

Plant Engineering

Chemical Plants

Polymer Plants

Drying Plants

Recycling

Equipment

Services

AQUAFIL Engineering GmbH was founded mid 1988 in Berlin (Germany) by Ing. Wolf Karasiak with the main shareholder AQUAFIL S.p.A. (Arco, Italy). AQUAFIL Engineering has its headquarter in Berlin.

AQUAFIL Engineering employs engineers, chemists, production managers and technical designers with long and great experiences. AQUAFIL Engineering has a flat and simple management structure which allows maximum flexibility for the market and clients.



AQUAFIL S.p.A., the main shareholder of AQUAFIL Engineering GmbH, has developed in the last years into one of the leading companies for Polyamide 6 polymer-, filament- and BCF-production in Europe. Since many years AQUAFIL Group has been the leader of the European PA6 BCF market with a share of more than 35%.

The AQUAFIL Group has production facilities in several countries around the world and employs more than 2.500 people.

AQUAFIL Engineering provides high German engineering quality and equipment. The strategic approach of AQUAFIL Engineering is to develop and build flexible, economic and environmental friendly plants. The AQUAFIL Engineering technologies for polyamide and polyester business make our customers competitive in the world market due to the high and consistent quality of final products, low operation and conversion costs.

AQUAFIL Engineering's portfolio is split into different units:

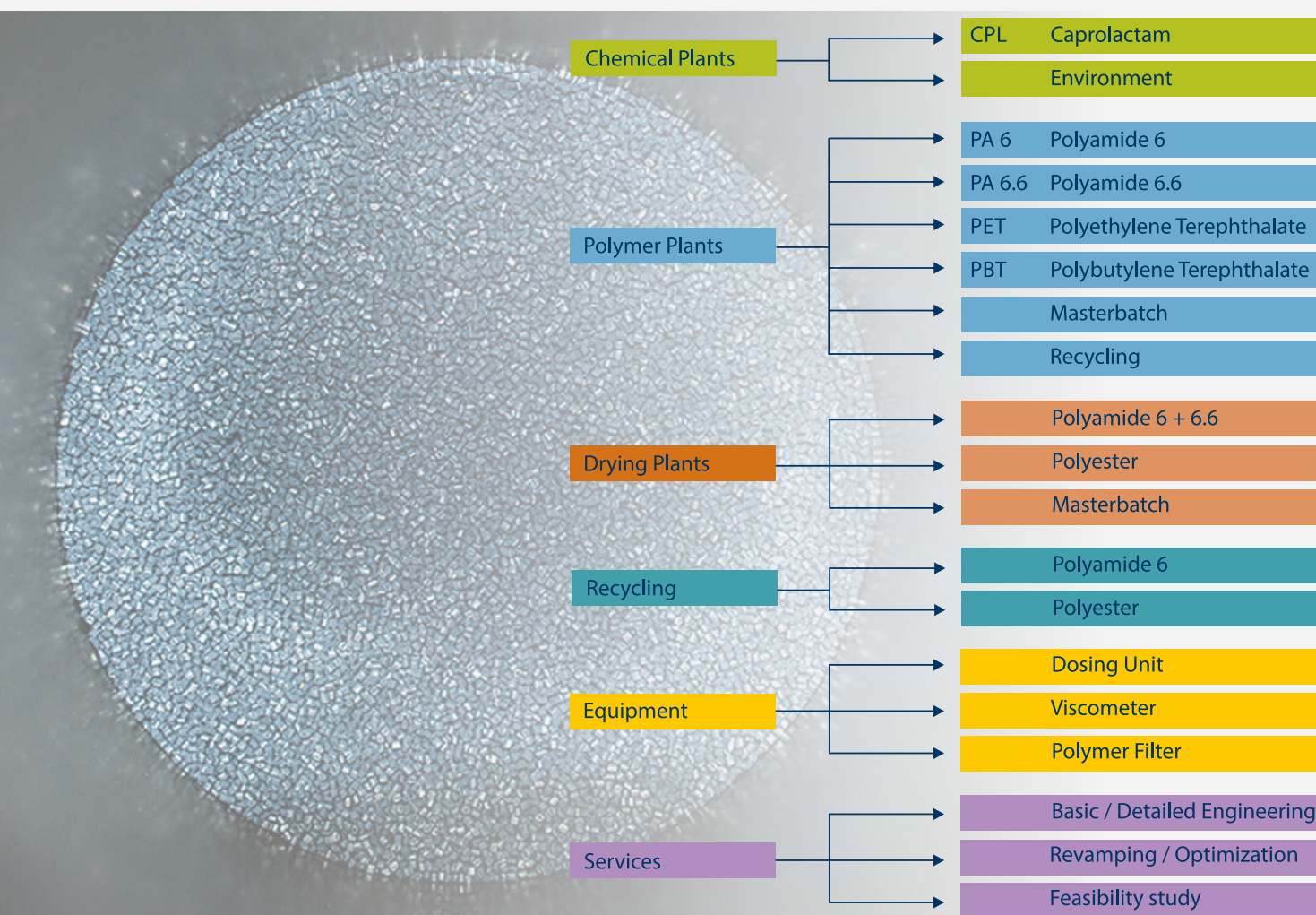
- Chemical Plants
- Polymer Plants
- Drying Plants
- Recycling
- Equipment
- Services

The main focus of AQUAFIL Engineering is the supply of continuous and batch polymer plants for polyamide and polyester.

