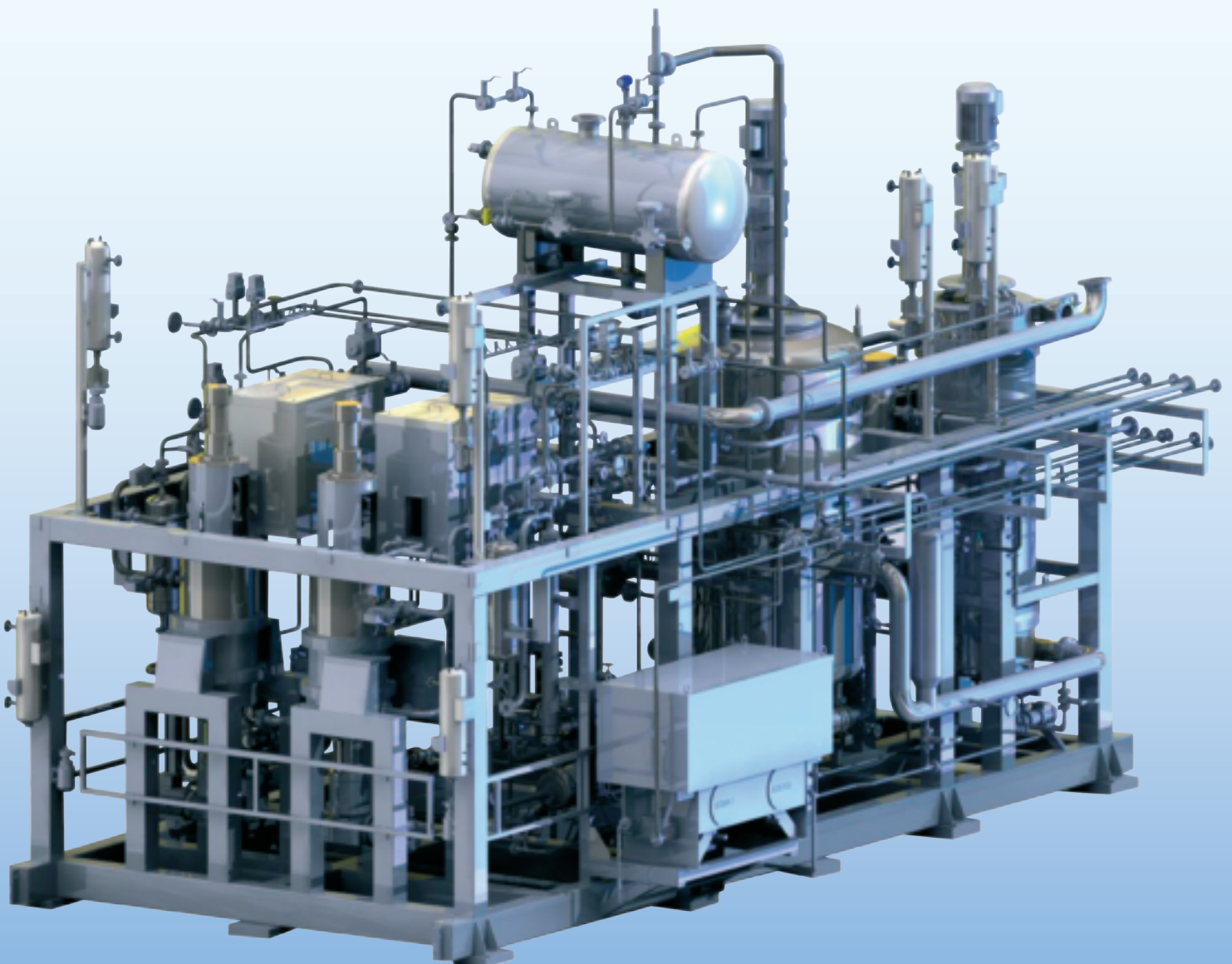


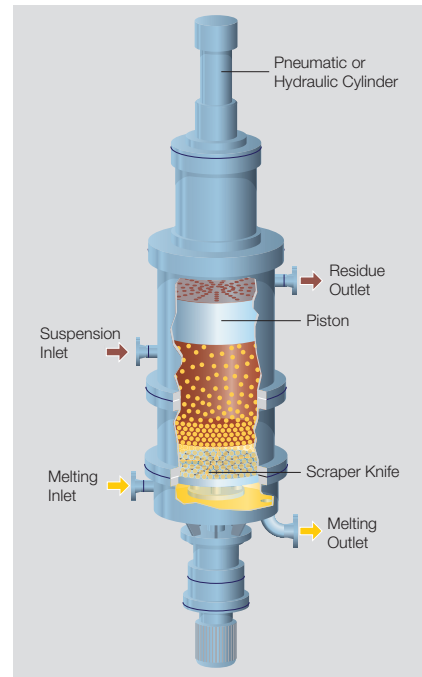
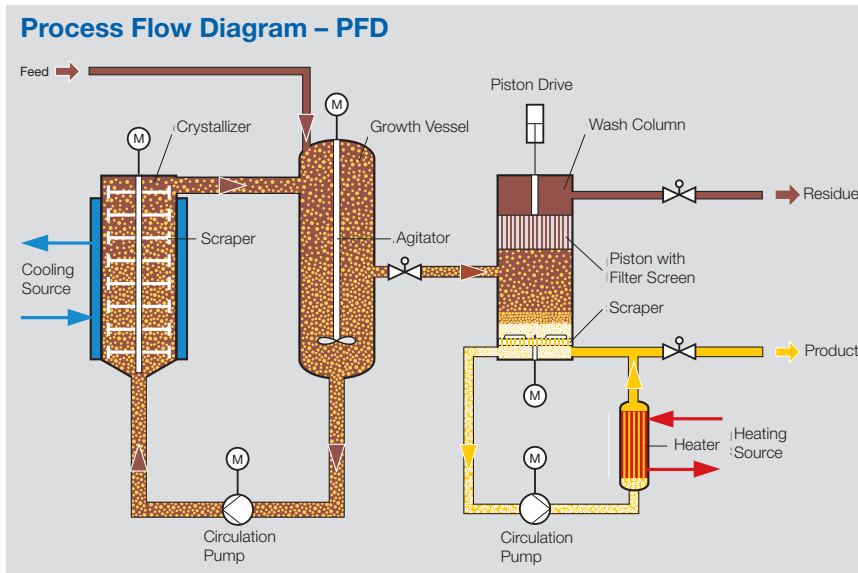
# Suspension Crystallization Technology



# Suspension Crystallization Technology

Suspension crystallization technology completes Sulzer's existing portfolio of melt crystallization technology consisting of falling film and static crystallization. Based upon careful evaluation of the technologies, our clients can be sure to receive the ideal process for their separation challenge, be it one of our crystallization technologies or even a hybrid process.

Suspension crystallization is a highly selective, low energy consuming and solvent-free separation process. The technology offers a very efficient, highly reliable and fully automatic separation process. Thus, it is ideally compatible for the increasing industrial demand for high purity products and ecological production methods.



## Wash Column

The wash column is a mechanical separation device driven by a standard pneumatic or hydraulic piston. The wash column itself consists of a cylinder, a moveable piston with integral filter screen and a rotating disk with scraping knives in the lower part of the cylinder. The space between the piston and disk is filled with packed bed of crystals.

The efficiency of the wash column depends mainly on the crystal size and viscosity. Larger crystals and lower viscosity make the separation more efficient.

