“Farr Plunger” Corrosion Control

Optimal plunger for wells with H_2S, CO_2, salt water, and other corrosive agents

Benefits

- Extended plunger life in corrosive and high wear environments

- Reduced operational costs for well pulling and pump repair

- Increased production from less downtime

Muth Pump LLC is replacing conventional sucker-rod-pump plungers with a new design. Solids (e.g. sand, coal fines) and corrosives (e.g. H_2S, CO_2, NACl) have plagued downhole pumps. The “Farr Plunger” reduces the chance of corrosive materials prematurely wearing the barrel and sand sticking the plunger.

Protection against corrosion and wear

Many wells have highly corrosive materials which cause premature failure in traditional pump plungers. For example, sour wells (e.g. H_2S environments) can quickly destroy unprotected metal surfaces. Previously, customers have deployed expensive alloys designed for corrosion protection to extended pump life or frequently replaced components due to failure.

InnerArmor Coatings from Sub-One Technology protect the internal surfaces of the “Farr Plunger” against wear and corrosion. The coatings have passed extensive ASTM and NACE test standards including a 30 day sour autoclave test. Acting as a layer of protection against corrosion and wear, InnerArmor coatings have been proven effective in H_2S, CO_2, salt water, and other corrosive environments.

InnerArmor coatings also deliver protection against erosion and abrasion from flowing sand and other particles. The coatings offer very high hardness with very low coefficient of friction to protect the pump barrel during operation. Rather than purchasing high-price metal alloys for protection against corrosion, erosion and wear, InnerArmor coatings, applied using an environmentally benign process, offer customers superior performance with low-cost metals

“Farr Plunger”

InnerArmor Coating on Internal Surface of the Plunger Barrel

InnerArmor®

Protection against sticking sand

Generally, conventional plungers have a 0.002- to 0.003-in. clearance between the plunger and the pump-barrel wall. However, the rod connector at the top of the plunger has a 0.06-in. clearance. This gap at the top of the plunger causes most of the problems associated with conventional plungers. As the plunger starts its upward movement, sand is forced outward into the gap because of the shape of the connector. When the well is shut in, even for a short period of time, sand will settle out and fall on top of the plunger connector. When the well is placed back on production and the plunger starts its upward movement, sand is wedged into the gap, sticking the plunger inside the pump barrel. In the Farr plunger, the connector was moved from the top to the bottom of the plunger(Fig. 2), which eliminated the 0.06-in. gap between the connector and the pump barrel at the top of the plunger. The angle at the top of the plunger was reversed to force sand inward. This new design allows sand to be pumped out of the wellbore with the fluid, thus reducing instances of sticking the pump with sand.

For More Information

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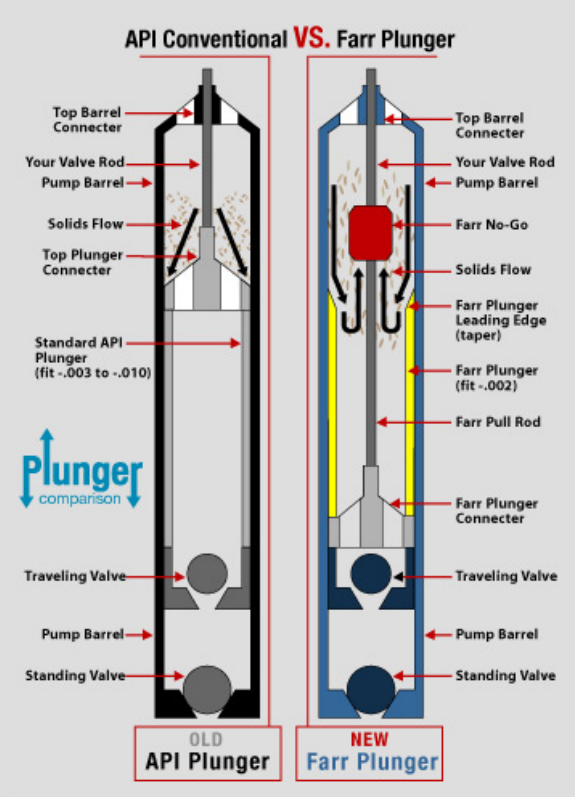
Comparison of Plungers



Coating Specifications

Corrosion control	Hydrogen sulfide (H2S), Hydrofluoric acid (HF), Hydrochloric acid (HCl), Nitric acid (HNO_3), Sulfuric acid (H_2SO_4), Salt, Methane (CH_4), CO/CO_2
Sample Testing	Sour Autoclave NACE TM0185 Salt spray ASTM B117
Thickness	15-25 µm
Hardness	1200-1500 HV
COF	0.11