The production plants of the AQUAFIL Group enable AQUAFIL Engineering to run pilot and industrial scale tests of new developments before entering the customer market. Due to years of experiences and excellent research activities in the group and the collaboration with external companies or universities, AQUAFIL Engineering has become one of the world leaders in polyamide and polyester production technologies with own know-how and patents.

The scope of supply includes:

- know-how and production licenses
- feasibility studies
- basic engineering
- detailed engineering
- supply of complete production plants
- supply of single components/sections
- supervision of erection and start up
- training of plant operators
- modernization/optimizing of plants
- scale up of chemical plants and equipment according to clients know-how or basic engineering



Polyamide

Polyamide polymers are characterized by the functional group (R-NH-CO-R) in their main chain like PA6 (Polyamide 6, made out of Caprolactam) and PA6.6 (Polyamide 6.6, made out of Hexamethylene diamine and Adipic acid). Today polyamide products are used in a wide range of application like textiles, automotive, carpets and sportswear due to their different properties.

In the last years AQUAFIL Engineering has made new developments in the area of polyamide production which make the plants more flexible, economic and ecological.



Continuous Polyamide Plants

Product and Process

According to the requirements of the customer AQUAFIL Engineering offers batch as well as continuous polymerization plants. The plants can produce Nylon 6 polymer for textile and technical yarns, BCF, engineering plastics or film.

The process starts either from liquid or solid Caprolactam (CPL). The plant includes the CPL melting, 2 or 3-stage polymerization, strand or under-water cutting, 1 or 2-stage extraction, chips drying with or without solid state polymerization (SSP) and chips conveying and storage. CPL containing water is concentrated in a multi-stage concentration plant and recycled in the process.

The continuous plants can be designed up to a single line capacity of 200 tons/day.

LDR® Process

The LDR® (Lactam Direct Recycling) process is operated since decades in AQUAFIL and customers Polyamide 6 production plants.

The LDR® process is the most efficient and worldwide unique system to recover the CPL water in the polymerization unit. The concentrated CPL water is reused in the polymerization and the clean water is reused in extraction, thus avoiding process waste water (see also Lactam water concentration).

The LDR® process combines the advantages of:

- 100% Caprolactam usage due to total recycling
- low energy and utility cost
- simple plant design and operation
- no process waste water
- no air pollution

The process is available for all polymer qualities. With the newest innovation, the High Quality-LDR® (HQ-LDR®), also highest class polymer grades can be produced.

If requested the polymer can be also produced with over proportional feed of CPL concentrate for the production of engineering plastics.



Batch Polyamide Plants

Product and Process

For modified Polyamide 6 polymers or for low production capacities the batch polymerization process is advisable. A fast change of product specification is possible and the production can be stopped and started at any time. The batch polymerization can be engineered with batch or continuous extraction and batch or continuous drying of chips.

The lactam water concentration plant is similar as for the continuous process. Batch polymerization lines are offered up to 2,5 t/b and up to 6 b/d, depending on the viscosity.

The batch polymerization process can be used for the production of Polyamide polymer of different applications like textile, BCF, technical and compounding products.

Advantages

- modified polymer production
- fully automatic
- simple design
- high flexibility
- low energy/utility consumption
- continuous extraction and drying/SSP possible

Lactam Water Concentration

Standard lines of 3.000, 4.000, 6.000 kg/h and 12.000 kg/h water evaporation are available with 3- or 4-stage evaporation. The lactam water can be concentrated up to 80% b.w.

Advantages

- continuous operation
- low energy consumption
- no regular cleaning
- concentrate 80 % CPL
- water 0,1 % CPL
- careful treatment of product
- no choking
- direct recycling in polymerization
- no environmental problems, closed water circuit



Polyester

Polyester polymers are characterized by the functional group (R-COO-R) in their main chain like PET (Polyethylene Terephthalate), PBT (Polybutylene Terephthalate), PEN (Polyethylene Naphthalate), bio-based PLA (Polylactic Acid), PBS (Polybutylene Succinate) and PBAT (Polybutylene adipate-co-terephthalate). Today polyester products are used in a wide range of applications like textiles, automotive, packing and container due to their different properties.

In the last years AQUAFIL Engineering has made a lot of innovations in the area of polyester production which make plants more flexible, economic and ecological.

Continuous Polyester Plants

AQUAFIL Engineering has long experiences in building and designing continuous and batch polycondensation plants for textile, film and bottle grades. Some of our engineers are already working in the business field more than 40 years. The managing director of AQUAFIL Engineering is one of two inventors of the shaft less finisher DRC® (called Disc-Ring-Cage reactor). The finisher design has been improved in the last years and is used for medium viscosities as well as high viscosities up to IV 1.2.

2-Reactor Technology

The 2-Reactor plant technology can be used for capacities up to 600 tons/day. AQUAFIL Engineering analyzed carefully the market situation in the past. The study showed the request of the market and the customers for highly efficient plants and low conversion costs.

Following the idea of smaller, more flexible and simplified production AQUAFIL Engineering has designed the 2-Reactor process for which patents have been granted for the technology as well as for the equipment. The concept of simplified and flexible polycondensation plants allows to compete with the production cost of large scale plants. The 2-Reactor technology based on the unique AQUAFIL UPR® reactor (Universal Polymerisation Reactor) can be used for textile, film and bottle applications with IV 0.58-0.68 and technical yarns with IV up to 0.98.

The unique reactors for the polyester process are designed and patented by AQUAFIL Engineering. The reactors are fabricated by selected manufacturers with high quality standards in Europe.

Before the main reactors are shipped to the clients, each reactor is tested with a heat and vacuum test according to AQUAFIL Engineering standards in the workshop.



