

PremiumPort Dynamic Injection and Inflow Control

PremiumPort™ allows operators to dynamically manage the pressure profile along horizontal wells and drive optimum well performance from complex reservoir intervals. The unique valve and port system can be actuated for a variety of production and injection operations over the life of the well.

DESCRIPTION

PremiumPort consists of a multi-position valve integrated with either two, or three ports which can be left as simple openings, or configured with nozzles for flow control applications.

Using reservoir modelling, ports can be fitted at the wellsite with a nozzle (ICD) suitable for either injection or inflow control.

A Harrier™ shifting tool, run on coil tubing, is used to shift the position of the valve to expose different port configurations.

PremiumPort

THE CHALLENGE

Horizontal wells encounter widely varying formation characteristics and operators need completion strategies designed to allow different techniques to be applied during liner deployment, initial production, and as the well ages.

THE SOLUTION

With PremiumPort, shifting the position of the full-bore valve sets the ports to be either closed, open, or a combination of open/closed. Applications can include:

- Stimulation
- Well clean up
- Chemical injection
- Inflow control and balanced horizontal sweep
- Steam distribution
- Zone shut off
- Multiple sequential operations

PremiumPort can be configured with a variety of nozzle styles:

- **CrossFlow** - for horizontal wells with high production or injection rates, vertical wells in consolidated formations with commingled zones of different pressures, and for high temperature steam or water injection
- **SecureFlow** - for cyclic steam, SAGD heavy oil, high pressure gas production wells and high pressure steam or water injection
- **StandardFlow** - for moderate flow rate, moderate pressure wells with no downhole

PremiumPort is a registered trademark of Absolute Completion Technologies Ltd.

PremiumPort Performance

RELIABLE VALVE OPERATION

The dependable operation of PremiumPort's multi-position valve is based on a unique proven design:

- The interior surface is chromed and Teflon impregnated to decrease friction during operation, and to prevent scale or wax build up over extended periods of limited operation
- Valve operation has been tested to 1500 actuations at 2000 lbs. force with no evidence of seal degradation

RELIABLE SEAL FUNCTION

The proprietary seal design maintains the integrity of the interior of the valve thus ensuring consistent, reliable and safe operation during multiple manipulations over the life of a well.

The seal design eliminates the risks of seal washout from sudden high pressure differentials, or seal erosion by solids during opening, closing or stimulation operations.

RELIABLE NOZZLE OPERATION

Nozzles installed in ports for inflow or injection control are made of Tungsten Carbide and may also be coated with Titanium Nitride for maximum erosion and corrosion resistance.

Each flow port and/or nozzle is isolated by the proprietary seal design.

HARRIER SHIFTING TOOL

The Harrier shifting tool can be run with coil tubing or jointed pipe to shift the position of the sleeve and select different valve configurations. Valves can also be manipulated with e-line deployed tractors. The shifting tool is uniquely designed with the following advantages:

- Any valve position can be achieved in any order, in one trip while concurrently stimulating or gravel packing a target interval
- Retractable keys are staged by an increase in differential pressure created by increased circulation or pumping pressure
- When the shifting tool is latched to the PremiumPort valve, the valve position is shifted by moving the work string upwards or downward
- The keys only release after the valve reaches the desired position, and then they automatically disengage
- The keys allow the work string to release from the valve without depressuring and while pulling out of the hole

PREMIUMPORT WITH SAND CONTROL OPTIONS

Multiple PremiumPort tools can be integrated with sections of sand control for dynamically adjustable flow control along the lateral as required.



FracFilter™ is a special design of PremiumPort that integrates fracturing control, flow control and injection control into a system that can be integrated with sand control if required and installed as a well completion liner prior to stimulation. The fracturing port capability is one of the port positions in the PremiumPort multi-position valve system.

PREMIUMPORT CONFIGURATIONS

PremiumPort Options					
Port Configuration	# of Valve Positions	Valve Position Description			Applications
PremiumPort 20C	2	Open	Close	-	Stimulation
PremiumPort 30CI	3	Open	Close	Inflow	Inflow control
PremiumPort 3ICI	3	Inflow #1	Close	Inflow #2	Inflow control
PremiumPort 20D	2	Open	Close	-	Water injection
PremiumPort 30CD	3	Open	Close	Injection	Zone shut off
PremiumPort 3DCD	3	Injection #1	Close	Injection #1	Steam injection

Note: The Specifications for PremiumPort 30CI follow. Please contact a Technical Application Manager to request detailed specifications for other configurations.

