Sulzer is a world leader in the energy industry. We provide state-of-the-art pumping solutions for oil and gas production, transportation, refining, and petrochemical processing. sulzer.com/upstream
Decades of world records in oil and gas

1975  World’s first duplex injection pumps  Algeria – 13 units
1977  World’s largest injection pumps  15.7 MW – 2 units
1978  World’s largest crude oil pipeline  Saudi Arabia – 33 units
1978  World’s largest oil pipeline pumps  Saudi Arabia 11.2 MW – 33 units
1981  World’s largest injection pumps  Alaska – 18.8 MW – 2 units
1984  World’s largest offshore injection pump  Abu Dhabi – 14.2 MW – 1 unit
1985  World’s longest pipeline  Canada – 100 units
1992  World’s largest vertical injection pumps  Norway – 6.7 MW – 2 units
1994  World’s largest LNG send out pumps  Turkey – 2,121 m – 5 units
1999  World’s largest offshore multiphase pumps  North Sea – 4.5 MW – 2 units
2000  World’s largest multiphase pumps  Siberia – 6.0 MW – 4 units
2001  World’s highest pressure injection pumps  Gulf of Mexico – 605 bar – 4 units
2002  World’s largest injection pumps  Caspian Sea – 27 MW – 4 units
2007  World’s largest LNG send out pumps  Belgium – 1.43 MW – 3 units
2008  World’s largest oil pipeline pumps  Russia – 14.5 MW – 24 units
2011  World’s highest pressure injection pump  Gulf of Mexico – 800 bar – 2 units
2012  World’s highest power subsea multiphase pump  3.2 MW – 1 unit
2020  World’s highest pressure injection pump  Gulf of Mexico – 1,000 bar – 2 units

The Sulzer advantage

Expertise
Sulzer has extensive knowledge in the oil and gas market. Our highly skilled engineers have an excellent track record in implementing effective solutions to meet the needs for increased pressures and flow rates in the offshore floating production field.

Reliability
With the increases in remote and under-developed production locations, pump reliability is vital to the success of projects.

Sulzer’s pumps have a reputation for being reliable in the most challenging of locations which makes us the right partner for offshore floating production projects.

Customer service
Our engineers work closely with each customer to ensure their pumps meet the specific needs of the project.

Sulzer supports the customer as a sole-source supplier with a vast range of products and a global network of service centers.

State-of-the-art testing capabilities
All Sulzer manufacturing plants have advanced testing facilities, capable of demonstrating pump performance and proving the ancillary equipment to ensure smooth commissioning and start-up.

Gas turbine string testing
One of the Sulzer differences is our unique in-house gas turbine string test facility in Leeds, UK. Having supplied hundreds of gas turbine driven pumps, we are aware of the need to run the full train prior to shipment. The GT test facility in Leeds can string test with gas turbines up to 30 MW. The other test loops in Leeds can test to even higher MW using motors and Variable Frequency Drive (VFD). Our other facilities have similar variety of test facilities to test pumps they build.

Subsea testing
Sulzer, together with FMC technologies, a leading provider of subsea production and processing systems, have developed a powerful new subsea multiphase pressure boosting system. These systems combine field proven pump hydraulics from Sulzer and both permanent magnet motor technology and world leading subsea processing system integration from FMC technologies.
You set out the challenge, we have the solution

<table>
<thead>
<tr>
<th>Oil production</th>
<th>Pipelines</th>
<th>Floating Production, Storage and Offloading (FPSO)</th>
<th>Process and auxiliary systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pumps for injection, main oil line, seawater lift, fire-fighting, subsea and associated auxiliary applications</td>
<td>Booster pumps and main line pipeline pumps for upstream and mid-stream applications: crude oil, diluted bitumen, diluent, Natural Gas Liquids (NGL), refinery products and petrochemicals (gasoline, diesel, Liquefied Petroleum Gas (LPG), super critical ethylene, etc.)</td>
<td>Pumps for injection, firewater, seawater lift, offloading, process and auxiliary</td>
<td>Diagnostic and consulting, maintenance and support, technical and economic optimization through retrofits</td>
</tr>
</tbody>
</table>