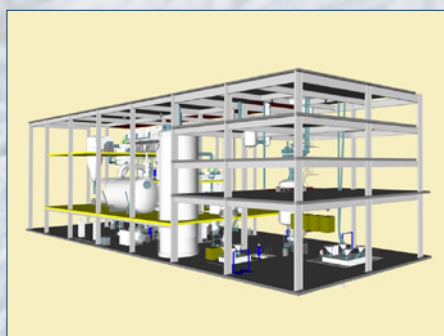
Continuous Polyester Plants

Low Building Technology (LBT®)

The newest development of AQUAFIL Engineering is the LBT® polycondensation plant. It fits into a simple storage hall and does not require a difficult building structure. Customers can drastically reduce the building and erection cost and time, up to 50%. Additionally, the LBT® plants achieve the lowest electrical consumption worldwide compared to latest competitor plants.

LBT® and UPR® advantages

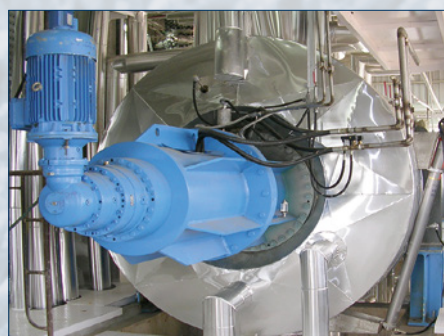
- less equipment cost
- less utility consumption
- shorter hold-up and reaction time
- lower AA-generation
- lower DEG formation due to large surfaces, low temperatures
- lower oligomer formation and losses
- reduced space and building cost
- shorter project realization time



Melt to Fiber/Resin/Film Process

AQUAFIL Engineering can supply polycondensation plants for direct spinning of fibre or filaments (DSP), direct film casting (DFC®) and high viscosity for resin.

Modifications needed for fiber, resin or film applications can be made with special AQUAFIL Engineering Melt Modifying Systems (MMS).

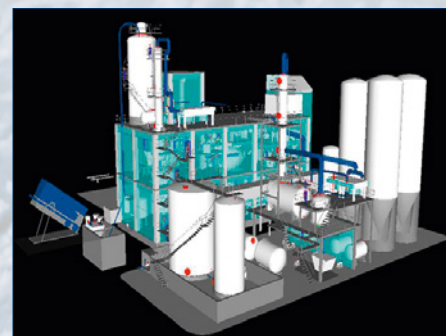


Batch Polyester Plants

AQUAFIL Engineering is able to provide 2- or 3-reactor batch polycondensation plants for polyester specialties. On request of customers AQUAFIL Engineering launched an updated batch polyester plant technology with new reactor design.

The new batch polycondensation plant was built already for different capacities up to 8 t/batch (10 batches/day).

The batch product quality and capacity can be improved and increased in combination with an AQUAFIL Engineering continuous polyester polycondensation plant.



Masterbatch Plant

Masterbatch Production Units

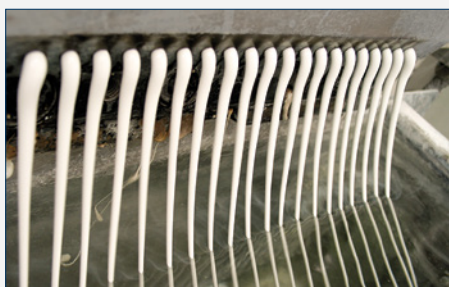
AQUAFIL Engineering GmbH is marketing polyamide and polyester masterbatch production units. A masterbatch production unit is interesting for all companies that are using masterbatch chips frequently and in high amounts in their spinning or film facilities.

Masterbatch Injection Units

Masterbatch injection units are using masterbatch chips which are molten in an extruder and injected into the polymer melt line which is coming directly from the polymerisation respectively polycondensation plant.

Masterbatch Drying Units

To achieve the best quality yarn, it is required to have a low and uniform residual moisture content of masterbatch chips. For this purpose, AQUAFIL Engineering has developed its own drying technology which is very economical and reliable compared to the standard drying processes. For further information, please check chapter "Drying Plants".



Plant Revamping & Optimization

AQUAFIL Engineering supplies revamping and optimization services for AQUAFIL or third party plant technologies. Customers who request a modernization of their old production plants and/or a diversification of product for their large "world scale" production plant, can be served by AQUAFIL Engineering. The revamping/optimization package provides a study of the existing plant and recommends modifications that can reduce energy cost, increase production capacity and/or producing a second or third product in parallel to the main product flow.

Finally, AQUAFIL Engineering can supply the engineering and equipment to realize the improvements. The latest revamping projects have been done with a return of investment in less than one year.

For further information, please see also chapter "Services".



Recycling Plants

AQUAFIL Group companies are using already since several years own developed recycling technologies. AQUAFIL Engineering offers and delivers recycling solutions as standalone or integrated unit in their polymer plants.

AQUAFIL Engineering has several different recycling technologies for different polymers and applications.

The type and appearance of waste is deciding whether a traditional mechanical or chemical recycling solution or a combination of both have to be chosen.

The latest innovation is a new complete polyester recycling system with modular construction principle, called "EverPET®".

For further information, please see also chapter "Recycling".

Drying Plants

AQUAFIL Engineering GmbH has a long experience in drying different polymer chips. AQUAFIL Engineering supplies chips dryers in connection with their polymer plants as well as separate single units according to the request of the clients. All drying plants have excellent economics and treat the polymer in a gentle way.