Suspension crystallization plants consist of two loops. The crystallization loop is comprised of a crystallizer and a growth vessel. Crystals are created by a scraped wall crystallizer after which they have time to increase in size within a stirred growth vessel. After crystals mature in the crystallization loop, they proceed to the separation loop where they are recovered by a piston type wash column.

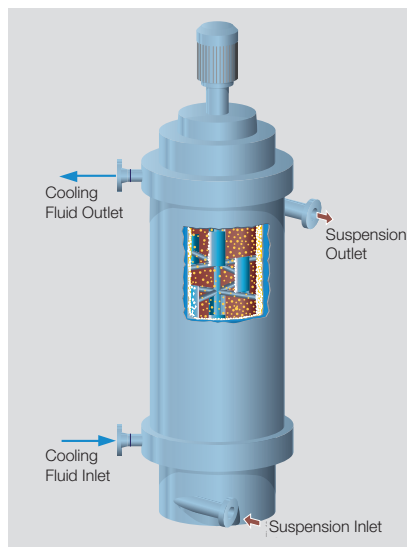
The process begins when the feed stream is introduced to the growth vessel. There, it is added to the crystal suspension being continuously circulated between the crystallizer and growth vessel. The mature crystal suspension is transported to the wash column, where it is compressed within the wash column and separated into pure and impure components. Liquid residue is removed from the top of the wash column while the washed crystals are removed from the bottom using a rotating scraper disk. The pure crystals are then melted in the melting loop utilizing a heater, thus producing a liquid pure product.

## Crystallizer

The crystallizer is a vertical, jacketed vessel with an internal rotating shaft to which scraper blades are attached. Cooling fluid flows through the jacket removing heat from the bulk liquid resulting in the formation of new crystals.