Gas (LNG) Ultra-high pressure send out pumps for the latest generation of LNG terminals

CO2 CO2 pipeline transportation and high pressure injection pumps

Pump services

<table>
<thead>
<tr>
<th>Water injection</th>
<th>Crude oil off-loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reliable water injection is critical to modern oil production processes and is dependent upon efficient pumps that can operate for extended periods before needing maintenance. As the search for oil leads to the development of ever more extreme fields in terms of depth or geographical remoteness, the pumps selected become critical to the fields’ practical operation and viability. Sulzer manufactures four pump ranges specifically tailored for injection applications. Re-injecting produced water is an extremely abrasive application and would be detrimental to a pump’s performance, which can be evident in as early as a few weeks. Sulzer has developed coating technology that will greatly extend the pump life. Sulzer Pumps reputation is second to none for delivering ground breaking designs that keep the ‘state of the art’ ahead of the demands of these new developments.</td>
<td>Depending on the FPSO design, a booster pump is often required to export crude oil delivered to deck level by the FPSO cargo system. These pumps need to take the available output from the cargo pumps and boost it to sufficient pressure to allow transportation to an offloading tanker or pipeline to shore. Through utilization of expertise gained in years of experience in designing pumps for transcontinental pipelines, Sulzer produces engineered solutions specifically tailored to individual customer requirements.</td>
</tr>
</tbody>
</table>

Flow assurance Sulzer BB3 and BB5 pumps are also used for flow assurance service – sometimes referenced as dead oil or hot oil circulation. Though they are usually electric motor driven, sometimes they are specified with diesel engine drivers. These pumps are critical to maintain oil production in cold deep water.

Seawater treatment Enhanced oil recovery methods mean that prior to injection Sea Water will be treated to remove or reduce salt content. Sulzer pumps are employed to deliver sea water to the RO membrane rack to achieve this. Configuration of the sea water treatment module will determine which pump type is selected. BB2 pumps are usually designated for this application; however, multistage BB3 and BB5 pumps will be specified when higher pressure is required at the membrane.

<table>
<thead>
<tr>
<th>Firewater systems</th>
<th>Seawater lift</th>
<th>Process and auxiliary systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewater pumps lie at the heart of a FPSO firefighting system. The ability to run reliably under extreme conditions for extended periods of time is a key customer requirement. Sulzer’s self contained hydraulic drive fire pump system delivers optimal firefighting performance coupled with features to ensure minimum maintenance is required during long periods on standby. Conventional shaft drive fire sets are also available. Both options are fully packaged and tested by Sulzer to meet exacting customer needs.</td>
<td>Provision of seawater for cooling and other service requirements demand efficient, compact pumping solutions. Sulzer’s range of vertical axially split pumps are ideally suited to this application. Mounted inside the hull and taking suction from the sea chest, their compact dimensions minimize space. For seawater lift pumps specified mounted inside a caisson, Sulzer is able to provide vertical solutions with electro-submersible motor and traditional line-shaft.</td>
<td>The complex processes performed on a typical FPSO rely on the performance of dozens of pumps handling a variety of liquids under widely varying process conditions. The pumps are available in full compliance with the latest API610 and ANSI standards as well as designed for general industrial applications. Whatever the process or auxiliary application, Sulzer has a selection optimized to deliver economic, reliable performance.</td>
</tr>
</tbody>
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Offshore floating production

The complex processes performed on a typical FPSO rely on the performance of dozens of pumps handling a variety of liquids under widely varying process conditions. Sulzer offers pumps in full compliance with the latest API610 and ANSI standards as well as pumps designed for general industrial applications.

Whatever the process or auxiliary application, Sulzer has a selection optimized to deliver economic and reliable performance for:

- Water injection
- Firewater systems
- Seawater lift
- Crude oil off-loading
- Flow assurance
- Seawater treatment
- Process and auxiliary systems

### Floating Storage and Off-Loading (FSO)
A vessel used only to store oil without processing it is referred to as a floating storage and offloading vessel (FSO).