AQUAFIL Engineering's continuous chip dryers for polyester and polyamide 6/6.6 have been working for many years in AQUAFIL and other production plants. They have been optimized and improved continuously to reach today's perfection. This perfection in drying quality and economy is confirmed in the past by many external customers.

Polyamide 6 & 6.6

AQUAFIL Engineering polyamide dryers are solid-bed dryers. The chips are flowing through the dryer forced by gravity. The filling of the dryer can be done by several methods according to customer request and available space.

The drying is effected by hot dry nitrogen which passes through the dryer in opposite flow direction of the chips. The dried nitrogen has the specific dew point that is required. The circulated nitrogen leaves the dryer at the top, passes a cleaning system (to separate the dust), a heat exchanger and returns to the dryer. The nitrogen, required for the heating and drying of chips, is recycled completely. The whole drying system is delivered gastight. The humidity and oxygen content of dry nitrogen is measured continuously. The drying plant can also perform as postcondensation reactor. With certain process adjustment it is possible to provide final relative viscosities up to 5.

Advantages

- low energy and nitrogen consumption
- high flexibility 40-110%
- residual uniform moisture of chips as low as 0,05% b.w.
- extremely sharp hold up spectrum
- heat recovery included

Polyester

AQUAFIL Engineering polyester drying systems consist of a solid-bed dryer and crystallizer, if required. The crystallizer can be separated or integrated into the dryer according to the required plant arrangement. The crystallizer part is equipped with a chips lifter. The chips lifter keeps the chips moving, not allowing them to stick together during heat up. The chips are flowing through the dryer forced by gravity. The filling of the dryer can be done by different systems according to customer request and available space. The drying is effected by hot dry air which passes through the dryer in opposite direction to the chips. The dried air has a dew point below -40°C . The air is circulated in a closed circuit by roots blowers. There is no intake of fresh air. Only moisture to be removed is from chips and not from any intake air.

The air leaves the dryer at the top, passes a cleaning system to separate the dust, and returns to the blowers and air drying unit. The air required for the heating and drying of chips can be recycled completely or partially. The humidity of dry air is measured continuously.

Cooling of air is not required resulting in reduced energy consumption. Cooling water is not required.



Polyester

Advantages

- continuous chips drying system
- flexible design of dryer with incorporated crystallizer or as stand-by crystallizer
- low energy consumption, also at reduced capacity
- high flexibility without mechanical modification
- residual moisture of chips is very low
- extremely sharp hold up spectrum ensures the same treatment for all chips
- drying by hot dry air, no nitrogen required
- heat recovery is not required due to special design
- no maintenance and no cleaning required for the dryer
- no cooling water required due to special design
- continuous operating/through put is controlled by the extruder
- large number of sizes allows optimum selection of dryer
- closed air circuit, no waste air and no intake of fresh air
- air flow adjusted by blower speed
- own design of air drying unit with integrated heat recovery

Application

Drying of Polyester chips or flakes for:

- textile filaments
- micro filaments
- staple fibre
- technical yarns
- POY, FOY, FDY
- Bico-spinning
- Non-woven spinning

Consumption

- based on a dryer with 750 kg/h nominal capacity
- figures are referring to 1000 kg of dried chips:

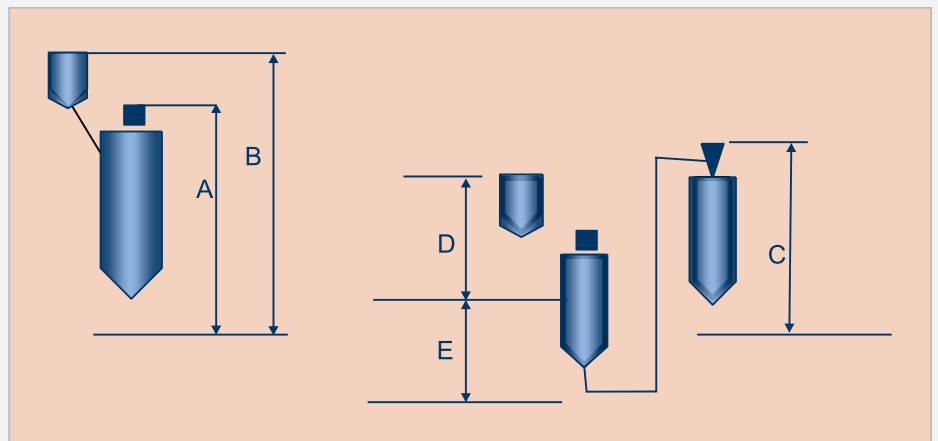
| | |
|---------------------|--------------------------------------------------|
| Energy for heating: | 80 kWh, equal to 68.800 kcal, equal to 288.052J. |
|---------------------|--------------------------------------------------|

| | |
|-------------------------|--------|
| Electricity for drives: | 13 kWh |
|-------------------------|--------|

| | |
|-----------------|---------------------|
| Compresses air: | 0,2 Nm ³ |
|-----------------|---------------------|

Quality

- working range 40-110%
- moisture down to 15 ppm



Dryer capacity

| | kg/h | 50 | 100 | 150 | 200 | 250 | 300 | 400 | 500 | 750 | 1000 | 1250 | 1750 | 2000 |
|---|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|
| | t/d | 1,2 | 2,4 | 3,6 | 4,8 | 6 | 7,2 | 9,6 | 12 | 18 | 24 | 30 | 42 | 48 |
| A | m | 3,3 | 4,1 | 4,4 | 4,6 | 5,2 | 5,3 | 5,5 | 5,9 | 6,5 | 6,8 | | | |
| B | m | 4,4 | 5,2 | 6 | 6,1 | 6,8 | 6,8 | 7,3 | 7,7 | 8,3 | 8,9 | | | |
| C | m | | 4,0 | 4,4 | | | 4,7 | | 5,1 | | | | | |
| D | m | | 2,2 | 2,4 | | | 3,7 | | 4,2 | | | | | |
| E | m | | 2,6 | 2,8 | | | 3,0 | | 3,7 | | | | | |

EverPET®

The EverPET® technologies^{*)} are the newest developments in the field of polyester recycling and are unique technologies of AQUAFIL Engineering. EverPET® is the brand name for a number of different recycling systems customized to companies needs and includes solutions for mechanical as well as for chemical recycling.

