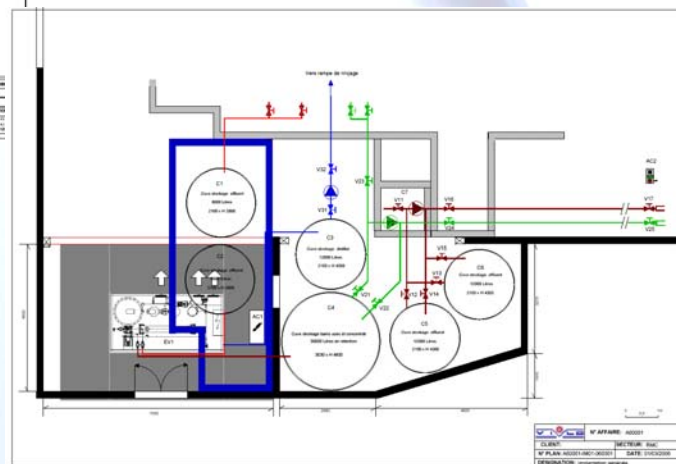
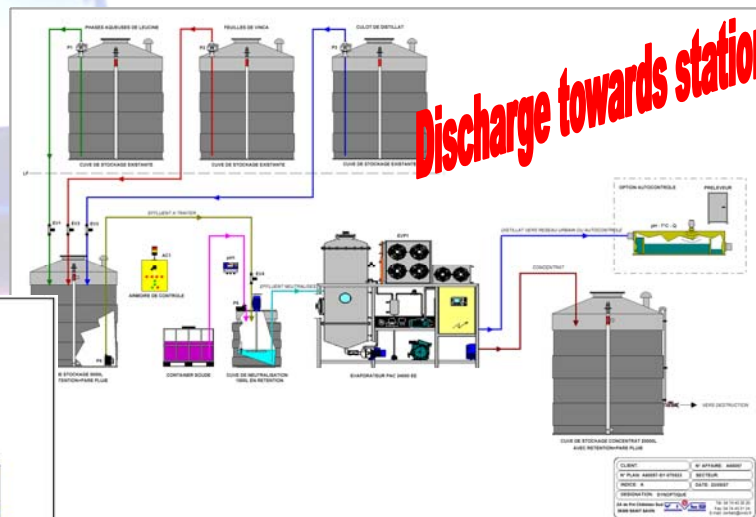
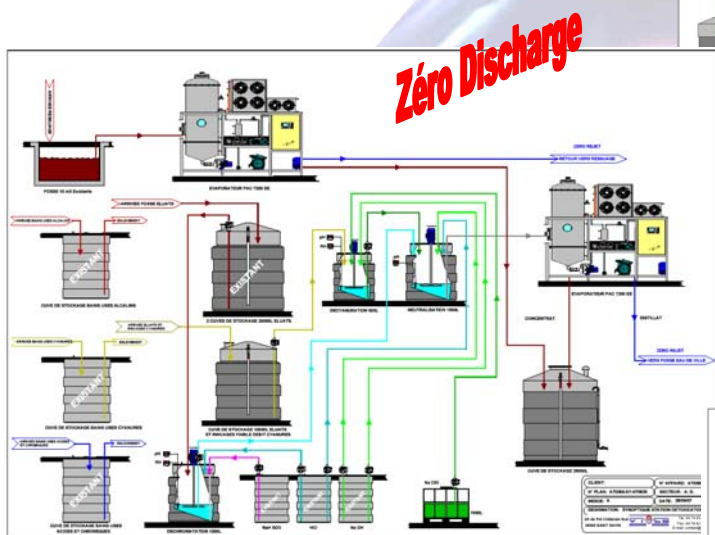
- M : Mono effect
- D : Double effect
- T : Triple effect

- Capacity 240 à 150 000 l/d



EXAMPLES OF INSTALLATIONS

The distillate produced by our evaporators can be rejected towards a wastewater treatment plant, towards a natural environment or reused in process so allowing **the zero discharge** of your installation.



