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Licensed Polyolefin Technologies and Services

Hostalen

Low-pressure slurry process technology for the production of high-performance multimodal HDPE grades

Film I Blow molding I Pipe

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Hostalen ACP plant – Basell Orlen Polyolefins, Plock, Poland

At the heart of the new *Hostalen* "Advanced Cascade Process" (*Hostalen* ACP) process technology are three reactors in cascade, enabling the production of multimodal HDPE resins. Extension of the well-proven and highly regarded *Hostalen* bimodal process technology to multimodal capability marks another significant milestone in LyondellBasell's rich history of innovation.

Hostalen ACP process technology manufactures multimodal HDPE for high-performance resins with industry-leading stiffness / toughness balance, impact resistance, high stress cracking resistance and processing advantages for use in film, blow molding and pipe applications.

The success of the technology is reflected in the one million tons of *Hostalen* ACP capacity in production annually at the company's wholly-owned and joint venture locations:

- Basell Polyolefine GmbH, Wesseling, Germany – 320 kt/a, start-up 2004

- Basell Orlen Polyolefins SP. z o.o., Plock, Poland – 320 kt/a, start-up 2005

- Saudi Ethylene & Polyethylene Company, Al-Jubail Industrial City, Saudi Arabia – 400 kt/a, start-up March 2009

- Basell Polyolefine GmbH, Münchsmünster, Germany – 250 kt/a, start-up 2010

Key characteristics of *Hostalen* ACP process technology

Technology highlights

- Slurry cascade process with three stirred polymerization reactors in series

- Customized molecular weight distribution and composition of final product, achieving "tailored molecular design"

- Polymerization conditions can be adjusted independently for each reactor

Design and reliability

- Developed from the leading *Hostalen* bimodal process technology with demonstrated high reliability

- Single Ziegler catalyst chemistry

- Commercially proven at plant capacities up to 400 kt/a

- *Hostalen* bimodal process can be expanded to *Hostalen* ACP technology

Product capabilities and flexibility

- Produces multimodal grades used in all HDPE applications required by customers globally

- Addresses customer needs for expanded processing and product property needs

- Stiffness / toughness performance and stress resistance / stiffness balance pushed to new limits

- In-reactor process stability and superior homogenization results in batch-to-batch consistency

- Manufactures HDPE used in high-performance applications

Hostalen ACP process description

Process stages

- Catalyst feeding
- Polymerization
- Powder drying
- Extruder and pellet handling
- Hexane recycling
- Butene-1 recycling

The *Hostalen* ACP process technology uses ethylene monomer (and butene-1 comonomer) to produce multimodal HDPE with outstanding properties and performance characteristics. The process consists of three polymerization reactors, continuous stirred tank (CSTR) operating in cascade, with a liquid phase of hexane as the medium in which the reaction mixture is suspended. The catalyst is injected into the first reactor only, whereas raw materials are fed under independent controls to the remaining reactors. The polymer is then separated in the work up section from the slurry and dried; the final polymer powder is transported to the additivation and extrusion section.

Hostalen ACP process flow diagram
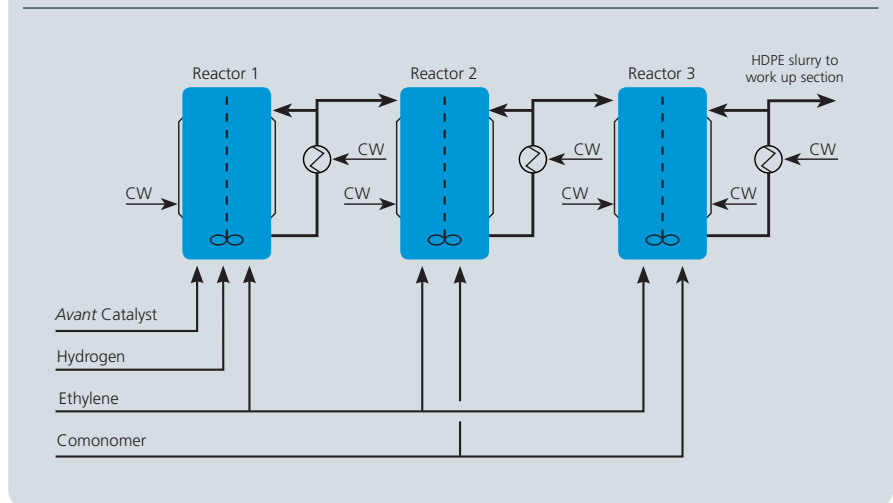
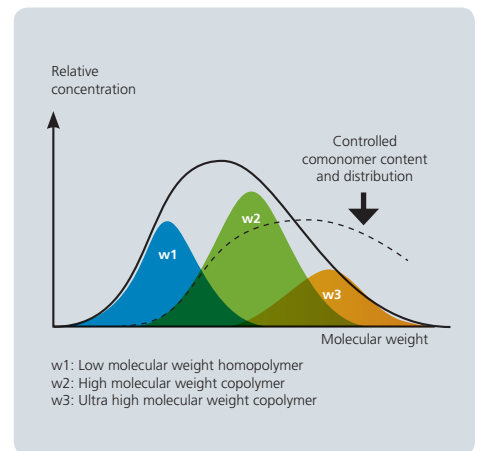## Hostalen ACP process technology

Capabilities and product properties

The ability to tailor the molecular weight distribution of each HDPE grade has established a new frontier in mechanical and processing properties:

- Improved toughness and impact resistance compared to conventional bimodal HDPE grades at the same densities due to the multimodal molecular weight distribution

- Increased stiffness of grades enables thin-walling capabilities, which can reduce the wall thickness of small blow molding parts by approximately 15% and increase the potential for weight savings and reduced raw material usage

- Due to their intrinsically broader molecular weight distribution, grades process faster and easier compared to conventional bimodal HDPE

Typical customer applications:

- High-stiffness, high-tenacity film, including packaging liners and bags
- Large and small blow molding, including packaged consumer goods
- Pipe, including pressure pipe for the transport of gas, drinking water and sewage
- Tapes and monofilament, including applications in the textile industry
- Injection molding, including caps and closures

w1: Low molecular weight homopolymer
w2: High molecular weight copolymer
w3: Ultra high molecular weight copolymer

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