The products made with EverPET® technology have highest quality and are equal to virgin material.

Depending on the quality of waste, that have to be recycled, there are different EverPET® recycling systems:

EverPET® - internal

clean PET waste of fixed IV without color, additives, metallisation or lamination

EverPET® - industrial

clean PET waste of different IV without color, additives, metallisation or lamination

EverPET® - consumer

clean PET waste of different IV and color, additives, metallisation or lamination

The new recycling systems replace the traditional recycling procedures, mainly consisting of:

- sorting
- extrusion, filtration and pelletizing
- chips conveying / storage
- chips drying, dosing and again melting / extrusion

In case customers are using a traditional extrusion recycling system of a third technology provider, AQUAFIL Engineering is offering optimization or revamping, with

EverPET® - IV Lift

increase of viscosity after extrusion in melt or solid

EverPET® - internal

The EverPET®-internal recycling technology including the feedback to the polycondensation plant (applied for patent) is an advancement of already proven recycling process of AQUAFIL Engineering.

Advantages

- EverPET®-internal produces a uniform high quality polymer, whereas the old conventional process generates a low quality polymer due to thermal and hydrolytic degradation
- EverPET®-internal reduces energy costs for recycling by minimum 30%, because of less process steps, no re-melting / extrusion systems
- EverPET® pellets have higher bulk density and reduce required storage volume dramatically (in same cases by 20 times)
- EverPET® pellets can be used in-house and/or sold as raw material to other polyester producer

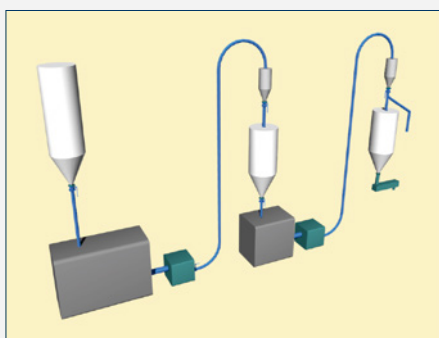
- EverPET® pellets allow higher recycling rates in polyester production

Process

The EverPET®-internal process can handle clean and clear film fluff or similar material. The EverPET®-internal process unit, consisting of equipment and auxiliaries, is designed to treat a PET produced in-house, where no contamination have taken place.

The final EverPET® pellets can be used in different ways like:

- in continuous or batch polycondensation process
- in extrusion and compounding process
- in sales as raw material for other polyester producers



New economical EverPET®-internal (direct feed into polycondensation or to bagging station)



diameter 10 mm



diameter 25 mm



diameter 8 mm

EverPET®-internal: different pellet shapes

^{*)} PET stands for all polyester products like bottle, film, fiber, compounds.

EverPET® - industrial/-consumer

EverPET®-industrial and -consumer is able to handle different polyester viscosities including impurities. EverPET® can even recycle metallized, laminated and colored materials which is unique in the market (applied for patent). Therefore there is no limitation for the sourcing of the polyester (PET) waste.

Advantages

- EverPET® - industrial /-consumer process uses as raw material PET waste of different viscosity, with lamination, metallization and/or color
- EverPET® - industrial /-consumer process reaches highest decontamination rate (due to soft glycolysis)
- EverPET® product is a glycolised PET which can be used in a virgin polyester plant
- EverPET® product reduces the energy consumption in virgin PET plant

- there is no difference in final polyester product, no matter whether it was produced from 100 % PTA or 100% EverPET® product