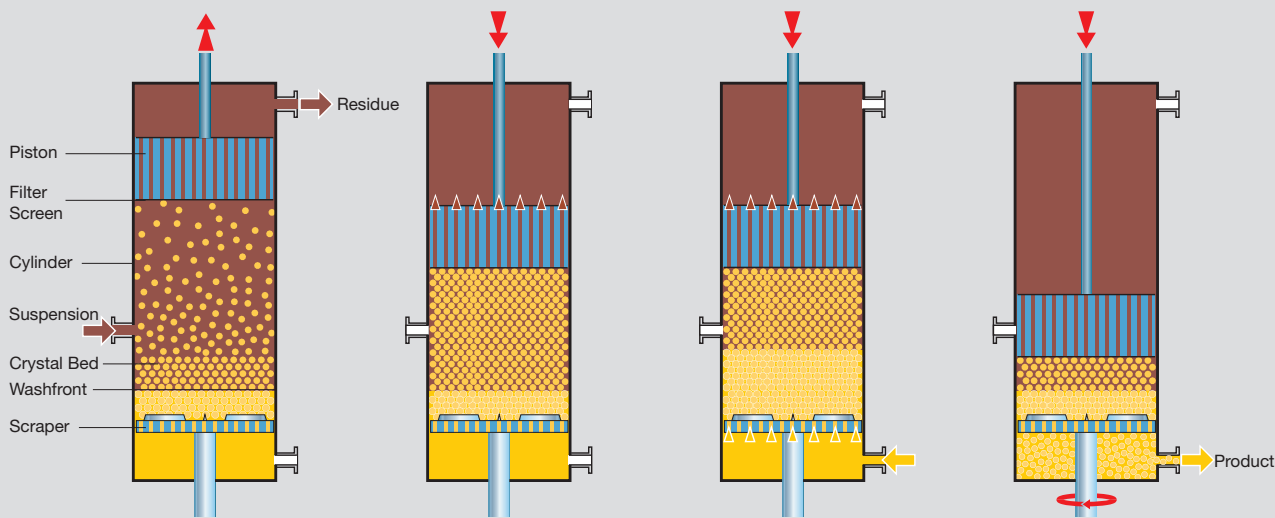
## Growth Vessel

The growth vessel, also referred to as ripening vessel, has an agitator to keep the crystals evenly distributed in suspension. The holding volume dictates the residence time and sub-cooling allows the crystals to grow.



The wash column with visible wash front

## Wash Column – How It Works



### 1. Filling

The filling step starts with the piston moving upwards. The space below the piston is filled with suspension from the suspension loop. At the same time, the liquid residue above the piston is pushed back to the suspension loop or is removed from the process as final residue across the battery limit. The filling stroke ends with the piston at the top position.

### 2. Compressing

The space between the piston and the crystal bed is now filled with crystal suspension. The piston then starts to move downwards forcing liquid residue to flow through the filter screen. The crystals cannot pass by the filter screen thus they remain in the wash column. As the piston continues its compression stroke, a new bed of crystals will be formed above the existing crystal bed.

### 3. Washing

The piston continues to push against the crystal bed increasing the pressure in the melting loop. This creates a pressure difference across the crystal bed and forces the purified liquid in the melting loop to move upwards through the scraper openings and through the crystal bed, thereby washing the crystals. The wash front gets displaced and moves upwards.

### 4. Scraping

The fourth step starts by activating the rotating disk which holds the scraping knives. The piston continues to push against the crystal bed and moves it downwards as the scraper knives cut off pieces of the crystal bed discharging them into the melting loop. The scraping step is finished when the piston has reached its lowest position and the rotating disk has been switched off.

## Pilot Tests

Should you have a separation task to be solved, our test engineers will carry out pilot tests for you, either in our laboratory or at your site with our mobile pilot plants. Test results will then provide the necessary basis for plant design and cost estimate of a commercial plant.



Pilot plant for trials in our well equipped laboratory

## Applications

- Acetic Acid
- Acetonitrile
- Adipic Acid
- Benzene
- Caprolactam
- Durene
- Ethyl Lactate
- Hexamethylenediamine (HMD)
- Ionic Liquids
- Lactic Acid
- MDI
- Methacrylic Acid
- o-Phenylphenol
- p-Diisopropylbenzene
- p-Dichlorobenzene
- p-Chlorotoluene
- p-Nitrochlorobenzene
- p-Xylene
- Phenol
- Trioxane



Skid mounted unit for MDI at Huntsman in the Netherlands

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Sulzer Chemtech Ltd, a member of the Sulzer Corporation, with headquarters in Winterthur, Switzerland, is active in the field of process engineering and employs some 4000 persons worldwide.

Sulzer Chemtech is represented in all important industrial countries and sets standards in the field of mass transfer and static mixing with its advanced and economical solutions.

The activity program comprises:

- Process components such as fractionation trays, structured and random packings, liquid and gas distributors, gas-liquid separators, and internals for separation columns
- Engineering services for separation and reaction technology such as conceptual process design, feasibilities studies, plant optimizations including process validation in the test center
- Recovery of virtually any solvents used by the pharmaceutical and chemical industry, or difficult separations requiring the combination of special technologies, such as thin film/short-path evaporation, distillation under high vacuum, liquid-liquid extraction, membrane technology or crystallization.
- Complete separation process plants, in particular modular plants (skids)
- Advanced polymerization technology for the production of PLA and EPS
- Tower field services performing tray and packing installation, tower maintenance, welding, and plant turnaround projects
- Mixing and reaction technology with static mixers
- Cartridge-based metering, mixing and dispensing systems, and disposable mixers for reactive multi-component material

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