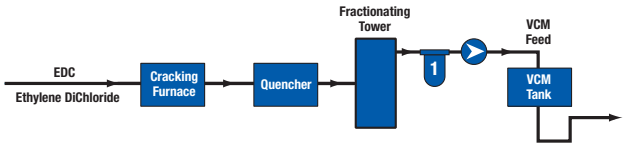
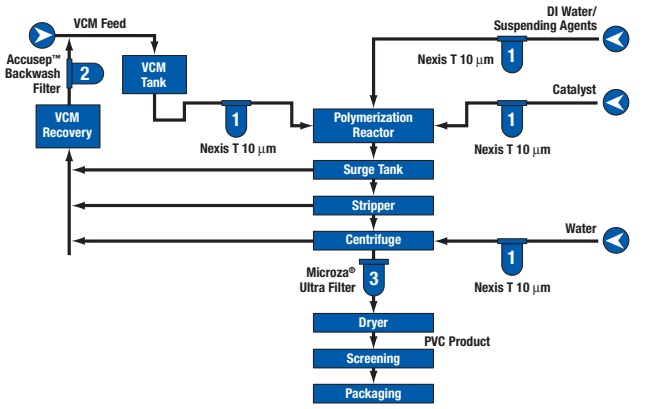
PALL Fuels and Chemicals

VCM/PVC Process

VCM Process



PVC Process: Suspension Polymerization



Production Process

Almost all Vinyl Chloride Monomer (VCM) produced is used in manufacturing of Polyvinyl Chloride (PVC) resins. PVC is used in the building and construction industry, consumer goods and packaging. Filtration plays an important part in the VCM/PVC process as it has a direct affect upon process yield, process efficiency and product quality, and also helps minimize operator exposure to hazardous VCM.

Typically, vaporized ethylene dichloride is dried and passed over a catalyst (e.g. pumice or charcoal) packed in stainless steel tubes that are directly heated in a cracking furnace. The hot effluent gases are quenched and the condensed gases fed into a fractionating tower operating under pressure. The product VCM is formed by condensing the overhead vapors in a water condenser. The VCM is then filtered and sent to either a storage tank for further processing to produce PVC or sold to other manufacturers that make PVC.

Most PVC is manufactured using the mass suspension process. Usually VCM along with D.I. water and other suspending agents are fed into a polymerization reactor. PVC along with unreacted VCM exits the reactor and various separation steps such as stripping and centrifugation are required to recover and recycle the VCM. The PVC slurry is dried and pellets are then screened, packaged and sold.

Filter Recommendations

1 Incoming VCM is filtered prior to shipment to a PVC plant. However, in a typical PVC plant the VCM is pumped to a storage tank before being fed into the polymerization reactor. It is recommended that the raw materials, VCM[1], catalyst, D.I. water/suspending agents be filtered to guard against impurities being introduced into the reactor. Contaminants can lower conversion rates, effect process efficiency and cause frequent shutdowns.

Nexis® T 10 micron (µm) fixed pore filters are recommended for these services. Nexis T filters have a higher voids volume than other conventional depth filters. This means higher dirt capacity to yield longer service life thereby reducing the frequency of cartridge changouts and operator exposure (important in the case of toxic VCM).

During the centrifugation step, the PVC is separated from the VCM. The water to the inlet of the centrifuge is filtered to prevent the PVC from being contaminated by impurities. Nexis T filters rated at 10µm are recommended for this service. Filtering the water improves the product quality of the PVC. This allows the operator to sell the product for applications that generate a higher revenue (i.e. film grades) rather than selling the product for crude or commodity construction grade materials that carry a much lower market value.

2 PVC is recovered and reclaimed from wash waters. Pall AccuSep™ 5 micron filters are recommended to recover PVC fines. These filters ensure that the water is free from particulate contamination.

3 Pall Microza® hollow fiber ultrafiltration systems are used to dewater the PVC solids before the dryer, thereby greatly reducing energy costs.

[1] Nexis filters typically recommended. Check with the factory if vessels are “steamed out” prior to cartridge changeout.

References

"Vinyl Chloride Monomer Success Story", Literature code: CPD - S.S.1

PALL Fuels and Chemicals

New York - USA
888.873.7255 toll free in the USA
516.484.5400 phone
+01 516 484 0364 fax
fuelsandchemicals@pall.com email

Portsmouth - Europe
023 9230 3303 phone
023 9230 2509 fax
fuelsandchemicals@pall.com email

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