

Cyclone Pump System

The answer for pumping wells with **damaging solids**

The **Cyclone Adapter** system represents a true advancement in down-hole pump technology. Sand, grit, iron sulfide, and other fines which normally contaminate the produced oil and water can now quickly pass through the pump assembly. No longer are residual concentrations of these particulates allowed to collect between barrel and plunger.

Clearance between conventional pump plungers and barrels permit some fluid bypass, or slippage between these surfaces. Within this void space, sand, formation fines, and other particulates can accumulate. During the normal up-and-down motions of the plunger, these accumulations cause rapid wear, usually in the form of vertical scoring, to both the plunger and barrel surfaces. Moreover, frictional forces generated by these accumulations cause excessive stresses to be generated throughout the pump and rod-string which often result in a stuck pump, automatic shut-down of the pumping unit, or a parted rod string.

Repairs necessitated by the above forms of damage, plus revenues lost during resulting downtime, cost the oil and gas industry tens of millions of dollars each year. By incorporating the **Cyclone Adapter** system within the pump assembly, stuck plungers and premature wear of barrel and plunger surfaces can be eliminated. Costly well servicing and pump replacements can be reduced to a minimum.

How is this possible? During the down-stroke the **Cyclone Adapter**, along with the Cyclone Seat Plug forces any entrained particulates collected within the space between barrel and plunger inward through the axial evacuation ports and into the center of the plunger. Here, they commingle with other fluids entering the pump and are displaced into the tubing. Throughout the up-stroke particulates are also collected within the tapered neck of the **Cyclone Adapter**, where, during the down-stroke, they are flushed upward and enter the tubing through the Cyclone Top Plunger Adapter.

Simultaneously with the above, the axial ported technology, incorporated within the **Cyclone Adapter**, causes the fluid/particulates to constantly rotate. This rotation permits the pump barrel and plunger to wear more evenly, resulting in longer pump life and a more cost efficient pump assembly. While the pump is not operational, settling solids are redirected into the ID area of the plunger, reducing the possibility of stuck plungers and excessive barrel wear. This is done using the radial ported vane technology featured on the Cyclone Top Plunger Adapter.

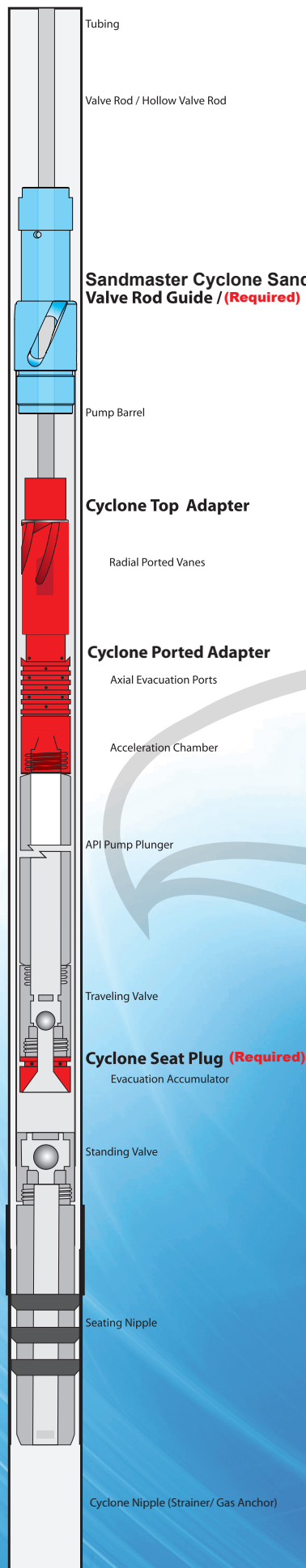
For best results, the complete **Cyclone Adapter** System is recommended.

****Eagle's Cyclone System is NOT a barrel plunger. The Cyclone Adaptor is a solids remediation tool, only to be used in conjunction with a standard API plunger design.***

****All parts to be assembled to API Specifications***

Benefits Include:

- Reduced number of stuck plungers
- Better flow efficiency
- Better pump efficiency
- Reduced barrel wear
- Reduced plunger wear
- Uniform wear of plunger
- Uniform wear of barrel
- Reduced down time
- Extended pump runs
- Reduced cost of operation



Cyclone Adapter System

▲ Up Stroke:

