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Annulus Reclosable Circulating Valve

Unlimited opening and closing cycles in HPHT wells

APPLICATIONS

- Downhole reservoir testing
- High-pressure, high-temperature (HPHT) wells
- Fluid cushion displacement
- Stimulation fluid spotting and reclosing during acidizing and testing
- Underbalance annulus testing

ADVANTAGES

- Unlimited opening and closing cycles
- Flexibility in well-kill operations
- Insensitivity to tubing pressure cycling, rates, and pressure testing
- Multiple spotting of a cushion for tight reservoirs
- Mud-immune system that maximizes tool operating reliability
- Capability of being run in open position to fill tubing or before spotting a cushion and closing the tool
- Eight cycle-opening index system
- Compatibility with PCT* pressure controlled tester or IRDV intelligent remote dual valve
- Fullbore flow ports for high circulating and reversing rates
- H_2S service per NACE MR0175/ISO15156

The annulus reclosable circulating valve (ARCV) has the ability to circulate or reverse circulate multiple times for cushion spotting or desired well-kill operations.

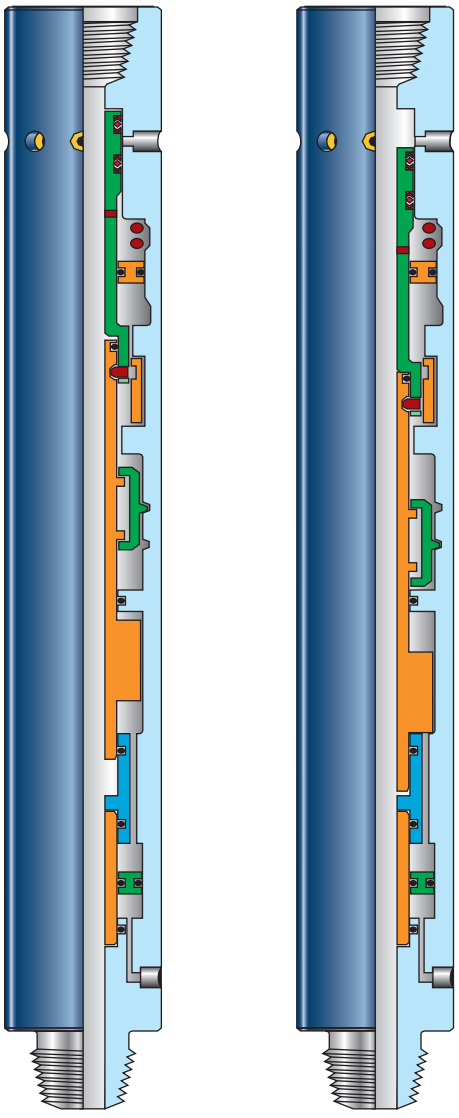
The ARCV-F is qualified and rated to the PCT-F specifications and is compatible with both the IRDV intelligent remote dual valve and the PCT tester valve. It is composed of six sections—from the circulating valve at the top of the tool connected through a mud-immune indexing system to the operating section that generates piston movement by means of annulus pressure over reference pressure from the upper and lower nitrogen chambers.

The ARCV is cycled by applying rapid pressure to the annulus. This applied pressure creates a differential pressure across the power piston. When sufficient differential pressure is achieved, the power piston shifts the operator mandrel and cycles the tool.

An indexing system functions similarly to the PCT hold-open system; when the applied casing pressure is bled off, the ARCV shifts to index to the next position and completes the cycle. Nitrogen reference pressure is not affected by thermal changes because it is ported directly to the annulus, allowing continual thermal expansion and contraction of the nitrogen.

Applying a predetermined number of annulus pressure cycles moves the valve to the open position, and the next annulus pressure cycle recloses the valve. The valve can be set to run into the hole either closed or open, which permits filling the string automatically. Once on depth, the cushion fluid can be spotted up to the desired depth and the ARCV cycled closed.

The valve can be reopened to reverse circulate out the tubing fluids, and the cushion can then be respotted if required, to aid in cleanup. Because the valve is insensitive to tubing pressure, it can be safely operated in underbalanced annulus well testing conditions without concern for inadvertent cycling due to tubing pressure cycling above the annulus pressure.



Annulus reclosable circulating valve.

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Specifications		
Model	**ARCV-FEA**	**ARCV-FEB**
Max. OD, in [mm]	5 [127]	5 [127]
Tool ID, in [mm]	2.25 [57]	2.25 [57]
Pressure ratings		
Differential, psi [MPa]	15,000 [103]	15,000 [103]
Max. annular, psi [MPa]	25,000 [172]	25,000 [172]
Max. tubing, psi [MPa]	29,000 [200]	29,000 [200]
Max. opening differential, psi [MPa][†]	5,000 [34]	5,000 [34]
Temperature rating, degF [degC]	425 [218]	425 [218]
Length, ft [m]	31.7 [9.66]	31.7 [9.66]
Weight, lbm [kg]	1,200 [544]	1,200 [544]
Service (NACE MR-0175/ISO15156)	H_2S/acid	H_2S/acid
Tensile strength at min. yield, lbf [kN]	350,000 [1,557]	350,000 [1,557]
Connection	3½ IF	3½ PH-6

[†] External pressure greater than internal pressure.

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