FLOW FLUID FORCIBLY

SPEW
POSITIVE DISPLACEMENT PUMPS

TWIN SCREW PUMP

SST Series

SPEW Pumps – Engineered for Reliability, Designed for Performance

SST Series Twin Screw Pumps are rotary positive displacement pumps that use two synchronized, non-contacting screws to convey fluid axially from suction to discharge, delivering a smooth, near-pulsation-free flow. Their design enables pressure-independent, precise flow control across an exceptionally wide viscosity range, from low-viscosity, non-lubricating liquids to very high-viscosity and shear-sensitive fluids. External timing gears prevent metal-to-metal contact, resulting in low wear, high reliability, and long service life, while the gentle pumping action ensures low shear, self-priming capability, bi-directional operation, and tolerance to entrained gas. These technical advantages make twin screw pumps highly versatile, efficient, and dependable for continuous-duty applications in oil & gas, marine,

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1. Product Overview

SPEW SST Series Twin Screw Pumps are heavy-duty rotary positive displacement pumps engineered for continuous transfer, circulation, and loading/unloading duties where a wide operating envelope is required. The twin screw principle enables stable, near-pulsation-free flow from very low viscosities to extremely high viscosities while preserving product integrity for shear-sensitive fluids. SST pumps are well suited for single-phase liquids as well as demanding services involving entrained gas, varying viscosity, and temperature fluctuations.

The SST series employs two synchronized, intermeshing screws rotating in opposite directions within a precision machined casing. Fluid is trapped in sealed cavities and transported axially from suction to discharge. Synchronization is ensured by external timing gears, eliminating screw-to-screw contact and reducing wear. Bearings are located outside the pumped liquid chamber to enhance reliability and to allow flexible sealing and material configurations.

1.1 Typical Industries

Oil & Gas: crude, condensate, produced liquids, slop/sludge transfer, tank farms, terminals

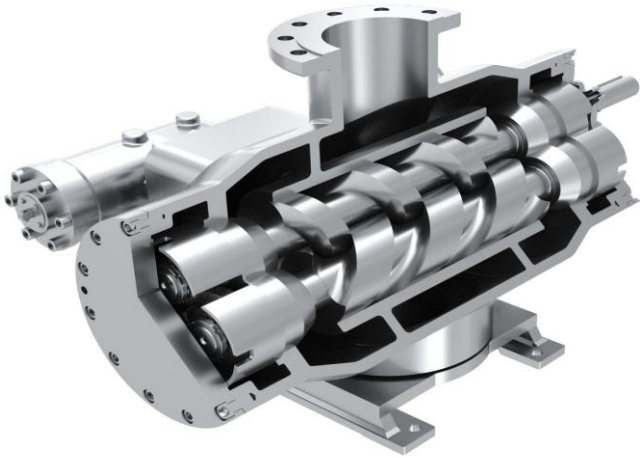
Marine: cargo transfer, bunkering, stripping, fuel oil service

Refining & Petrochemical: feed transfer, product blending/circulation, polymerizable fluids (with precautions)

Chemical & Process: resins, solvents, adhesives, surfactants

Lubricants & Additives: base oils, viscosity improver blends, additives dosing/transfer

Food & Pharma (where permitted): viscous syrups, oils, concentrates, sanitary configurations as required



2. Operating Envelope

The following ranges represent typical capabilities of the SST product family. Final selection depends on fluid properties (viscosity, density, vapor pressure), temperature, suction conditions, solids/gas content, materials, and sealing plan. For guaranteed performance, provide duty points and liquid data sheet.