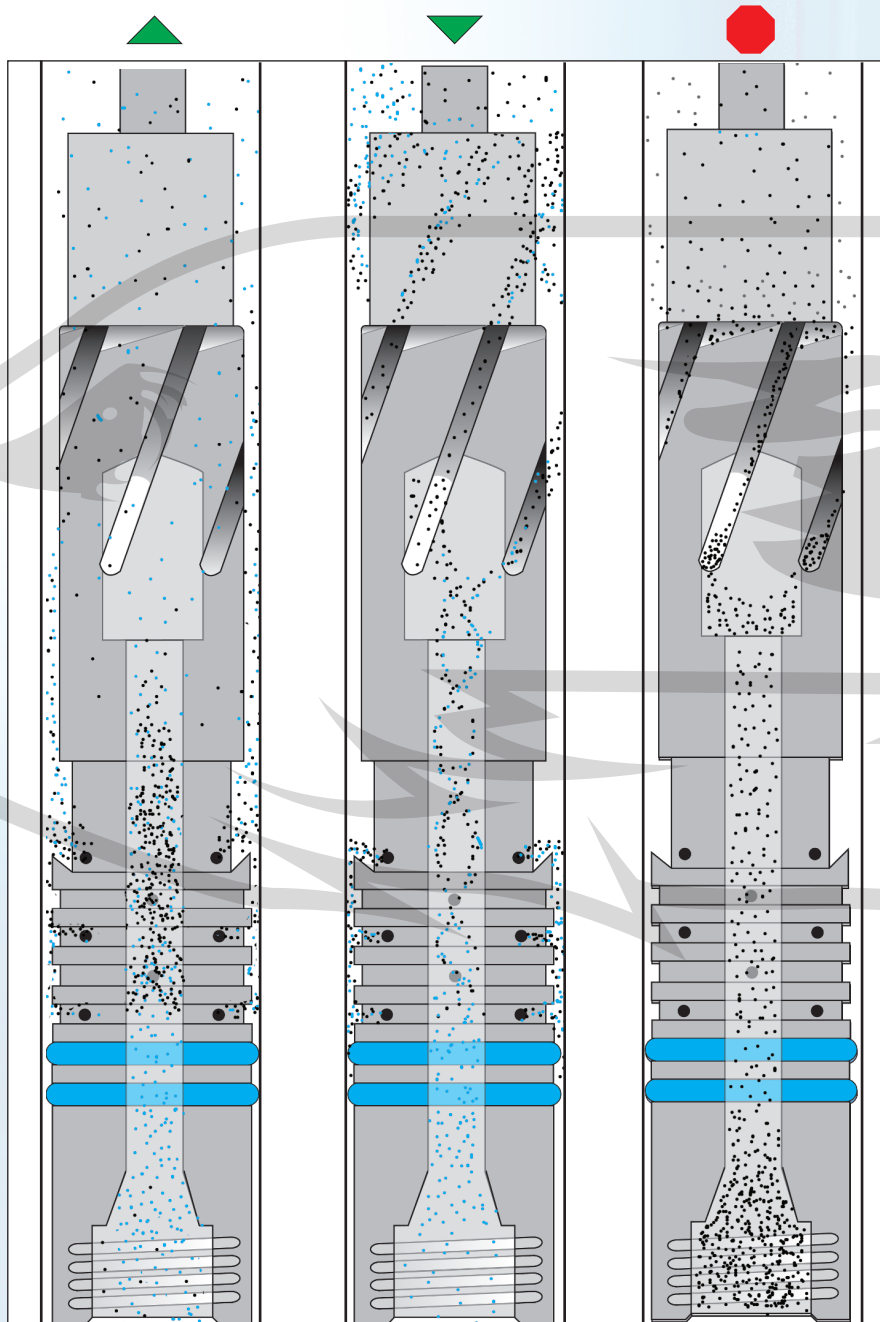
Throughout the up-stroke particulates such as sand, silt, and iron sulfide residing above the plunger are swept inward and away from the inside surface of the barrel and collect in the tapered recess of the Cyclone Adapter's reduced neck-diameter. The cyclone adapter's patented taper technology hydraulically forces residual particulates inwardly to the ID of the plunger. This feature virtually eliminates stuck plungers and excessive barrel damage.

▼ Down Stroke:

During the down-stroke, these same particulates which were collected in the cyclone adapter's tapered recess are flushed away and enter the produced well stream. In turn, particulates entering the barrel/plunger void from below the plunger are pulled inward through the radially located evacuation ports and are also flushed from the pump by the produced well stream. In each situation, residual build-up of damaging fines between barrel and plunger are eliminated, greatly prolonging the run-times of barrel and plunger surfaces.

● Stopped:

While the pump is not operational, particulates such as sand and iron sulfide will settle/concentrate. The Cyclone's patented radial ported vane design redirects the solids inward into the plunger ID. This keeps the solids concentration from wedging between the plunger OD and the pump barrel, eliminating additional damage and/or stuck plungers.



Material Construction:
316 Stainless Steel

US and Canada Patents
World Wide Patents Pending

 **Eagle Innovations Inc.**
Advanced Oilfield Technologies

www.eagleinnovations.net

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