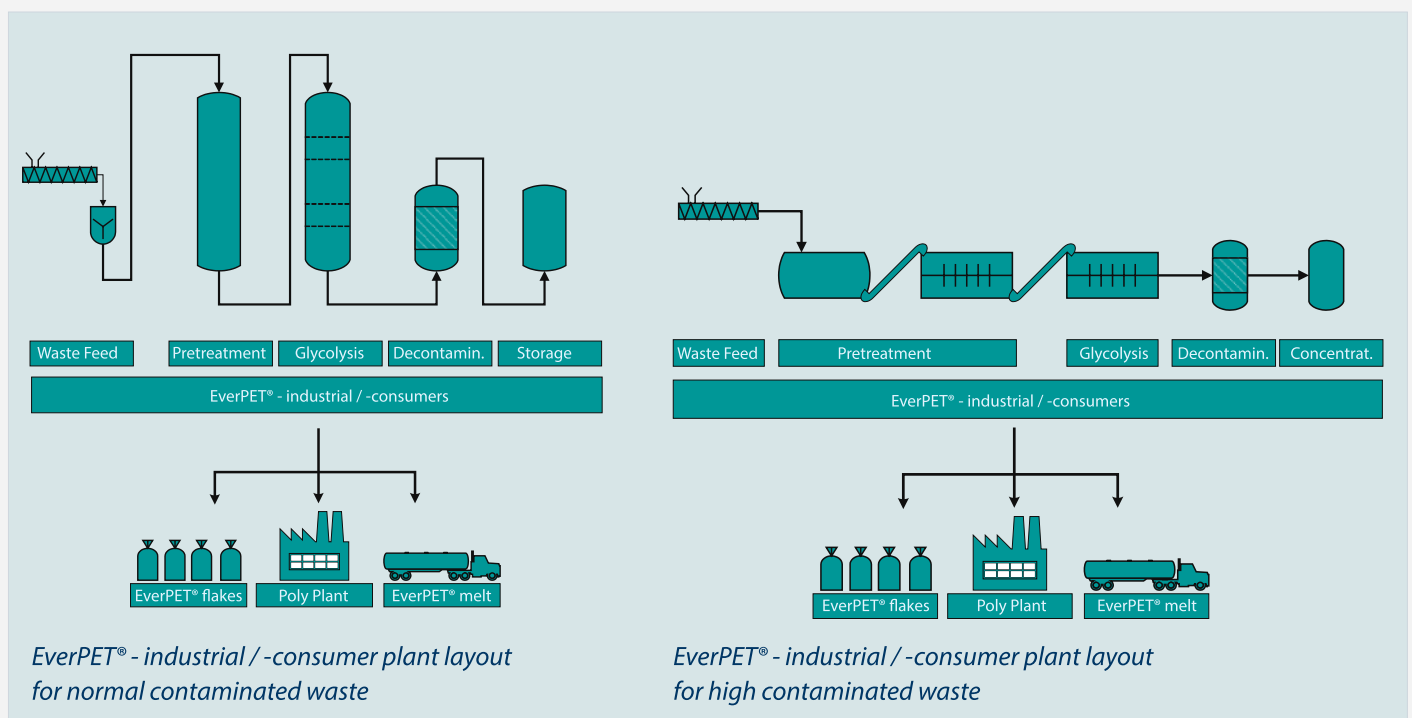
Process

The EverPET®-industrial or -consumer plant starts with the pretreatment of the cleaned and washed PET waste. In this step the material is equalized and fine impurities (like paper, glue, other polymers) are eliminated. Additionally, the material is prepared for the glycolysis section.

The EverPET®-industrial or -consumer plant is designed for the intake of different sources and shapes (e.g. flakes, fiber, film) and different viscosities. Depending on the contamination and other factors there are different plant designs available which reflect in a vertical or horizontal glycolysis reactor design. The glycolysis is made at low temperatures (soft glycolysis) and particles that are not dissolved are filtered out.

The glycolysed polyester (oligomer) is pumped afterwards through a special decontamination section including a final filtration step.

The oligomer of the EverPET® process is concentrated, reused in the polycondensation plant or flaked for external sales.



EverPET® - IV Lift

The viscosity of polyester is decreased during a normal extrusion process, even by using a vacuum system.

EverPET® - IV Lift allows not only to hold the intrinsic viscosity, but to increase it after the extruder. The IV lift can be made in liquid or solid phase according to the requirements. Additionally the EverPET® - IV Lift reaches a much higher decontamination yield than known systems.

Advantages

- IV increases in liquid or solid phase up to IV 1.2
- high decontamination rate (due to higher residence time and surface area)
- produces a uniform quality and viscosity
- low energy consumption in liquid phase

- low space requirement - plug & work design (HV reactor, vacuum system piping completely installed in a container)
- proven AQUAFIL Engineering technology since years

Process

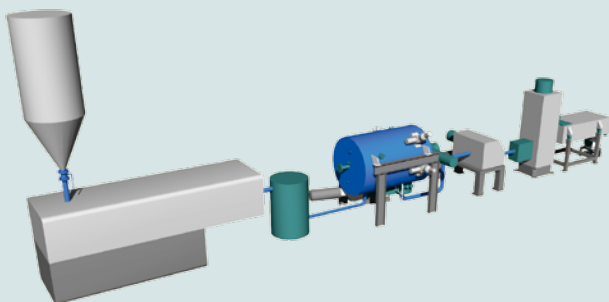
The EverPET® - IV Lift process makes the viscosity increase in liquid or solid phase. The decision for liquid or solid is mainly driven by the requirements of customer. From the economical point of view the liquid phase viscosity increase is in favour.

The required viscosity will be reached by using the AQUAFIL Engineering High Viscosity Reactor (HVR). The reactor design differs from liquid to solid phase. The viscosity will be increased to the normally required level between I.V. 0,78 to I.V. 0,85. The reactors can be designed for viscosities up to IV 1,2.

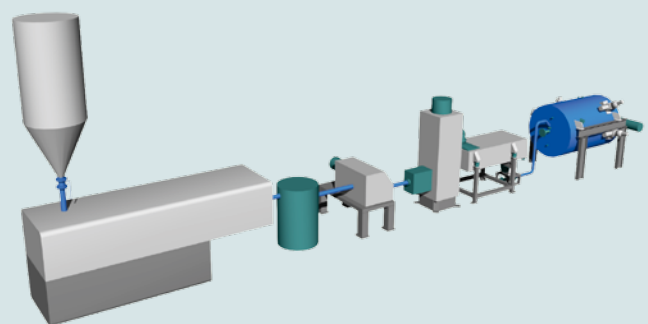
The complete EverPET® - IV Lift system including HVR, heating circuit, polymer discharge gear pump and vacuum system can be assembled up to a certain capacity in a steel frame or container (Plug and Work Modul).

