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► Defender[®] seals

Sand mitigating seal section for extreme downhole environments



Advanced seal extends ESP operational life

Summit ESP[®] – A Halliburton Service has developed the Defender[®] super sand seal to operate in extreme downhole environments. Configured for each application, the Defender seal is designed to extend the operational life of electric submersible pump (ESP) systems with extreme redundancy and a design that prevents wellbore abrasives from damaging the seal and motor sections.

The tool's sealing mechanisms are designed to extend the operational life of ESP systems by equalizing downhole pressure and preventing the intrusion of damaging wellbore fluids. Configurations for Summit ESP seals can be customized for service in extreme downhole environments.

In our standard ESP systems, the seal section is located between the intake and motor, where its principal functions are to protect the motor and support the downward thrust generated by the pump. The seal is equipped with a shaft-mounted thrust runner that transfers downthrust forces from the pump shaft to a heavy-duty thrust bearing that is fixed to the housing. The positioning of this bearing allows Summit ESP pumps to be run in tandem configurations without the need for integrated thrust-handling capabilities.

FEATURES

- Automatic sand flush head design
- Protected pressure relief design
- Customizable bag configurations
- Single or tandem configurations
- Modified for high horsepower an extreme conditions
- Enhanced high-load (EHL) bearing

BENEFITS

- Upthrust bearing requires nolocking ring, spacer or shims, andallows shaft movement to be setwith high accuracy
- Exit ports prevent the swirlingeffect of abrasives, which destroysshaft seals and radial bearings
- Reduces downtime
- Mitigates issues with thermalexpansion of motor oil

In a typical installation, an ESP system is submerged in fluid and lowered often several thousand feet into the wellbore. As well fluid enters the wellbore, the fluid column above the ESP increases, generating a pressure differential between the motor oil and the fluid in the annulus. Summit ESP seal sections equalize the pressures while preventing motor damage by blocking the invasion of wellbore fluids. Furthermore. Summit ESP seals are designed to handle the thermal expansion of motor oil during regular operation of the pumping system.



Defender[®] seals significantly reduce operator's costs

These charts illustrate that the deployment of the Defender[®] super sand seal avoided significant cost for the operator over a 24-month period.



*USD 85/bbl and USD 4/Mcf used to calculate deferred production value

Seal section chambers are installed as either labyrinth or bag configurations. Labyrinth configurations permit well fluid to enter a chamber through a top-mounted vent port, thereby allowing pressures to equalize. The well fluid, which typically is heavier than motor oil, migrates to the bottom of the chamber where it is isolated from the next chamber, by virtue of a breather tube designed to allow only clean, non-damaging motor oil floating at the top of the chamber to pass between chambers.

Bag seals use a flexible elastomer bag contained within the seal housing to segregate and protect the motor oil from well fluid. As with a labyrinth seal, wellbore fluid is allowed to enter the housing through a vent port to create pressure equilibrium, but the bag acts as a flexible barrier to prevent contamination of the motor oil. Generally, both style chambers may be used in vertical applications, and bag seals are used when the pump must be set in a wellbore with a horizontal deviation of more than 45°. In high-horsepower applications or those with extreme reliability concerns, Summit ESP seals can be run in tandem configurations.



Defender® super sand seal

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