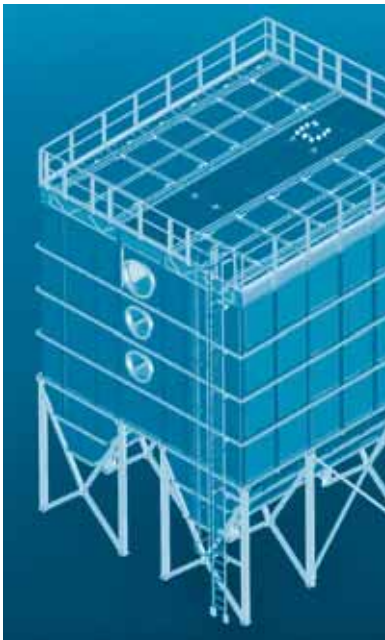
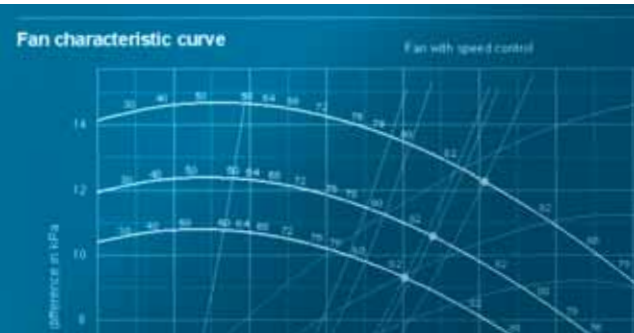


Innovations from Venti Oelde

Transport and Processing of PET Bottles



**Venti
Oelde**

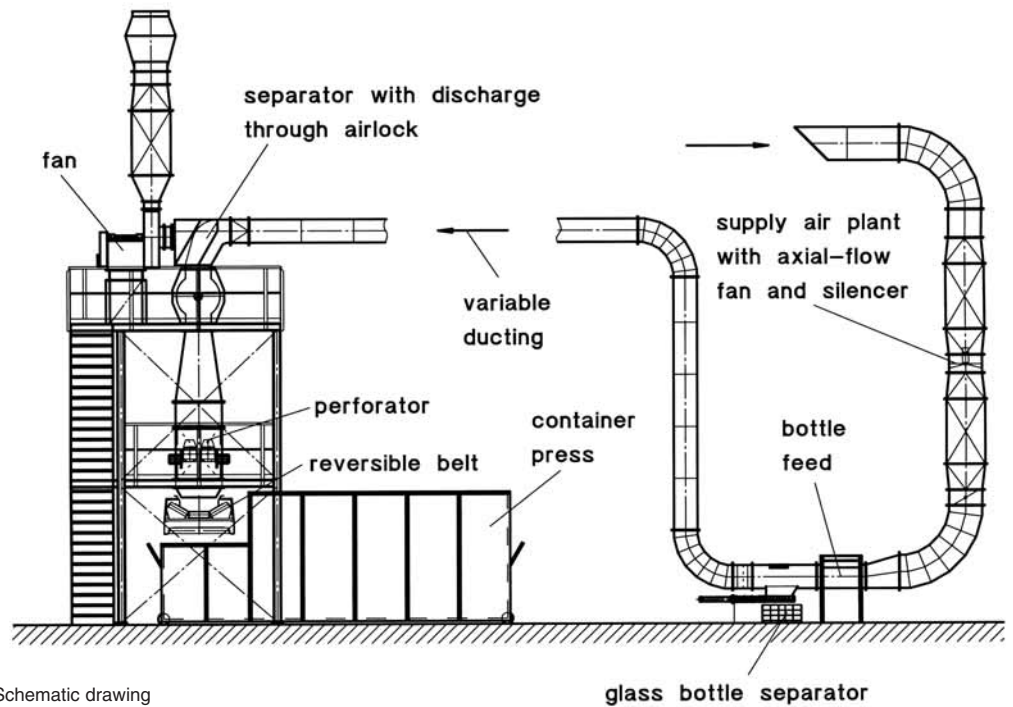
Transport and Processing of PET Bottles

"So that the outcome is environmentally compatible!"