### Semi-submersible floating platform
A semi-submersible is a specialized marine vessel with good stability and seakeeping characteristics. The semi-submersible vessel design is commonly used in a number of specific offshore roles such as for offshore drilling rigs, safety vessels, oil production platforms and heavy lift cranes.

### Tension Leg Platform (TLP)
A TLP is a floating platform suitable for deepwater oil and gas field development. The platform is moored to the seabed by high tensile strength steel tubes which allow very little vertical motion.

### SPAR
A SPAR platform is a type of floating oil platform typically used in very deep waters. SPAR production platforms have been developed as an alternative to conventional platforms.

### Floating Production Unit (FPU)
Floating production units will usually be barge shape or platform type semi-submersible. As the name implies, these units have limited or no storage capacity.

### Floating Liquefied Natural Gas (FLNG)
Floating above an offshore natural gas field, the FLNG facility will produce, liquefy, store and transfer natural gas (LNG) at sea before carriers ship it directly to markets.
### Meeting your most demanding needs

<table>
<thead>
<tr>
<th>Application</th>
<th>Floating Production, Storage and Offloading (FPSO)</th>
<th>Floating Production Unit (FPU)</th>
<th>Floating Storage and Off-Loading (FSO)</th>
<th>Semi-Submersible Floating Platform</th>
<th>Tension Leg Platform (TLP)</th>
<th>SPAR</th>
</tr>
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<tbody>
<tr>
<td>Water injection</td>
<td>HPcp GSG CP MSD</td>
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<td>HPcp GSG CP MSD</td>
</tr>
<tr>
<td>Seawater lift</td>
<td>SJS SJT SMHv</td>
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</tr>
<tr>
<td>Crude oil off-loading</td>
<td>MSD HSB TSA</td>
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</tr>
<tr>
<td>Seawater treatment</td>
<td>BBTD BBS</td>
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<td>BBTD BBS</td>
<td>BBTD BBS</td>
</tr>
<tr>
<td>Flow assurance (dead oil / hot oil)</td>
<td>MSD CP GSG</td>
<td>MSD CP GSG</td>
<td>MSD CP GSG</td>
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<td>MSD CP GSG</td>
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</tr>
</tbody>
</table>
Product overview

OH1

CPE ANSI process pumps range ANSI / ASME B73.1 OH1

Features and benefits
- Maximized reliability thanks to shaft sealing conditions and heavy-duty bearing unit
- High standardization, easy installation and robust construction equate to reduced maintenance and operating costs

Applications
- Viscous liquids, clean and slightly contaminated liquids, fibrous slurries

Key characteristics
- Capacities: up to 1'650 m³/h / 7'000 USgpm
- Heads: up to 275 m / 900 ft.
- Pressures: 27.5 bar / 400 psi
- Temperatures: up to 260°C / 500°F

OH2

OHH/PRE overhung single stage pump API 610 OH2

Features and benefits
- Broadest range coverage in the industry for API 610 type OH2 pumps
- Finned bearing housing and fan cooling for long bearing life
- Bearing lubrication designed for vessel pitch and roll
- Low flow Barksie type impeller variants available
- High suction pressure design (PRER) available
- Available in special alloys for corrosive service

Applications
- Process and boosting applications

Key characteristics
- Capacities: up to 2'250 m³/h / 10'000 USgpm
- Heads: up to 400 m / 1'300 ft.
- Standard design pressures: up to 76.5 bar / 1'110 psi
- High pressure design: up to 150 bar / 2'200 psi
- Temperatures: up to 425°C / 800°F

OH3

OHV/OHVL overhung vertical inline pump API 610 OH3

Features and benefits
- Finned bearing housing and fan cooling for long bearing life
- Broadest range map in the industry for ISO 13709 (API 610) type OH3 pumps
- Heavy duty baselines with 2x BD 13709 (API 610) nozzle load option
- BD 21049 (API 650) cartridge type mechanical seals for reduced emissions
- Electric motor, VFD, engine and steam turbine drivers

