Polymers

Polymer process technologies

The Air Liquide Global E&C Solutions portfolio of Zimmer® technologies for polymer processes, based off more than 60 years of technological innovation, covers polyamides and polyesters.

With the market for polymers undergoing rapid expansion, Air Liquide Global E&C Solutions offers a comprehensive portfolio of polymer processes based on Zimmer® technologies in two main product families of polyamides and polyesters.

Our **polyamide** offer comprises two products or technologies: on the one hand, plants that produce Polyamide 6 (PA6) chips, which can subsequently be used for packaging (incl. PA6 Film), textiles and engineering plastics; and on the other hand plants which produce Polyamide 6.6 (PA6.6) chips, destined for textiles or engineering plastics purposes.

For **polyesters**, our portfolio includes three main technology applications: The first one concerns plants producing polybutyleneterephthalate (PBT) chips needed for engineering plastics and textiles. The second one is designed for plants which produce polyethyleneterephthalate (PET) chips, for packaging (such as bottles), textiles and engineering plastics purposes. These plants can also be directly connected to spinning plants for the production of textiles and may be combined with our third technology for polyesters, designed for the production staple fibres.

Polyamide 6 process

Our polyamide 6 continuous polymerization two-stage technology covers all stages from monomer melting to hydrolytic caprolactam polymerization, followed by chip production, extraction and drying.

This process allows for low residence times and results in a flexible production of medium-to high-viscous polymer for textile applications up to tire cord grade products.

Our large-scale units are capable of processing up to 400 tons per day in one line of polymerization and caprolactam recovery.

Lactam water recovery

In addition to our polyamide 6 continuous polymerization process, our technology portfolio offers a unique multistage caprolactam water recovery system, the benefit of which is the recovery of caprolactam in a high purity. The recovered caprolactam has virgin caprolactam quality and can be used for the production of PA6 suitable for high speed textile spinning applications thereby increasing feedstock efficiency.

Polybutylene terephthalate (PBT)

For a long time, the major raw materials used for polybutylene terephthalate (PBT) production were dimethyl terephthalate (DMT) and butanediol (BDO).

Air Liquide Global E&C Solutions proposes a continuous process based on Zimmer® technology where the DMT is substituted by terephthalic acid (PTA).

The benefits of PBT produced from PTA as opposed to DMT include less raw material consumption, a higher polycondensation speed, no methanol handling, and the production of tetrahydrofuran (THF), which is a highly valuable by-product.

Polyester (PET) continuous process

The key features of our continuous polycondensation plants that is based on Zimmer® technology for the production of PET are large capacities up to 1500 tons per day in one line and outstanding product quality. Due to optimized residence times, a low temperature profile and an optimized process cascading, our process achieves an efficient conversion of raw material and great product homogeneity.

Polyester packaging

For polyester packaging we offer a range of technology variants ready to meet customer needs: Direct High Intrinsic Viscosity (DHI) process, the conventional process with polycondensation and solid state postcondensation (SSP) or a conventional process with the latent heat crystallization are available. All of these processes offer the benefits of excellent product quality and low acetaldehyde (AA) content.

Film-grade PET

Our technology for the production of polyester film chips is based on Zimmer® technology, with a package that encompasses the production of film grade polyester, preparation and addition of additives, film waste recycling technology and special analysis.

For the production of high quality Polyester and Co-Polyester specialties up to 120 tons per day, we offer a batch process technology, whereas larger capacities can be addressed by a continuous process technology.

Polyester industrial yarn

For polyester industrial yarns we propose a direct melt route technology, which incorporates our double drive disc ring reactor (DDRR).

We also offer a chip route process, adjusted to customer needs, with a tumble dryer or a continuous SSP (solid state polycondensation) reactor.

Staple fiber

Over the past 40 years, our Zimmer® staple fiber technology has constantly been improved, resulting in large direct spinning plants capable of up to 200 tons per day in one line with excellent end product quality.

Staple fibers are produced in a two-stage process. The first is a continuous spinning process using the high productivity spinning system Zimmer® BN 100. This is followed by discontinuous fiber processing line for the production of all types of fibers for a wide range of applications.

Polyamide 6 continuous polymerization two-stage technology