PET packaging and bottles which have ended their useful life do not belong on the tip. They can be re-used to provide raw materials and energy in recycling processes. This is one of the considerable strengths of PET. Even after a long useful life, its mono-material structure makes it suitable for recycling and it can be returned to the economic cycle as a valuable raw material.

During development of the PET bottle transport and processing plant, Venti Oelde was trying to provide for the operator a safe and economical solution, permitting reclaimed PET material, even with large differences in height, to be transported in a space-saving manner over long distances. How? – Why, by air, of course!

The task appears in principle as a relatively simple scenario: in the national and international drinks industry PET bottles are being used ever more frequently. Their excellent properties and the particular ecological profile are the main reasons for this. Beverages containing fruit juices, concentrates, dairy produce and mineral water head the hit-list for the application of this technology. Empty plastic drinks bottles are returned almost all over the world in cases and boxes. The useful life of bottle and case differ greatly. All boxes and containers designed for this purpose can usually be re-filled with new bottles without any special treatment. Not, however, the PET bottles. If they are returnable bottles they must be carefully cleaned. Non-refillable bottles or damaged returnable bottles are collected and then passed on to recycling companies.



Schematic drawing

Depending on the type of recycling process, the bottles have to be cleaned and/or mechanically ground before being further processed. New products, such as fibers, foil or even PET containers can be made from the reclaimed PET material. It has recently become possible to manufacture PET bottles from reclaimed material. In countries, such as Australia, New Zealand, Belgium, Chile, Sweden or Switzerland, the multi-layer process for PET bottles is widespread. This is the production of multi-layer bottles, in which the outside or intermediate layer is made from recycled PET, and the inner layers which come into contact with the contents, are made from virgin PET. Generally the recycling content in these bottles represents up to 40 %, and, with the most up-to-date process, up to 80 %.



Feed station with supply air plant and conveying duct

Inexpensive, reliable and environmentally friendly

For various reasons, the location of the recycling plant for plastic drinks bottles is almost always different from the place where the bottles are returned and the cases re-used. The problem arises therefore of transporting the empty bottles easily, safely and, if possible, automatically from where the empty drinks cases are re-used to the location of the collecting, manufacturing or disposal plant for the PET bottles.

When considering possible solutions, the main task was to find a system

- which can exist inside the eco-balance (economy and ecology)
- which can adapt to many different local and operational conditions
- which can be modified at a later date to take account of any alterations in the surrounding parameters
- where the smallest possible space is required for the conveying duct

The process flow diagram shows a solution which completely fulfils the stated parameters and, particularly with regard to its design flexibility and variability, has already proved successful in several cases.

The actual “heart” of the PET bottle disposal plant is an axial-flow fan which takes air from the atmosphere to feed the conveying system. Two silencers are included to provide sufficient sound attenuation outside and within the workshop. The principle advantage of this arrangement can be seen on the plan. The area required for the system is extremely small.

The air flows through the feed station into which the bottles are emptied. Depending on the application, these can be up to a complete case. Bottle feed can be either manual or automatic using a handling system selected by the client. Additional noise insulation with mineral wool attenuates noise at this point. In a method similar to a pneumatic



