Reciprocating compressors

Product overview
Our technologies have been at the forefront of reciprocating compression for more than 100 years

- **1922** First ammonia synthesis compressor
- **1964** First hypercompressor for LDPE
- **1966** First compressors for re-injection of associated gas
- **1976** Highest working pressure in a hypercompressor for LDPE: 3,500 bar
- **1990** Fully balanced compressor for offshore applications
- **2014** Highest installed power for a LDPE compression unit: +38 MW
- **2019** One of the largest API 618 compressors: 20+ MW for 8-cylinder unit
## Product line at a glance

### API 618 slow speed
**Process-gas compressors**
- Balanced opposed type
- Horizontal and opposed cylinders
- Cylinders: 1 to 10
- Speed (rpm): 300 to 750
- Pistons speed (m/s): 3 to 4.5

**Chem/petrochemical**
- Refrigeration
- Ethylene, HDPE, LLDPE
- Ethylene oxide
- Polypropylene
- Low-density polyethylene

### API 618 high speed
**Natural gas compressors**
- Balanced opposed type
- Speed (rpm): 750 to 1,200
- Pistons speed (m/s): 5 to 6
- Common in offshore and FPSO because of their reduced footprint vs. equivalent slow-speed unit

**Hypercompressors**
- High-power machines for LDPE production up to 3,500 bar
  - Unique frame design
  - Suction pressure: 200 to 300 bar
  - Discharge Pressure: 1,200 to 3,500 bar
  - Installed power up to 40 MW
# Reciprocating compressor portfolio

<table>
<thead>
<tr>
<th>Family</th>
<th>Frame size</th>
<th>Throws</th>
<th>Max. power</th>
<th>Max. rod load</th>
<th>Max. speed</th>
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<tbody>
<tr>
<td>API 618 process</td>
<td>OA</td>
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<td>PH</td>
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<td>PK</td>
<td>4–24 **</td>
<td>72,000</td>
<td>2,900</td>
<td>310</td>
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</tbody>
</table>

* At max. speed and max. number of cylinders.  
** Number of cylinders. Up to 12 cylinders in a single frame.
API 618 reciprocating compressor

Main components

- Volume bottles
- Pneumatic valve unloaders for capacity control
- Cast cylinder
- Crankshaft (forged steel)
- Main oil pump
- Crosshead (cast steel)
- Oil wiper packing
- Piston rod
- Rod packing
- Piston
- Cylinder valve
- Connecting rod (forged steel)
- Crankcase (cast iron)
- Sliding body
- Distance pieces (cast iron)
- Forged cylinder
Low density polyethylene (LDPE)
A challenging reciprocating compressor application

Booster/primary compressor
Two services on single frame
• 2 to 3 stages on booster, and 2 to 3 stages on primary
• 6 or 8-cylinder configuration
• Suction pressure: 1 to 2 bar
• Discharge pressure: 300 bar
• Installed power up to 12 MW
• Scope of supply includes process gas plant—vessels, separators, gas coolers, and control/safety valves

Hypercompressor
• 2-stage service
• Suction pressure: 200 to 300 bar
• Discharge pressure: 1,200 to 3,500 bar
• Installed power up to 40 MW
• Industry biggest installed hyper is a 20PK, 20 cylinders, twin frame with 33 MW installed power
Hypercompressor for LDPE

Main components

- Crosshead assembly
- Connecting rod assembly
- Cranckshaft
- Packing
Acoustic and dynamic piping analysis

- Baker Hughes–Nuovo Pignone started acoustic analysis in the mid-1960s with an analogue simulator
- Unique in-house team expertise
- Extensive experience: more than 1,000 plants analyzed
- Always performed in conjunction with mechanical analysis
- Proprietary digital program in use since 1989, tuned with our analog simulator and field test, validated with over 25 years of experience

Expertise, modern tools, and facilities to define the optimum configuration for any type of reciprocating compressor plant—including the most critical as LDPE plants
API618 6HG
Service: LDPE booster primary
Location: US
API 618 8HG
Service: LDPE booster primary
Location: UAE
API618 6HE + LDPE 8PK

Service: LDPE plant
Location: China
API618 8HG
Service: hydrogen make-up
Location: Thailand
API618 8HG
Service: hydrogen make-up
Location: Kuwait
LDPE 12PK

Service: LDPE plant
Location: Canada

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API 618 process compressors
https://youtu.be/pV32BlgMGvA

LDPE compressors
https://youtu.be/4qKvF6cEpKk