Applications
- Process and boosting applications

Key characteristics
- Capacities: up to 1'450 m³/h / 6'800 USgpm
- Heads: up to 350 m / 1'150 ft.
- Standard design pressures: up to 51 bar / 740 psi
- High pressure design: up to 40 bar / 580 psi
- Temperatures: -160 to 340°C / -256 to 650°F

BB1

HSB horizontal axially split single stage between bearing pump API 610 BB1

Features and benefits
- Staggered vanes, double suction impeller on larger sizes for reduced vibration
- Custom hydraulics to meet both current and future requirements with a simple rotor / volute changes
- Ball-ball, sleeve-ball and sleeve-pivot shoe bearings are available
- High-speed designs available for remote gas turbine-driven applications

Applications
- Crude oil pipelines
- Heavy duty auxiliary applications

Key characteristics
- Capacities: up to 10'000 m³/h / 45'000 USgpm
- Heads: up to 550 m / 1'800 ft.
- Pressures: up to 150 bar / 2'200 psi
- Temperatures: up to 205°C / 400°F

HSA/SMH axially-split single stage pump API 610 BB1

Features and benefits
- Between bearing design for reliability at high flow rates
- Broad hydraulic coverage at 50 and 60 Hz speeds
- Axially split casing for ease of repair
- Vertical shaft (HSAv/SMHv) for limited deck space applications

Applications
- Onshore cooling water
- Offshore seawater
- FPSO

Key characteristics
- Capacities: up to 11'000 m³/h / 50'000 USgpm
- Heads: up to 700 m / 2'300 ft.
- Pressures: 15 to 40 bar / up to 560 psi
- Temperatures: up to 150°C / 300°F

HSAv/SMHv vertically mounted axially-split single stage pump API 610 BB1

Features and benefits
- With grease lubricated thrust bearing at the drive end and product lubricated proven design bearing at the non-drive end
- Interchangeable casing with the horizontal arrangement

Applications
- Seawater lift
- Ballast water

Key characteristics
- Capacities: up to 11'000 m³/h / 50'000 USgpm
- Heads: up to 260 m / 800 ft.
- Pressures: 15 to 40 bar / up to 560 psi
- Temperatures: up to 150°C / 300°F
BB2

BBS and CD between bearings single stage pump API 610 BB2

Features and benefits
- Centerline support for reduced thermally induced misalignment
- Double suction impeller for low NPSH3
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2 times API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load basematles for reduced installation cost

Applications
- Booster as well as high speed crude shipping services
- Sulfate removal

Key characteristics
- Capacities up to 5'000 m³/h / 22'000 USgpm
- Heads up to 450 m / 1'500 ft.
- Pressures up to 50 bar / 740 psi
- Temperatures up to 425°C / 800°F

BBT/B8TD radially split two stage pumps API 610 BB2

Features and benefits
- Centerline support for reduced thermally induced misalignment
- BBT-D double-suction impeller for low Net Positive Suction Head (NPSH)
- First critical speed is well above operating speed range for smooth operation
- Casing designed for 2x API 610 nozzle loads for freedom from piping distortions
- Grouted or ungrouted, 1x or 2x nozzle load basematles for reduced installation cost

Applications
- Seawater and crude oil boosting applications

Key characteristics
- Capacities up to 2'000 m³/h / 10'000 USgpm
- Heads up to 740 m / 2'500 ft.
- Pressures up to 100 bar / 1'480 psi
- Temperatures up to 425°C / 800°F

BB3

MSD axially split multistage pumps API 610 type BB3

Features and benefits
- Broadest hydraulic coverage of any BB3 type multistage pump in the market
- Axially split casing means rotor balance is not disturbed when rotor is installed
- Opposed impellers balance axial thrust, saving lube system costs on most applications
- Double suction, first-stage available on most sizes for reduced Net Positive Suction Head (NPSH)
- High speed option for gas turbine drive