The HVR unit is equipped with all instruments, valves and piping to operate the unit.

A power and control panel is provided for the HVR unit. The panel is completely wired.



EverPET® - IV Lift liquid



EverPET® - IV Lift solid

Equipment

AQUAFIL Engineering is offering single equipment that has been developed in-house due to no availability of suitable and reliable standard units.

AQUAFIL Engineering equipment have been engineered to meet the high quality standard of the AQUAFIL Group. In the meantime, such equipment can be purchased from AQUAFIL Engineering as package units with independent control system and can be easily installed as plug-in into any plant.

Viscometer

AQUAFIL Engineering In-line continuous viscometer is usually installed behind the finisher reactor in Polyester- or behind VK-tube in PA6-polymerization plants, measuring directly the viscosity of the polymer melt without further delay.

The signal of In-line continuous viscometer may be used for information only or can be used for process control (e.g. for vacuum (viscosity) control of the finisher).

Measuring method

- Delta-P of temperature controlled orifice

Installation

- installation in polymer line
- delivery with complete panel
- delivery includes in-outlet stop valve

Advantages

- In-line process and quality control, no waiting for laboratory result
- control system with own panel for measuring and drive
- data transfer to DCS or other process sections
- independent heating system, therefore no influence on viscosity measurement due to change of process parameters (temperature, flow, pressure)
- no loss of polymer, due to back-flow to process
- can be installed, removed or maintained during operation



Dosing

The AQU-RACY® dosing unit was developed by AQUAFIL Engineering to meet the high requirements of the AQUAFIL Group. All factories of the group are working with AQU-RACY® for dosing of Masterbatch chips. Since the successful launch in AQUAFIL Group production for different applications, AQUAFIL Engineering has sold the AQU-RACY® dosing unit all over the world.

The AQU-RACY® dosing unit can be used in general for all kind of granules. Anyhow most of the customers are using the dosing unit for Masterbatch chips.

General features using a masterbatch system:

- only basic polymer has to be stored and conveyed, product modifications are made at the single spinning extruder by adding the master chips
- high production flexibility, product changes can be made at once

- larger variety of products can be produced in a simple way
- low waste while changing the product
- small quantities of special products may be produced
- accurate dosing for any masterbatch directly at the extruder inlet

Advantages

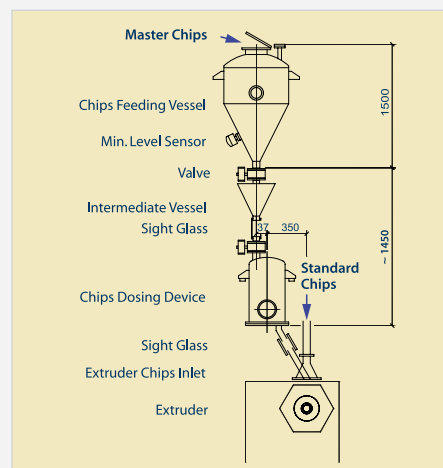
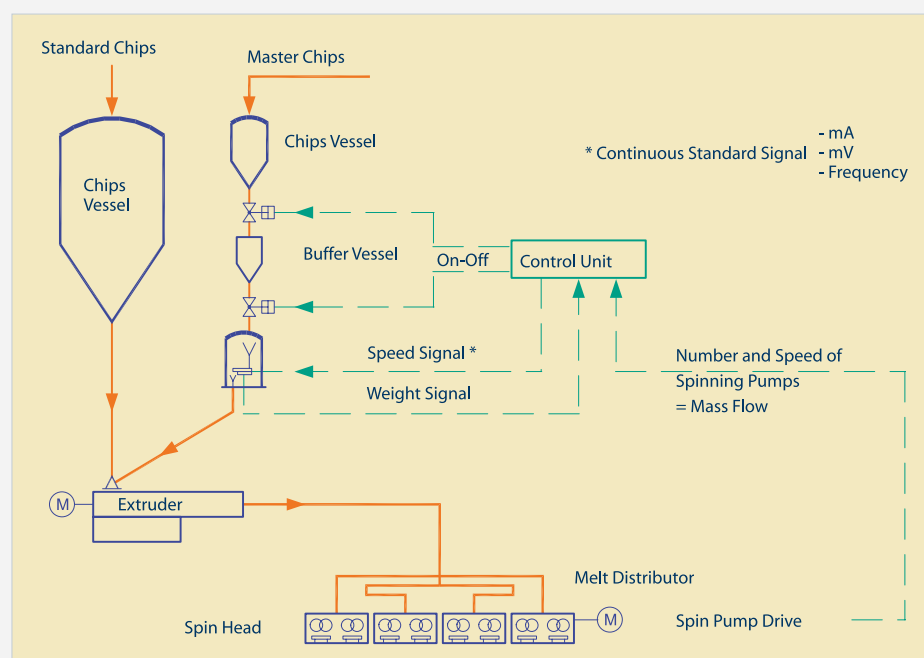
- gravimetric dosing, chips dimension not as critical as in volumetric dosing
- gas tight dosing unit, required for operation under nitrogen blanking
- standard material for product contact and housing is stainless steel
- no moving or rotating parts
- no maintenance required, no danger of screw break or jamming
- simple control system
- data transfer to other process section

Scope of supply

From masterbatch feeding nozzle to extruder inlet:

- chip feeding hopper
- dosing device
- control unit
- all necessary valves and instruments

| Technical data type | 200 | 500 | 1300 | 2500 |
|---------------------|-----------------------------------------------------------|---------|-----------|----------|
| Dosing rate g/min: | 1 - 200 | 2 - 500 | 20 - 1300 | 100-2500 |
| Accuracy: | from $\pm 0,1g$ to $\pm 0,5\%$, depending on dosing rate | | | |



Filter

AQUAFIL Engineering filtration systems are available for polymer filtration and filtration of gases (mist eliminators) for different processes.