Parameter	Typical Range / Capability
Flow Rate (Q)	Up to 3,000 m³/h (family range; depends on size and speed)
Differential Pressure (ΔP)	Up to 25 bar (continuous), higher on specific configurations
Maximum Discharge Pressure	Up to 40 bar (configuration dependent)
Viscosity	1 cSt to 3,000,000 cSt (selection depends on speed, ΔP, and heating)
Temperature	-40 °C to +250 °C (materials/seals dependent)
Speed	200 to 3,600 rpm (typical; VFD recommended for wide range)
Suction Lift (Self-priming)	Up to ~9 m (depends on viscosity, speed, line losses, priming state)
Entrained Gas Handling	Tolerant to gas fractions (application dependent; consult for multiphase)
Flow Characteristics	Near-pulsation-free, bi-directional (subject to seal/relief configuration)

2.1 Performance Curves (Placeholder).

Performance curves (capacity vs. differential pressure, power, efficiency, NPSHr) are provided during detailed engineering based on:

Fluid: name/composition, viscosity @ operating temperature, density, vapor pressure
Operating temperature range and any heating/tracing arrangements
Duty point: flow, suction pressure/level, discharge pressure/head, pipeline losses
Gas content, solids content/particle size, lubricity, corrosivity, and any polymerization risk
Required turndown ratio and control philosophy (VFD / bypass / control valve)
Insert curve pages here in final catalogue pack (one page per selected pump size and speed).

3. Working Principle

The twin screw pump is a rotary positive displacement machine. Two screws (male and female, or identical counter-rotating profiles) are mounted on parallel shafts and rotate in opposite directions. As the screws rotate, cavities are formed between the screw flights and the casing. These cavities open at the suction port, allowing fluid to fill by pressure differential. Continuous rotation transports the trapped fluid axially along the screw length toward the discharge port. The cavities reduce in communication with the suction as they progress, preventing backflow. The fluid is discharged as the cavities open to the discharge port.

Because the screws are synchronized by external timing gears, the screw profiles do not contact each other. This non-contacting design minimizes wear and allows handling of fluids with varying lubricity. The result is smooth, low-pulsation flow with low shear, suitable for delicate products and for stable metering in blending/circulation systems.

3.1 Key Functional Characteristics

Positive displacement: flow is proportional to speed (within slip limits).

Low pulsation: near-continuous axial conveyance reduces pressure ripple.

Wide viscosity window: from solvent-like liquids to very viscous fluids with suitable speed selection.

Bi-directional capability: flow direction reverses with rotation direction (ensure relief/valving compatibility).

Self-priming: capable of lifting fluid under suitable conditions, especially at higher viscosities.

3.2 Slip and Efficiency

As with all positive displacement pumps, internal leakage (slip) increases with differential pressure and decreases with higher viscosity. Selection should ensure adequate volumetric efficiency at the duty ΔP and minimum expected viscosity. For very low viscosities at high ΔP, larger size or higher speed may be required, subject to power and NPSH limitations.

4. Design & Construction

4.1 Main Components

Component	Description
Casing	Rigid housing with suction/discharge ports; precision bores for screw rotors and liner surfaces.
Screw Rotors	Hardened/engineered profiles for axial conveyance; non-contacting synchronization via timing gears.
Shafts	High-strength shafts with accurate alignment; designed for torque and hydraulic loads.
Timing Gears	External, hardened and ground gears providing rotor synchronization; oil bath lubricated.
Bearings	External anti-friction bearings supporting rotor loads; isolated from pumped fluid.
Seal Chamber	Seal housing compatible with single/double cartridge seals and flushing plans.
Relief/Bypass (Optional)	Integral or external protection against overpressure; set per system requirement.
Ports & Connections	Flanged connections as per ANSI/ASME, DIN, JIS (as specified).

4.2 Bearings and Gearbox

Bearings and timing gears are located in external housings to improve reliability and allow selection of lubrication arrangements. Timing gear lubrication is typically an oil bath, with optional forced lubrication for high-temperature or continuous high-speed service. Bearing housing designs may include oil seals, labyrinth seals, and venting provisions as required.

4.3 Clearances and Wear

Rotor and casing clearances are engineered to balance volumetric efficiency with operational safety across temperature. For abrasive or low-lubricity applications, special coatings or hardened materials may be applied. For high temperature service, thermal growth allowances and warm-up procedures are considered in design.