Applications
- Pipelines
- Water injection
- CO2 pipeline and injection

Key characteristics
- Capacities up to 3'200 m³/h / 14'000 USgpm
- Heads up to 2'900 m / 9'600 ft.
- Pressures up to 300 bar / 4'500 psi
- Temperatures up to 425°C / 800°F

HPcp diffuser style high energy pump API 610 BB5

Features and benefits
- Inline or back-to-back rotor stack designs for rotordynamic stability
- Forged carbon steel, duplex SS, HIP’d and overlaid barrel construction
- TwistLock or bolted barrel closure with Superbolts™
- Sleeve, pocketed, or tilt pad bearings
- Grouted, ungrouted and offshore 3- or 4-point support basematles

Applications
- Water injection
- Offshore crude oil shipping
- Remote pipeline services

Key characteristics
- Capacities up to 4'500 m³/h / 20'000 USgpm
- Heads up to 8'100 m / 26'300 ft.
- Pressures up to 1'100 bar / 16'000 psi
- Temperatures up to 200°C / 400°F
VS0

**SJS submersible VS0**

**Features and benefits**
- No lineshaft couplings or bearings to maintain
- Low, medium and high voltage submersible motors available to 2 MW (2,700 hp)
- Water/glycol filled environmentally friendly motor for improved efficiency
- Variety of materials available from stainless steel to super duplex steel
- Two configurations available: standard (motor below pump) and inverted for low NPSHa applications (pump below motor)

**Applications**
- Offshore seawater lift
- Offshore diesel genset firewater
- Offshore ballast water
- Onshore pressure boosting

**Key characteristics**
- Capacities up to 10’000 m³/h / 44’000 USgpm
- Heads up to 230 m / 750 ft.
- Pressures up to 40 bar / 600 psi
- Temperatures up to 80°C / 180°F

Fire fighting systems

**SJT vertical turbine pump VS1**

**Features and benefits**
- Optimized hydraulics for high efficiency
- Packed stuffing box for reliable sealing and simple maintenance, mechanical seal is optional
- Rubber-lined product lubricated bearing in bowls and columns for long maintenance-free periods, other bearing materials are also available
- Spacer coupling allows servicing of the seal and thrust bearing as required
- Full pull-out design available for semi-open impellers and bowl diameter sizes > 50” to ease dismantling and maintenance

**Applications**
- Cooling water circulation
- Water supply
- Booster service
- Offshore firewater and service water

**Key characteristics**
- Capacities up to 62’000 m³/h / 270’000 USgpm
- Heads up to 110 m per stage / 350 ft. per stage
- Pressures up to 64 bar / 930 psi
- Temperatures up to 50°C / 122°F

**Diesel hydraulic driven pumping unit for firefighting**

**Features and benefits**
- Self-contained, containerized or skid module supports a diesel drive, booster pump, hydraulic power unit or angular gear box and lineshaft, fuel system, and all other systems required to operate the unit
- Minimum maintenance is required even during long periods on standby
- Available as container based and as open skid, and in duplex and super-duplex stainless steels
- Extremely robust

**Applications**
- FPSO
- Production platforms
- Drill ships

**Key characteristics**
- Capacities 500 to 3’500 m³/h / 2’200 to 15’500 USgpm
- Heads up to 200 m / 650 ft.
- Pressures up to 25 bar / 360 psi
- Temperatures up to 50°C / 122°F
The Sulzer Flow Equipment division keeps your processes flowing. Wherever fluids are treated, pumped, or mixed, we deliver highly innovative and reliable solutions for the most demanding applications.

The Flow Equipment division specializes in pumping solutions specifically engineered for the processes of our customers. We provide pumps, agitators, compressors, grinders, screens and filters developed through intensive research and development in fluid dynamics and advanced materials. We are a market leader in pumping solutions for water, oil and gas, power, chemicals and most industrial segments.

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