Polymer Filter

The polymer filtration system of AQUAFIL Engineering was developed in the AQUAFIL Group. AQUAFIL Engineering polymer filter have been optimized in many years of production in AQUAFIL Group spinning and polymerization plants. The unique system of reusable filter supports and separate filter hoses extends the maintenance periods and ensures always the same operating conditions and life time.

- Filtration surface: 0,32 - 1,7m²
- Filtration rate: 7-80 µm
- Pressure: 250 bar
- Differential Pressure: max. 100 bar
- Temperature: 320 °C
- Material: Stainless steel
- Heating: Dowtherm vapour or liquid

Aerosol Filter - Mist Eliminator

AQUAFIL Engineering has long experiences and several long term clients who are using continuously the mist eliminator systems for different applications.

AQUAFIL Engineering builds units for the following industries:

- Plastics
- Textiles
- Rubber
- Synthetic Fibers
- Chlorine
- Cellulose & Paper
- Phosphoric Acid
- Fertilizer
- Nitric Acid
- Metal
- Sulphuric Acid
- Others

There are many different production processes that generate fine organic aerosols and mists, e.g.

- Extrusion, injection molding, blowing, etc.
- Coating of textiles, metals, papers, films, etc.
- Thermofixation of textiles.

In the nylon production plants of the AQUAFIL Group at the spinning and casting die heads, monomers and oligomers are sucked off and led to the AQUAFIL Engineering mist eliminator. Several waste gas streams can be combined to one stream with a central mist eliminator. The cleaned air leaves the plant and the separated products return to the plant.

In all these cases, hydrocarbons are evaporated that condense in the atmosphere and generate fine mists with a high light scattering effect and therefore high opacity. Pollution control regulations in Germany forbid emission concentrations of more than 20mg/m³ for these products.

The required concentrations can easily be reached with a mist eliminator plant designed by AQUAFIL Engineering.

AQUAFIL Engineering can guarantee, because of its experiences, the separation efficiency which will be realized in separators under given conditions. However, sometimes it is advisable to carry out a test on site. Therefore, AQUAFIL Engineering has pilot plant available where realistic tests in partial flow with a capacity up to 2500m³/h can be carried out.

The basic components of this process are the AQUAFIL Engineering mist eliminators. These are filter cartridges, which are made of a dense-packed layer of special glass fiber. The filter candles are available in standard dimensions of 600mm diameter and 1500 resp. 3000 mm length. Nevertheless, also customized lengths, diameters and special constructions can be delivered.

For organic mist the 3000 mm cartridge has an average capacity of 2500m³/h at a pressure drop of 300 daPa. In case of higher volumes more than one cartridge is used.



Services

AQUAFIL Engineering can provide all kind of services needed for a chemical/polymer plant. The large range of high quality services include:

- Basic engineering
- Detailed engineering
- Supply of complete production plants (without building construction)
- Supply of single components or plant sections
- Supervision
- Start-up assistance
- Training of plant personal
- Scale up of chemical/polymer plants and equipment

Optimization / Upgrade

- Production (capacity increase, equipment design, reliability)
- Product quality
- Production costs (conversion costs, reduction of utility consumptions)
- Environmental aspects (recycling, waste water)

Procurement / After-Sales / Support

- Chemicals or catalysts for polymer plants
- Spare parts (limited to AQUAFIL plants)
- Quick support (only for owners of AQUAFIL plant or customers with extra service contract)
- Remote Monitoring/Support

Studies

- Plant, Revamping and Optimization Audits
- Feasibility Studies

AQUAFIL Engineering offers different „Service Packages“.
Please contact AQUAFIL Engineering for your personalized „Service Package“.



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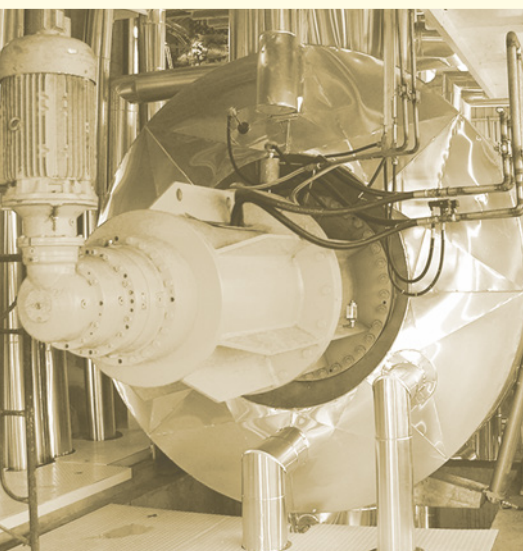
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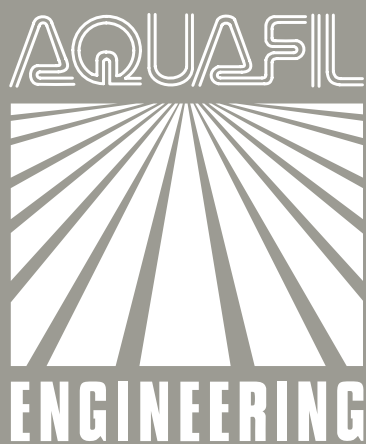
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