

Flow Control Device



The Flow Control Device (FCD) 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 FCDs 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.

Depending on the design of the FCD to be used, they can contain various types of sand control screening as well as different types of flow control orifices. Orifice selection can be changed down hole, using shifting sleeves. These orifices can also be plugged off using melt out plugs or burst disk subs. These plugs can isolate the FCD liner from formation fluids and pressures. The plugs will also allow the floatation of the liner to achieve longer installation depths.

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

APPLICATION

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

FEATURES

- Sliding sleeve assemblies, capable of three settings.
- Ports are custom engineered and provide protection from erosion, corrosion, and scaling.
- Complete FCD string can be removed from the well.
- Can be equipped with sand control measures.
- Down hole manipulation of sliding sleeve using standard Otis-B shifting devices.
- High hardness blast plates over ports.
- Melt Out Plugs and Burst Disk Plugs can be installed to all Orifice types to isolate or float in liners.

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 FCD 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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