Bal ance sheet economic

- Evaluation of the situation
 - Volume to be treated
 - Type of effluent to be treated
 - Purpose of the treatment
 - Norms to be respected
- Realization of an economic study
 - Cost of the current situation
 - Cost with system of treatment
 - Breakeven point
- Realization of a balance sheet of exploitation

Bilan d'Exploitation

Declaracion des Variables

Affaire N° : A70001-BE070112

VIVLO
38 SAINT SAVIN

EFFLUENT A TRAITER

| | | |
|-------------------------------|-------|--------------------|
| Quantite d'effluent a traiter | 1 200 | m ³ /an |
| Nombre de jour de traitement | 300 | jours/an |
| Volume a traiter par jour | 4 000 | litres/jour |

CHOIX EVAPORATEUR

| | |
|--|--------------|
| Type evapporteur | PAC 4000 SAF |
| Taux de concentration (%) | 90% |
| Capacite de traitement d'effluent par jour | 1320 |

Matériel

COÛT EVAPORATEUR

| | | | |
|--|-----------------|-----------------------------|--------------------|
| Coût évapporteur | 40 000 € | par an | par m ³ |
| Temps d'amortissement | 36 | mois | |
| Coût mensuel | 1 111 € | | |
| TOTAL CHARGES ANNUELLES EVAPORATEUR | 12 333 € | 11,1 €/m³ | |

COÛT PERIPHERIQUES

| | | | |
|--|-----------------|-----------------------------|--|
| Coût périphériques (lignes, accessoires, etc...) | 2 000 € | | |
| Temps d'amortissement | 36 | mois | |
| Coût mensuel | 56 € | | |
| TOTAL CHARGES ANNUELLES DES PERIPHERIQUES | 867 € | 0,6 €/m³ | |
| TOTAL CHARGE ANNUELLE DU MATERIEL | 14 000 € | 11,7 €/m³ | |

Exploitation

MAIN D'ŒUVRE INTERNE SUR SITE

| | | | |
|--|-----------|----------------|-----------------|
| Annuel | | | |
| Temps | | | |
| Temps de contrôle | 5 | minutes / jour | 25 |
| Temps de Maintenance | 4 | heures / mois | 40 |
| Total heures | | | 73 |
| Coût horaire Main d'Œuvre Interne | € / heure | | 202 € |
| TOTAL Main d'Œuvre Interne Annuel | | | 14 640 € |

CONCENTRAT

| | | | |
|--|-------|------------------|-----------------|
| Volume concentrat produit | 120 | m ³ | |
| Coût destruction concentrat | 150,0 | €/m ³ | 18 000 € |
| Surfact à boue: facteur de sur-concentration | 1,0 | | |
| Volume de boues à détruire | 120 | m ³ | |
| Coût destruction des boues (m ³) | | | 0 € |
| Coût d'élimination du concentrat | | | 18 000 € |

ENERGIE

| | | | |
|---|---------|----------------|----------------|
| Volume de distillat produit (m ³) | 1080 | m ³ | |
| Consommation électrique au litre de distillat | 0,150 | €/litre | |
| Consommation électrique (KWH) | 162 000 | KWH/an | |
| Prix du kWh | 0,0448 | €/kWh | |
| Coût énergie électrique | | | 7 288 € |

REACTIFS

| | | | | |
|---------------------------------------|---------|-----------|-----------------|-----------------------------|
| Consommation d'antimousse | 0,0000% | de | 1 200 | m ³ |
| Quantité de reactif annuel | 0 | litres/an | | |
| Coût du reactif au litre | 10,00 | €/litre | | |
| Coût antimousse | | | 0 € | 0,0 €/m³ |
| % reactif 2 | 0,0100% | de | 1 200 | m ³ |
| Quantité de reactif 2 (litre) | 120 | litres/an | | |
| Coût du reactif 2 au litre | 5,00 | €/litre | | |
| Coût reactif 2 | | | 600 € | 0,5 €/m³ |
| Coût total annuel des reactifs | | | 600 € | 0,5 €/m³ |
| TOTAL Annuel de Fonctionnement | | | 28 528 € | 23,9 €/m³ |

