Halliburton's EquiFlow® OptiSteam™ flow control device (FCD) helps improve completion performance and efficiency in steam-assisted gravity drainage (SAGD) operations by balancing steam injection throughout the length of a completion.

The EquiFlow OptiSteam FCD consists of four components – a top sub, bottom sub, sleeve, and a center nipple with two sets of flow ports. Injected steam travels through the tubing and controlled ports, into the tubing-liner annulus, and finally through the liner into the formation.

The sleeve is an optional component which provides the operator ON/OFF ability for each EquiFlow OptiSteam FCD. This allows flexibility to be run closed, circulate steam during warm-up, then shift open for injection. Also, if one zone becomes too hot, the device can be shifted closed. A common B-type shifting profile is used.

Halliburton's suite of flow control devices for SAGD wells offers the industry leading solutions to maximize production efficiency and improve operators steam-oil ratio (SOR). The EquiFlow® inflow control device (ICD) and autonomous ICD help optimize steam flow in SAGD production wells.

**Features**

- Externally adjustable
- Diffuser ports control exiting steam velocities
- Tested per ISO 14998

**Benefits**

- Allows for last minute changes to flow setting
- Final flow setting can be selected later in the project, after more information is collected on the well
- ON/OFF flow ability with sleeve

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**EquiFlow® OptiSteam™ FCD Technology**

<table>
<thead>
<tr>
<th>FCD OD</th>
<th>4.30-in. (109.2 mm)</th>
<th>4.80-in. (121.9 mm)</th>
<th>5.80-in. (147.3 mm)</th>
<th>6.80-in. (172.7 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Bore ID</td>
<td>1.87-in. (47.5 mm)</td>
<td>2.313-in. (58.8 mm)</td>
<td>2.813-in. (71.5 mm)</td>
<td>3.81-in. (96.8 mm)</td>
</tr>
<tr>
<td>Quantity of Nozzles (10 mm ID)</td>
<td>24</td>
<td>28</td>
<td>32</td>
<td>36</td>
</tr>
<tr>
<td>Standard Metallurgy</td>
<td>NACE 4140</td>
<td>NACE 4140</td>
<td>NACE 4140</td>
<td>NACE 4140</td>
</tr>
<tr>
<td>Standard Temperature Rating</td>
<td>520°F (271°C)</td>
<td>520°F (271°C)</td>
<td>520°F (271°C)</td>
<td>520°F (271°C)</td>
</tr>
</tbody>
</table>
EquiFlow OptiSteam FCD for SAGD Injector

With SAGD injectors, steam must be balanced to account for varying payzone thickness, reservoir heterogeneity, and heel-toe tubing frictional effects. An optimized steam chamber allows for maximized bitumen recovery versus the traditional dual tubing injection method, which cannot properly balance the steam chamber and often develops a ‘barbell’ chamber instead. EquiFlow OptiSteam FCD provides the proper outflow balance.

Without flow control devices

With EquiFlow OptiSteam FCDs

Simple external adjustability by plugging off ports prior to running

Design has been validated through computational fluid dynamic (CFD) software

For more information, contact your local Halliburton representative or email us at completions@halliburton.com.