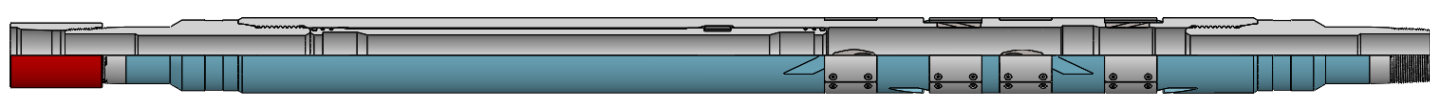


Staging Diverter Pup



The Staging Diverter Pup (SDP) is used for both optimal injection and/or production distribution control for Steam Assisted Gravity Drainage (SAGD) wells and Cyclic Steam Stimulation (CSS) wells. This can provide significant improvement on heavy oil and bitumen recovery. However, steam injection into horizontal wellbores may not always be distributed in a preferential manner. (i.e. equalized along the horizontal wellbore). Proper identification of critical components of operational and reservoir parameters are required to optimize the design and injection strategy, to maximize oil recovery and reduce energy consumption while reducing the Steam-Oil-Ratio (SOR). Other applications are optimization of solvent injection or a combination of steam-solvent injection and production wells.

Using multiple SDPs will enhance the delivery and distribution of steam into the target formation by providing the ability to selectively open and close off sections or change steam injection quantity equalized distribution along the wellbore that are equipped with sand control. This provides effective zonal isolation of steam into the formation to specific target locations within the reservoir.

Special consideration and engineering is required for SDP design under the application conditions. Experience gained and lessons learned have allowed development of the SDP for effective outflow and inflow distribution, and zonal isolation. The SDP can also be equipped with sand control devices.

APPLICATIONS:

- Provides high temperature and high-pressure service during injection, production and stimulation applications. Can be equipped with sand control measures.
- Enhanced oil recovery projects.
- Outflow and inflow control device used in combination or separately.
- For vertical and horizontal wells.

FEATURES:

- Sliding sleeve assembly:
 - 3 settings – all ports closed, lower ports closed only, upper ports closed only.
 - 2 settings – all ports closed; all ports opened
- Shifting direction can either open or close the SDP as per customer request.
- Steam exit from tool is axial flow.
- Ports are custom engineered, and provide protection from erosion, corrosion, and scaling.
- Complete SDP string can be removed from the well.
- Down hole manipulation of sliding sleeve using standard Otis-B shifting devices.
- High hardness blast plates over ports.

BENEFITS:

- Creates a more uniform shape of a steam chamber, lowering SOR's and improving production.
- Injection and production optimization – even outflow distribution and/or inflow distribution.
- Sliding sleeve allows for response to operational and reservoir changes.
- Eliminates dual tubing concentric injection systems.
- Allows for instrumentation lines to be run along the external body, not to interfere with the injection or production ports. Fits both fiber optics and pressure lines.
- The SDP can be rebuilt economically, to accommodate changes to flow (change nozzles).
- Monitor, eliminate or control steam breakdown potential.
- Ability to reduce the sub-cool temperature in SAGD wells, allowing for higher production rate.



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