5. Materials of Construction (Typical).

Material selection depends on corrosion, temperature, wear, and required compliance. Below are typical options; final material list is established during selection and order confirmation.

Part	Standard Option	Alternatives / Upgrades
Casing	Cast Iron / Carbon Steel	SS316, Duplex, Super Duplex, Alloy steels
Screws	Alloy Steel	SS316, Duplex, surface coated (application dependent)
Shafts	Alloy Steel	SS316, Duplex
Timing Gears	Hardened Alloy Steel	Special heat treated gear sets
Seal Faces	Carbon/Ceramic	Tungsten Carbide, Silicon Carbide
Elastomers	NBR	FKM (Viton), EPDM, PTFE (where applicable)
Fasteners	Carbon Steel	SS fasteners, coated fasteners

5.1 Coatings and Surface Treatments (Optional)

Hard coatings for wear resistance on rotors/liners
Corrosion-resistant coatings for aggressive chemicals
Special paint systems for marine/offshore environments

6. Sealing Arrangements & Seal Support

SST pumps can be supplied with single or double mechanical seals, including cartridge designs. Seal selection depends on fluid type (hazard, volatility), temperature, solids, and emission requirements.

Seal Type	Typical Use	Notes
Single Mechanical Seal	Non-hazardous, clean liquids	May include quench/flush for temperature control.
Double Mechanical Seal (Unpressurized)	Hydrocarbons, odor/toxic services	Typical API Plan 52 with buffer fluid.
Double Mechanical Seal (Pressurized)	High vapor pressure / emission control	Typical API Plan 53 with barrier fluid.
Packed Gland (Optional)	Certain viscous or non-critical services	Higher leakage; depends on acceptance.

6.1 Typical Seal Support Plans (Reference)

Plan 11: Flush from pump discharge (clean services)
Plan 52: Buffer fluid system (double seal, unpressurized)
Plan 53A/53B/53C: Pressurized barrier systems (double seal, pressurized)
Exact plan selection is finalized based on the complete service conditions and client standards.

7. System Integration & Protection

7.1 Overpressure Protection

Positive displacement pumps must be protected against dead-head conditions. SST pumps can be supplied with integral relief valves or external relief/bypass arrangements. Relief valve settings are typically based on maximum allowable system pressure and pump driver capability. Relief flow should return to suction tank or suction line as per system design, considering heat generation during recirculation.

7.2 Flow Control

VFD control (recommended): stable turndown, energy efficient, best for viscosity variation
Bypass control: simple but may generate heat and reduce efficiency
Control valve: used where constant speed is required; ensure cavitation/pressure drop limits

7.3 Piping Recommendations

Keep suction lines short, straight, and generously sized to reduce friction losses.
Avoid high points and air pockets; provide venting where needed.
Install suction strainers where solids may be present (size to minimize pressure drop).
Use expansion joints and pipe supports to prevent nozzle loads on the casing.
Provide isolation valves and a bypass line for maintenance and commissioning.

8. Pump Selection Data Sheet (To Be Filled for Quotation)

Provide the following information to finalize selection, curves, and guaranteed performance.

Section	Required Data
Fluid	Name/composition; density; viscosity vs temperature; vapor pressure; lubricity; solids/gas content
Duty	Flow (normal/min/max); suction condition (tank level/pressure); discharge pressure/head; ΔP
Temperature	Operating, minimum/maximum; heating/tracing requirements
Installation	Indoor/outdoor; hazardous area classification; ambient conditions; corrosion category
Materials	Casing/rotors/shafts; elastomers; compliance needs (ATEX/NACE/food-grade)
Sealing	Seal type; flush plan; seal support system; leakage/emission requirements
Driver	Motor power/voltage/frequency; speed; VFD; coupling; baseplate
Testing/Docs	Hydrotest; performance test; material certificates; QA documentation

9. Standards & Compliance

SPEW SST pumps are designed with reference to the following standards and can be supplied in configurations aligned with project requirements:

API 676 – Rotary Positive Displacement Pumps (design reference/where applicable)
ISO 5199 – Technical specifications for centrifugal pumps (not directly applicable to PD pumps; referenced only when client standards require general QA formats)
ATEX – Explosion protection (optional, per region and classification)
NACE MR0175 / ISO 15156 – Materials for sour service (optional)

9.1 API-676 Compliance Statement

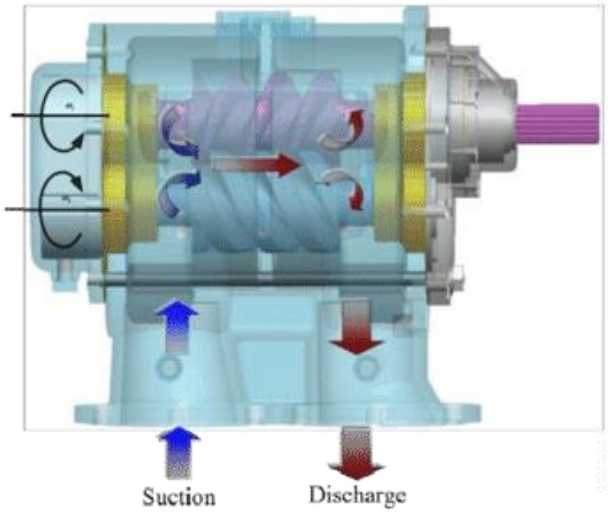
The SPEW SST Twin Screw Pump is a rotary positive displacement pump designed and manufactured to meet the applicable requirements of API 676 for the specified service, subject to the agreed scope of supply, materials, inspection/testing, and documentation. Any deviations, if required by the project, shall be listed and agreed during order confirmation.

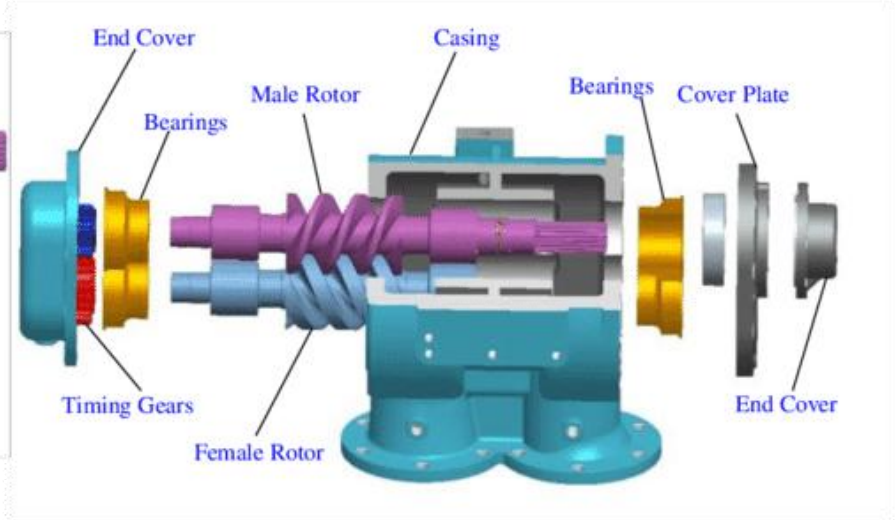
10. Testing, Inspection & Documentation

SPEW pumps follow controlled manufacturing and inspection processes. The following tests and documents can be offered depending on project criticality:

Item	Standard Offering	Optional / On Request
Hydrostatic Test	Yes	Test pressure and duration per standard/specification
Performance Test	Optional	Witnessed test with certified instruments
Vibration/Noise Check	As applicable	Extended checks for critical service
Material Certification	Mill certificates if required	EN 10204 3.1 / 3.2 as specified
Dimensional Inspection	Yes (key dimensions)	Full dimensional report
Painting/Coating Report	Yes (standard paint)	Marine/offshore paint system documentation
Documentation Pack	IOM manual & GA	Full QAP, ITP, spare parts list, exploded views

11. Diagrams Illustrations:





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