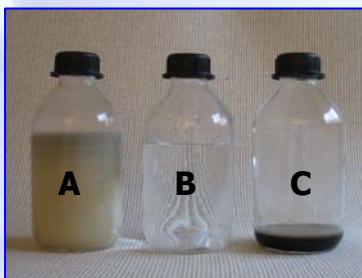
COÛT PIECES DE RECHANGE

| | | | |
|---|-----|----------------|----------------------------|
| Operation | Qte | Coût | Total |
| Joints échangeur multi trous | 1 | 188 € | 188 € |
| Servomoteur mécanique pompe de circulation | 1 | 1 500 € | 1 500 € |
| Ecouvillon nettoyage échangeur | 1 | 50 € | 50 € |
| Manivelle pour valve d'admission et de charge | 1 | 448 € | 448 € |
| Manivelle agit mousette coppe side | 1 | 202 € | 202 € |
| TOTAL Annuel des Pieces de Rechange | | 2 388 € | 2,0 €/m³ |

| BILAN D'EXPLOITATION | | par an | par m ³ |
|--|-------------------|-----------------|-----------------------------|
| TOTAL CHARGE ANNUELLE DU MATERIEL | (pendant 36 mois) | 14 000 € | 11,7 €/m³ |
| TOTAL COÛT D'EXPLOITATION ANNUEL | | 29 687 € | 24,7 €/m³ |
| | au lieu de : | 144 000 € | 120,0 €/m ³ |

RESULTS

To define in best the evaporator answering your need, we make tests of evaporation in laboratory in the conditions identical to the industrial process.



- A – Before treatment
- B – After treatment
- C – Residues to be destroyed

| | | |
|--------------------|---------------------------------|------------|
| Affaire : | A | Provenance |
| Ref échantillon | A | |
| Nature échantillon | Effluents lessiviels et d'usage | |

| Paramètres | Unités | Effluent | Distillat | Concentrat |
|---|--------|--------------|--------------|------------|
| pH | | 9,7 | 9,7 | 6,0 |
| Densité | g/ml | 1,006 | | <1,000 |
| Couleur | | Marron clair | Opalescent | |
| Odeur | | Non plaisant | Peu plaisant | |
| Matière en suspension | mg/l | 5320,0 | | |
| Solides décantables 2h | ml/l | <0,1 | | |
| Extrait sec à 105°C | % | 3,64 | | |
| Extrait sec à 600°C | % | 0,26 | | |
| Conductivité | µS/cm | 5030,0 | 171,0 | |
| DCO | mg/l | 157500,0 | 675,0 | |
| DBO5 | mg/l | 173,0 | <15,0 | |
| Chlorures | mg/l | 336,0 | <1,0 | |
| Fluorures | mg/l | 1,8 | <1,0 | |
| Sulfites | mg/l | <1,0 | <1,0 | |
| NTK | mg/l | 840,0 | 86,8 | |
| Azote nitrique | mg/l | 70,5 | <1,0 | |
| Azote nitreux | mg/l | <1,0 | <1,0 | |
| Ammonium | mg/l | 229,6 | 78,4 | |
| Bore | mg/l | 137,0 | 1,0 | |
| Fer | mg/l | 32,4 | <0,1 | |
| Cuivre | mg/l | 2,0 | <0,05 | |
| Composés organiques extractibles totaux | mg/l | 570,0 | <1,0 | |
| Solvants totaux comme n-hexane | mg/l | 5241,0 | 16,0 | |
| Détergents anioniques | mg/l | 46,0 | <0,2 | |
| Détergents non ioniques | mg/l | 288,0 | <0,3 | |
| Détergents totaux | mg/l | 334,0 | <0,5 | |
| Phosphore total | mg/l | <1,0 | <1,0 | |
| Manganèse | mg/l | 5,6 | <0,10 | |
| Nickel | mg/l | 0,28 | <0,1 | |
| Aluminium | mg/l | 0,4 | 0,15 | |

