Begg Cousland

World Class Filtration Solutions

Mist Elimination & Gas Cleaning Equipment for the Chlorine & Chlor-Alkali Industries

Chlorine Plant Process Technology

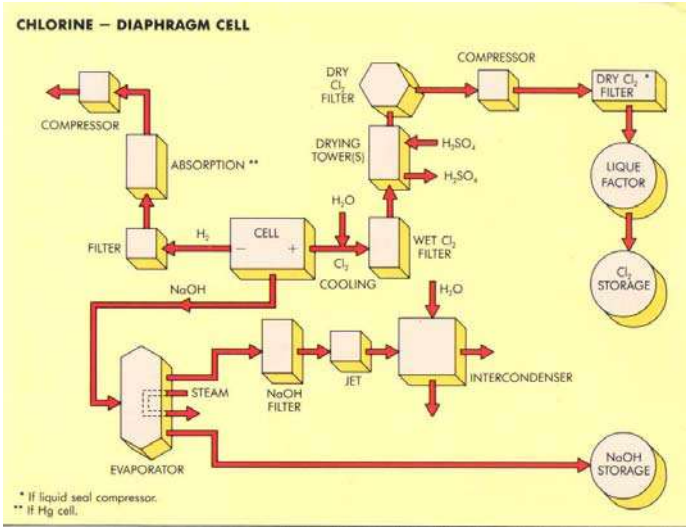
Electrolysis of brines in a diaphragm or membrane cell with chlorine produced at the anode with hydrogen and sodium or potassium hydroxide at the cathode.

The diaphragm cells contain a porous asbestos diaphragm to separate the anode from the cathode. This allows ions to pass through by electrical migration but reduces diffusion of products..

Overall reaction:
NaCl + H2O - NaOH + 1/2 H2 + 1/2 Cl2

If OH^- reaches the anode, hypochlorites are formed with subsequent loss of chlorine.

The oxygen will attack the graphite and chlorinated HC are entrained in chlorine gas.



When the Chlorine gas leaves the Diaphragm Cell, it is cooled and then dried in a Drying Tower by contact with Sulphuric Acid. Before the chlorine gas is dried Wet Chlorine filters should be installed.

Application 1. Wet Chlorine Gas Filtration

Mist Formation/Nature/Load
NaCl is entrained from cell; chlorinated HC (if graphite anode) are also entrained. Water (when direct cooling) saturates the gas stream.

Typical load: 800 - 3500 mg/Nm³

Problems to Solve
Filters are installed before the drying tower :

- To prevent NaCl blockage of downstream equipment
- To collect chlorinated HC, therefore to increase final product purity and prevent plugging of drying tower;
- To collect water to decrease sulfuric acid consumption in the drying tower.

Design Solution
TGW15 or B14W Glass Fibre mist eliminators with a structure of Titanium, or GRP/FRP with Derakane or Atlac resin coating
Usually a hanging filter style, either HT1 or HT3 (gas upwards, and passing the filter from outside to inside), or HT2 (gas downwards then horizontal, and passing the filter from inside to outside)

Application 2. Dry Chlorine Gas Filtration

Mist Formation/Nature/Load
H2SO4 entrained from drying tower and compressor (if liquid seal compressor)
Load: up to 7000 mg/Nm³ (if liquid seal compressor)

Problems to Solve
Filters are installed after drying tower or after the liquid seal compressor to collect sulfuric acid mists which :

- Impact product purity
- Freeze on tubes of liquefied decreasing heat exchange.
- Cause compressor corrosion

Design Solution
HT1, HT3 or HT2 hanging style mist eliminators
TGW15 or B14W glass fibre in 316L SS structure

Application 3. Hydrogen Stream Filtration

Mist Formation/Nature/Load
NaOH is entrained from cell.

Typical load NaOH : Max: 2000 mg/Nm³

Problems to Solve
Hydrogen is usually compressed for miscellaneous use
Filters are installed after cell to collect NaOH which :

- impact H2 purity
- corrode compressor
- decrease life of active charcoal system

Design Solution
PP13.5 polypropylene fibre with HT2 316L SS structure.

Application 4. NaOH Stream Filtration

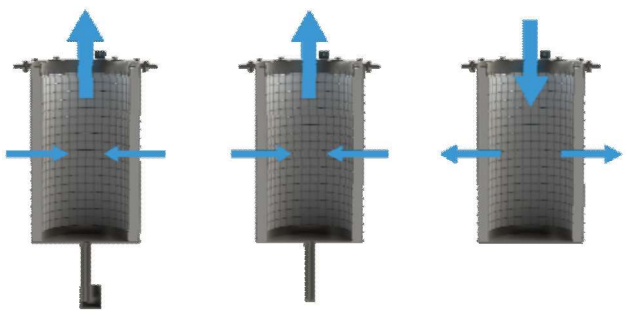
Often NaOH is concentrated e.g. from 50% up to 70%. This operation is carried in a high vacuum concentrator. Vacuum is generated by jet system with water intercoolers.

Mist Formation/Nature/Load
NaOH is entrained by the jet system up to 2000 mg/Nm³.

Problems to Solve

Filters are installed before jet system to collect NaOH mists which mix with the water of intercondenser and create water pollution problem.

Design Solution
PTFE fibre in a 316L SS Cylindrical candle filter structure or Panel filter form.



HT1 Type **HT3 Type** **HT2 Type**