

Cake and precoat filtration

Lenzing CakeFil Filter

The Lenzing CakeFil Filter is a fully automatic self-cleaning tubular pressure filtration system, otherwise known as a candle filter. This sophisticated filtration technology is centered around cake building, that is, a cake of the solid contaminants in the liquid stream builds on each of the porous cake support cloths that cover the full length of the candle elements. This results in the cakes themselves becoming the filter media through which the clean liquid (filtrate) passes.

Since the cake's solids are size graduated, that is, the largest particles are in contact with the cloth and smaller ones are further away, very fine filtration is possible.

Specifically, 1 micron filtration is achievable without filter aid and 0.5 microns is possible with filter aid. Captured solids can either be retained or discarded as waste. The waste discharge can either be "dry to the touch" (around 40-50% moisture content) following the automatic blowdown step or in pumpable wet slurry form. An automatic cake washing step (prior to the cake blowdown step) is also possible in the case of the dry cake discharge design. The sophisticated design of the filter candles used by Lenzing ensures uniform cake structure, thus fine filtration, as well as efficient cake discharge.



Precoat filtration – Advantages

- Filtration down to 0.5 microns with filter aid
- Suitable for corrosive fluids
- Dry-to-the-touch as well as slurry discharge

Fluids Filtered

- Petrochemical products
- Acids, lyes, solvents, chemicals
- Sugar solutions
- Catalyst recovery

Cake filtration – Advantages

- Filter fineness down to 1 µm without filter aid
- Solid contents in the liquid feed of up to 10% in specific cases and operating conditions
- Efficient cake discharge

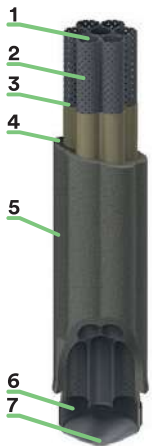
Filter cake



Lenzing CakeFil Filter

Operating principle

Formation and drying of filter cake



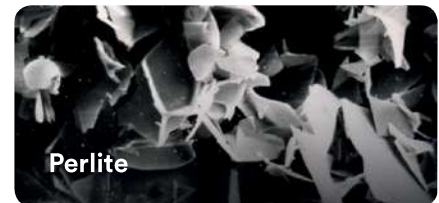
Functional description

- 1 Central tube**
Filtrate collector with solid wall for total displacement of filtrate from the filter element
- 2 Filter tubes**
Support for filter medium
- 3 Filter tube apertures**
- 4 Filter medium**
Pressed against the bundled filter tubes during filtration
- 5 Filter cake**
- 6 Collection chamber**
Connection central tube (1) with filter tubes (2)
- 7 Filtrate**
Exits filter element through central tube
- 8 Blow-Back-Gas**

Discharge of filter cake



Filter aid



Cake building on candle elements

During the filtration process, the liquid to be filtered is pumped into the pressure vessel and then through the vertically suspended candles in an outside to inside flow direction. Solids collect on the surface of the support cloth that adheres to the flower shape of the six exterior small diameter tubes which are welded together with one interior tube to form one single candle. The candle design ensures a uniform cake structure over the full length of the candle, resulting in fine particle removal and a very gradual differential pressure build-up over the course of the batch process.

Cake discharge

After the filtered fluid is emptied from the filter vessel, the cake can be optionally washed. Following the washing step, the cake is then dried via an injection of air or gas through the candles in the same direction as the previous liquid flow (outside to inside). Once the moisture from the cake has been removed as much as possible, compressed air or gas is again injected through the candles but in the reverse direction, that is, from the inside to the outside. This has the effect of blowing open the filter cloth on each candle. At that point the cloth no longer adheres to the flower shape contour of the candle but rather becomes fully cylindrical. This has the effect of breaking the cake into slivers. The cake then drops to the bottom (conical) section of the filter vessel and is discharged through an open valve into a receiving bin.

Filtrate

During the filtration process, the cake filtered filtrate flows downward through the six concentric perforated filter tubes into a sump section of a candle and then rises inside a seventh non-perforated central tube. The filtrate exits the filter vessel through horizontal pipes called "registers" that are mounted in the upper section of the pressure vessel.

Cake drying

Following the draining of the fluid from the bottom (sump) section of the filter vessel, compressed air or gas is injected through the filter cake (in the same direction as the liquid flow), that is, from the outside of the candle towards the inside towards the inside. Much of the residual moisture in the cake is forced into the non-perforated central tube of the candle.