

SP Series Technology

Slim Pump Safety Valve Product Update

The Slim Pump Safety Valve (SPSV) is a retrofittable safety solution designed to support artificial lift production. The SPSV is installed through-tubing, in-line with a cable-deployed electric submersible pump (ESP), to deliver enhanced operational safety. If an existing ESP fails, operators can avoid the cost of a workover and lengthy remediation downtime by retrofitting the assembly above the existing pump. This through-tubing technology is fast and cost-efficient and ideal for depleted wells, or for reinstating shut-in wells that require artificial support to maximise production.

Operation

The SPSV sits below the ESP in the well and operates independently, removing reliance on the existing subsurface safety valve (SSSV) components and uses no pressurised chambers, hydraulic control lines or electrical power, which improves reliability. It is actuated by pressure differentials, to fail-safe close when the ESP is switched off and opens again when the ESP is pumping. It can be opened and closed as many times as required and provides an effective well barrier, being unaffected by lower well pressure. It effectively acts as a fluid loss valve, preventing PMM backspin for additional safety.

Market Readiness

The SPSV is API 14A accredited and is a unique, patent-pending technology. It has been fully commercialised and has successfully completed systems integration testing (SIT), on both of its through-tubing size variants, demonstrating efficient and reliable operation under field simulated conditions.

The SIT was conducted independently by Zilift, at their purpose-built facility, utilising their own cable-deployed ESP in-line with the SPSV, within a test and validation flow loop. A range of tests were performed to ensure that both SPSV variants, a 2.625" and a 3.19" sized valve, functioned in synergy with the ESP.

Both valves opened within seconds of the ESP's activation, ensuring no cavitation or overheating of the pump occurred. The valves quickly closed again on shut-down of the ESP and during continued operation, no impact in ESP performance was witnessed. Zilift personnel conducted pump-curve tests to fully validate the SPSV with their ESP technology.

SPSV deployments are currently planned in the North Sea and Middle East markets.



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Design and Application

Created using advanced materials and with the option for additive manufactured components, the SPSV provides a compact and cost-effective solution. It is available in variants for both 3.5" or 4.5" tubing with a standard temperature rating of 150 deg. C.

The unique bi-directional design permits a surface pressure test, to verify the integrity of the packer, valve and completion equipment. Emergency full bore pump-through is also available.

This versatile technology is multi-purpose and can be used as a safety valve for any well, in-line with rigless cable-deployed ESP systems, coil tubing deployed ESPs or jet pumps and velocity strings.



Operating Principle:

- Once deployed, the SPSV is failsafe shut and is unaffected by pressure from below.
- Operation of the ESP causes the SPSV to open.
- Once the valve has opened, ESP output will not be affected by the valve.
- Switching off the ESP will cause the valve to shut by means of a biasing spring.
- Whilst its recommended to equalize before opening, an ESP differential of 500 psi can open the valve even with 5,000 psi well pressure differential.

Features & Benefits:

- Patent pending design allows bi-directional sealing up to 5,000 psi. Well pressure or surface test pressure boosts valve shut.
- FLV operation prevents backspin of ESP.
- Metal to metal valve seat and poppet design for reliability.
- Precision burst disc for pump-thru/ equalisation.
- Standalone unit can be adapted to suit a variety of deployment scenarios.
- Subsurface controlled design requiring no hydraulic or electrical power to operate.
- Does not rely on existing completion components such as control line or seal bore integrity.
- Low operating pressure, does not restrict ESP operation or capability.

Valve API 14A V3 Annex B Qualified at SwRI.