Heat is a typical product of high pressure compression and Hammelmann offer a plunger cooling system that overcomes this potential problem. The system is designed to completely dissipate the heat created in the plunger seal area to prevent premature polymerisation of the co-monomer within the pump.

State of the art technology
Computational fluid dynamics (CDF) is employed to simulate and optimise the operational behaviour of the plunger seal. The theoretical results are then verified by a series of physical tests.

References
Hammelmann process pumps are installed in chemical industry plants safely and reliably transporting aggressive, toxic and explosive mediums day after day.

We will be pleased to engineer a customised solution for your needs.

BASF  Exxon Mobil  Bayer  HC Starck  British Petroleum  Henkel  Chevron  Ineos  Cognis  Lanxess  Dow Chemical  Nestle  DuPont  Sasol  Evonik Degussa  Shell

Pumps for the LDPE process

HAMPRO 255 - Vinyl acetate
Op. pressure 2500 bar
Flow rate 40 l/min

HAMPRO 175 - Methacrylic acid
Op. pressure 2500 bar
Flow rate 13 l/min

HAMPRO 75 – Acrylic acid
Op. pressure 2500 bar
Flow rate 6 l/min

Co-monomers
- Methacrylic acid
- Vinyl acetate
- Methyl Acrylate
- Ethyl hydrogen maleate

We will be pleased to engineer a customised solution for your needs.
Pumping co-monomers in the LDPE manufacturing process

To manufacture Polyethylene, ethylene gas undergoes multiple stage compression at pressures between 1600 and 3000 bar and is then injected into a reactor.

The Polymerisation occurs, dependent upon process variant in either a tubular reactor or in an autoclave at temperatures between 150 and 300°C.

Co-monomer is added to modify the products' physical properties. If the co monomer is directly injected into the reactor this has advantages for the process. For instance direct injection has a positive influence on the working lifetime of the wearing parts in the high pressure compressors, furthermore unwanted co-monomer contamination upstream the reactor is prevented.

In addition to conventional 400 bar injection equipment Hammelmann manufacture high pressure plunger pumps for direct injection of co-monomers at pressures up to 3800 bar. At this pressure a maximum flow rate of 6 m³ per hour can be realized.

Dynamic plunger sealing

The seal designs which are absolutely unique to Hammelmann enable safe, reliable, continuous duty operation at pressures up to 3800 bar.

The medium pressure is continuously reduced along the sealing surface. A minimum amount of high pressure leakage serves as lubricant and is returned to the pump suction chamber.

Gas tight design

Our latest variation of this pump series is the Zero emission where the pumped fluid is hermetically sealed within the pump, preventing leakage to atmosphere during operation.

The intermediate chamber of the pump can be outfitted with gas tight covers which provide a seal to atmosphere. The chamber is then charged with inert gas.

Extensive performance range

- **Power ratings**: up to 750 kW
- **Flow rates**: up to 2500 l/min
- **Operating pressures**: up to 3800 bar
- **Viscosities**: up to 2000 mPa s
- **Fluid temperatures**: -40 up to +200 °C

<table>
<thead>
<tr>
<th>Pump Number</th>
<th>Gpm</th>
<th>m³/h</th>
<th>l/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAMPRO 755</td>
<td>80</td>
<td>5.76</td>
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<td>HAMPRO 485</td>
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<td>HAMPRO 365</td>
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<td>1.38</td>
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<td>HAMPRO 125</td>
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<td>HAMPRO 25</td>
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<td>0.56</td>
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</tbody>
</table>

Series 5 process pumps

Hammelmann series 5 Triplex and Quintuplex pumps provide the highest standards of safety and reliability.

Twin conical valves

Suction and discharge valves are both conical in this configuration.

Compact construction

Hammelmann pumps produce maximum performance from a minimal footprint which is the result of combining a compact integral speed reduction gear end with the concept of a vertical configuration.

The integral speed reducer with twin helical gears arranged in a herringbone configuration ensures smooth running and even power transmission without axially loading the bearings.

Materials

The wetted parts are manufactured from the following materials:

- **Plunger / Labyrinth bush**: Tungsten carbide with nickel binder
- **Seals**: FFKM / PEEK
- **High pressure components**: 17-4 ph

Bellows system

The bellows are the hermetic seals for the power end to prevent the intrusion of fluid or gas. They are available in FKM, H-NBR and PTFE.

Dynamic plunger sealing

The seal designs which are absolutely unique to Hammelmann enable safe, reliable, continuous duty operation at pressures up to 3800 bar.

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Hammelmann pump range

LDPE process
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State of the art technology
Computational fluid dynamics (CFD) is employed to simulate and optimise the operational behaviour of the plunger seal. The theoretical results are then verified by a series of physical tests.

Pumps for the LDPE process

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