Pressed PET bottles



Separator with discharge through airlock

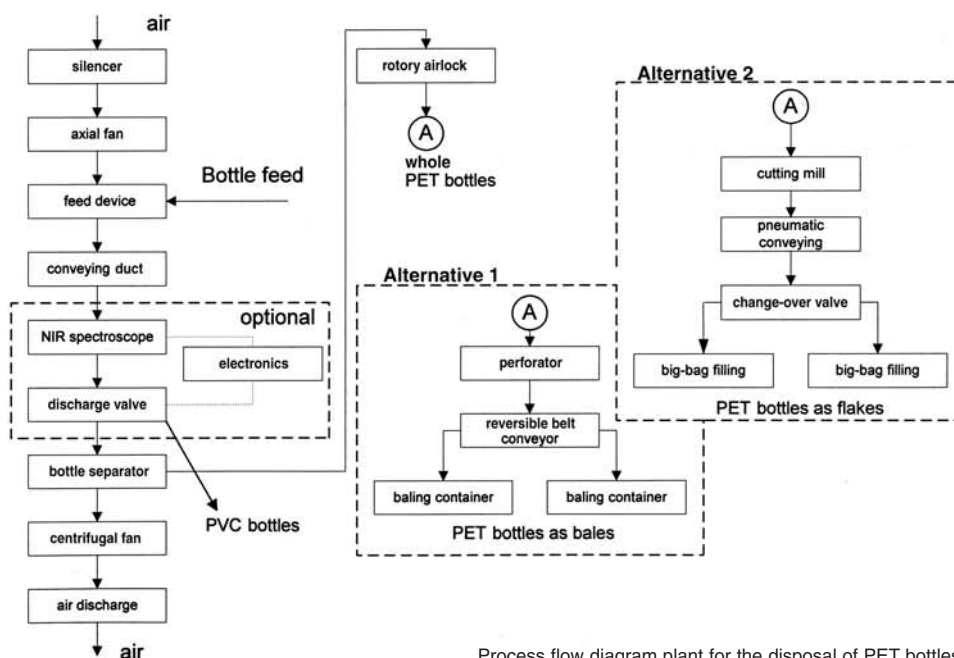
tube conveyor, the bottles are carried by the air stream to a separator. The conveyor duct itself can attain a length of 160 m and more. If required, sensors can be integrated which, by means of infrared spectroscopy, select and detect material. In this way contaminants, such as PVC, glass or dirty bottles can be pulled out by separating equipment.

In the separator the bottles are separated from the air stream by a rotary airlock.

A centrifugal fan draws the emission-free air out into the atmosphere. The containers then fall into a shaft and from there into further processing systems. The plant operator and/or his requirements decide the type of system.

Flexible and variable

In the illustrated example the rotary airlock is followed by a perforator. Holes are made in the PET bottles by means of two rotating rollers fitted with needle-like pins. This facilitates bottle pressing. Then, the perforated containers reach two presses via a reversible conveyor. They are here pressed to compact bales and conveyed to a container.



Process flow diagram plant for the disposal of PET bottles

Another method is to grind the PET bottles into flakes of defined particle size in a mill. The flakes are removed pneumatically from the cutting mill. Integrated into the conveying line are a metal sensor and a separator, enabling the flakes, free of metal pieces, to be filled into big bags.

Summary of the Advantages

- cost-effective plant design
- operational safety with several options
- simple adaptation to on-site conditions
- small space required for the conveying duct
- trouble-free modification of the plant (particularly of the conveying duct) when new on-site conditions arise
- easy conveyance over great heights and distances
- can easily cope with spasmodic bottle feed
- no moving machine parts in the conveying duct, which means practically no wear and tear
- completely enclosed conveying duct
- emission-free

By modifying this plant, not just downstream of the rotary airlock, the wide range of possible and practical PET recycling processes can be taken into consideration. Engineering of performance and selection of components for the system is extremely flexible. Capacities, length of conveying ducts, whether the transport system should be fixed to the ceiling or the walls or laid above or underground are all decided alone by the on-site conditions. Even vertical gradients can be easily overcome. The only limits are set by the degree of bends in the duct.

The galvanized steel plate pipes are coupled by quick-catch devices and are fitted with access doors every 5 meters. To facilitate maintenance of the peripheral plants, stairs, ladders, catwalks, platforms, etc. can be easily mounted. Expense and form of these are decided by the conditions and application. The complete system is equipped with a programmable controller to ensure high availability at all times.



High-efficiency centrifugal fan with changeover for return or exhaust air



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