

PCP SandGuard

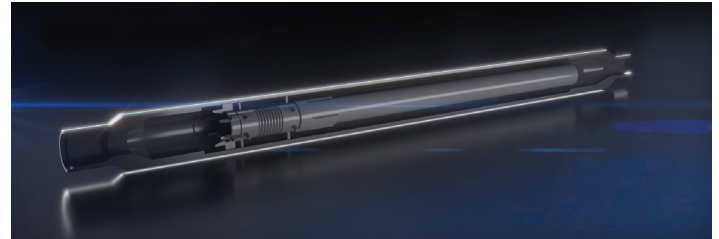
SAND AVOIDANCE AND PROTECTION EQUIPMENT OFFERING PROVEN, FAIL-SAFE SOLUTIONS TO EXTEND THE LIFE OF ARTIFICIAL LIFT EQUIPMENT

The SandGuard has become the industry leader in providing exceptional protection against the primary cause of ESP failure: Sand fallback. Continuing the legacy of the Multilift Solutions ESP SandGuard, the PCP SandGuard continues to provide the same functional quality as its predecessor, including complete isolation from the wellbore, sand diversion and isolation within the equipment and self-flushing features.

In addition to the core features of the SandGuard platform, the PCP SandGuard allows the installation and retrieval of the PCP rotor without pulling the entire equipment string. Situated just above the PCP stator, the PCP SandGuard allows the passage of a coupling up to 2" in diameter when pulled or retrieved. Additionally, after installing the PCP rotor, the diverter conforms to the diameter of the rod ensuring efficient and effective diversion of sand to the sand chamber and eliminating sand fall-back within the pump. These features provide the entire PCP system with a soft, trouble-free start every time.

Unique Challenges Require Unique Solutions

The PCP Sandguard overcomes the challenges of a through-tubing installation required of PCP equipment by utilizing the unique sand diverter system which allows a PCP rotor and coupling (up to 2") to be passed through the tool by expanding to accommodate the larger diameter. Following installation, the diverter system returns to the original diameter, conforming to the outside diameter of the rod during production.



Features

- Complete isolation of sand fallback
- Effective abrasion avoidance and diversion
- Self-cleaning feature on startup
- PCP rotor passage through tool
- Simple and quick installation procedures
- Overall protection against broken shafts, excessive wear to stator and stress on electrical system

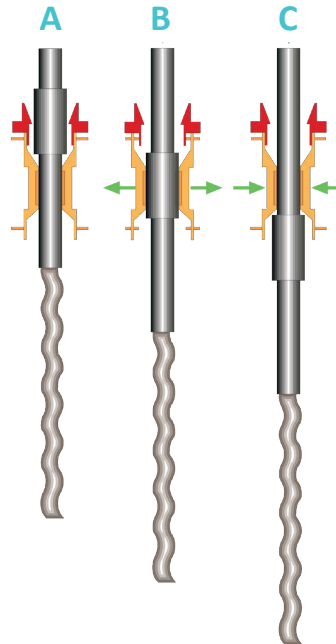


The sand diverter system provides the same features and function when the PCP rotor is pulled as well by expanding and contracting to conform to dimensions of the PCP. The simple yet effective design, provides a reliable way to ensure the PCP equipment stays in operations longer providing more uptime in production and significant costs to operations.

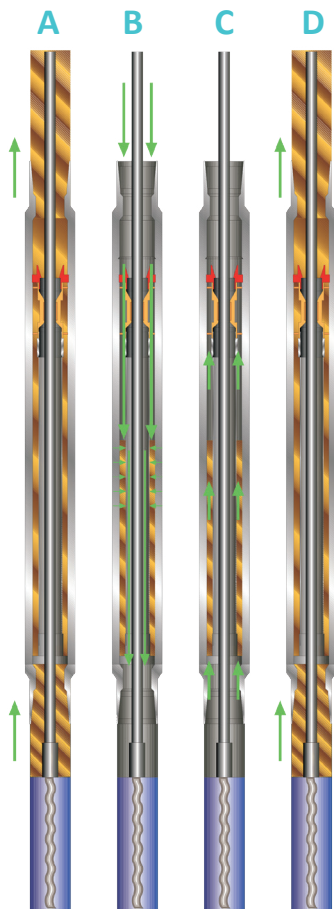
Reliable Technology, New Horizons

Relying on proven Sandguard technology in the ESP industry, the PCP Sandguard shares many features and functions that have been demonstrated through thousands of installations around the world.

As illustrated to the right, the function of the PCP Sandguard can be seen during a shutdown of a PCP system.



- A. The PCP rotor is passed through the diverter and enters the SandGuard inner tube.
- B. The PCP Rotor coupling mechanically activates the sand diverter system, which expands to allow the coupling to pass.
- C. After the coupling has passed through the sand diverter system, the diverter returns to normal internal diameter which conforms to the rods.



Phases of Shutdown and Sand Fallback

- A. **Normal production with oil, water and solids present in flow.** The Sandguard functions just as another tubing section during this phase with unrestricted flow and minimal pressure drop throughout the tool.
- B. **Shutdown occurs.** During this phase of the process, the fluid column in the tubing above the pump carries significant solids and sand that is harmful to the pump. The fluid falls back from gravity passing through the Sandguard, is diverted to the annular space between the housing and the inner (filter) tube where solids are captured and isolated from the pump while liquid is allowed to pass through to the pump.
- C. **New start.** The pump is restarted, unrestricted from debris, solids or sand allowing a gentle start protecting the pump from mechanical or electrical stresses caused by impacted solids. Additionally, the captured solids are flushed automatically from the flow of production allowing the tool to work time and time again.
- D. **Production continues** with adequate protection for the PCP system.