PremiumPort 30CI Specifications

DIMENSIONS								MECHANICAL PROPERTIES			
Casing Size	Material	Upper Thread	Lower Thread	OD (standard)	ID	Liner Weight	Liner Drift	Max Tensile Load (1)	Max Burst Pressure (Std. Configuration)	Max Collapse Pressure (Std. Configuration)	Open Port Flow Area
in	Grade	Standard	Standard	in	in	lb/ft	in	lbs	psi	psi	in ²
(mm)				(mm)	(mm)	(mm)	(kg/m)	(mm)	(N)	(MPa)	(MPa)
3.5	L-80	3.5 NUE	3.5 NUE	4.60	2.89	9.2	2.870	159000	10000	10000	2.8
(88.9)				(116.8)	(73.4)	(13.7)	(72.90)	(707267)	(68.95)	(68.95)	(1806.4)
4	L-80	4.0 NUE	4.0 NUE	5.10	3.37	11.0	3.350	144000	8000	8000	4.2
(101.6)				(129.5)	(85.6)	(16.4)	(85.09)	(640544)	(55.16)	(55.16)	(2709.7)
4.5	L-80	4.5 LTC	4.5 LTC	5.50	3.90	11.6	3.880	211000	8000	8000	2.6
(114.3)				(139.7)	(99.1)	(17.3)	(98.55)	(938574)	(55.16)	(55.16)	(1677.4)
5	L-80	5.0 LTC	5.0 LTC	6.00	4.30	15.0	4.280	294000	8000	8000	2.1
(127.0)				(152.4)	(109.2)	(22.3)	(108.71)	(1307777)	(55.16)	(55.16)	(1354.8)
5.5	L-80	5.5 LTC	5.5 LTC	6.63	4.82	17.0	4.800	337000	8000	8000	2.6
(139.7)				(168.4)	(122.4)	(25.3)	(121.92)	(1499050)	(55.16)	(55.16)	(1677.4)
6.625	L-80	6.625 LTC	6.625 LTC	7.80	5.82	24.0	5.800	337000	8000	8000	2.6
(168.3)				(198.1)	(147.8)	(35.7)	(147.32)	(1499050)	(55.16)	(55.16)	(1677.4)

(1) Tensile Strengths stated are designed to match or exceed standard liner tensile strengths.

Notes:

Tensile Strengths, Flow Port Area, and ID/OD may vary to match casing weights and connections. They are also customizable and can be designed for optimum performance.

Published max port flow rate and port area are based on LTC standard thread tensile strength and without factor of safety included. Different threads are available upon request and might result in different max port flow rate and port area.

The flow path is designed to the specifications of each application; therefore, the mechanical properties will change based on the dimensions of the MeshRite™ or other sand control system integrated with PremiumPort.

For Specification and Mechanical Properties please contact an Absolute Technical Application Manager for assistance in designing an appropriate flow control, fracture control and stimulation configuration for your reservoir conditions.

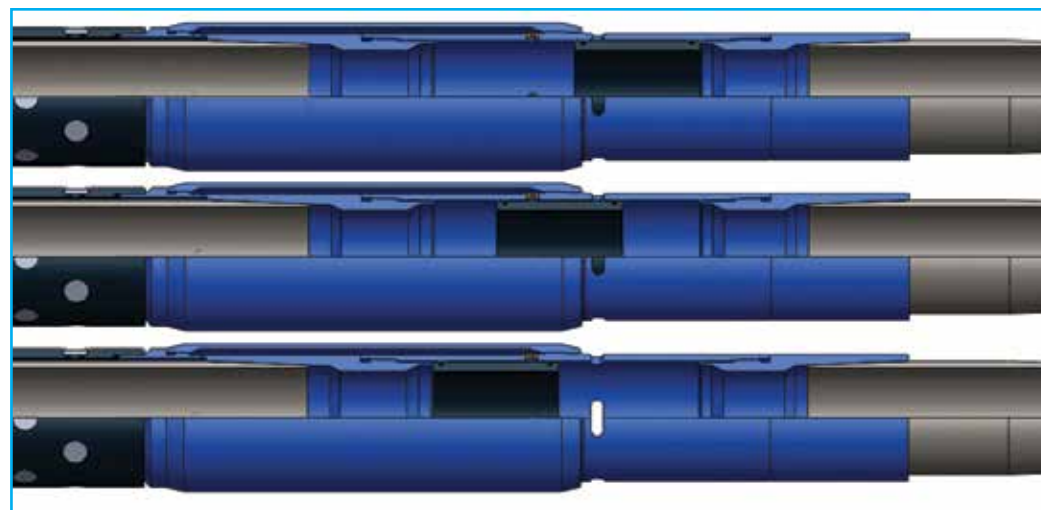


Figure 1: PremiumPort multi-position valve (top: port with nozzle for inflow control open, middle: both ports closed, bottom: second port open)

APPLICATIONS

PremiumPort can be used to improve the performance of multi-zone vertical as well as horizontal wells.

The valve positions can be selected in any order and any sequence depending on the operational program, production results, and life cycle of the well.

- **Closed** to float liner to depth with minimum torque and drag
- **Closed** to shut off problematic sections
- **Open** for injecting solvent, chemical, water, or acidizing
- **Open** with large ports to accommodate high flow rates for gravel packing
- **Open** for production through sand control screen
- **Inflow** control to delay water coning
- **Inflow** control to equalize toe to heel influx pressures
- **Steam Injection** in Cyclic or SAGD wells to equalize toe-to-heel distribution
- **Water Injection** wells
- **Open and Closed** for high rate, high pressure stimulation through a completion while protecting sand control screen

Flow Tracing

- Each valve in a PremiumPort completion can accommodate a unique sacrificial bio-tracer which will provide surface indication of the oil-water influx from each valve position and zone

BENEFITS

Single or multiple PremiumPort valves can be economically placed within each wellbore segment providing flexible port options to control flow, water coning, and to allow repeated clean up, and stimulations over the life of the well.

- In open hole completions, treatment fluids for stimulation or well clean up can be injected either down the work string or into the annulus between the work string and the casing
- PremiumPort allows circulation through the coil tubing string with access to the annulus between the reservoir and the liner
- In cemented applications, PremiumPort allows initial fracing or stimulation, and again later in the well life using a different port in a new area of the same segment

In closed position, stimulation ports, inflow nozzles, and optional screen systems are not exposed to internal work string pressures.

The valve can be shifted to activate ports in any order, with manipulation time of approximately 30 seconds.

A fullbore unrestricted ID greater than the liner drift ID creates a large flow through area to accommodate high flow rates and future remedial well operations.



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PremiumPort™ Patent is pending.

