Weatherford®

Safety Systems

Optimax™ Series Cement through Tubing-Retrievable Surface-Controlled Subsurface Safety Valves

Model WCP(E)-5 and Model WCP(E)-10

Weatherford's *Optimax* series cement-through tubing-retrievable surface-controlled subsurface safety valve (TRSCSSV), (Model WCP(E)-5 and Model WCP(E)-10), is a rod-piston, flapper-type safety valve—5,000 and 10,000 psi (39.4 and 68.9 MPa) working pressure ratings, 1,000 ft (304.8 m) and 2,000 ft (609.6 MPa) setting depth configurations—reflecting new technology developed by Weatherford to address cement-in-place completion techniques. The Model WCP(E)-5 and Model WCP(E)-10 are available with an optional self-equalizing flapper mechanism. This product was developed to provide total isolation of the valve's operations to eliminate the possibility of debris contamination during cementing operations.

An integral part of the completion string, both the Model WCP(E)-5 and Model WCP(E)-10 are controlled via a hydraulic control line. Application of control-line pressure maintains this safety valve in the open position; when pressure is bled off, the safety valve closes. In the event of uncontrolled flow, this failsafe closure protects property, personnel, and the environment on command. In the event of malfunction, the deployment of lockout and control-line communication tools adapts the valve to accept a wireline-insert safety valve, minimizing disruption to production operations.

Applications

- Fluid and gas environments
- Production and injection applications

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Optimax™ Series Cement through Tubing-Retrievable Surface-Controlled Subsurface Safety Valves

Model WCP(E)-5 and Model WCP(E)-10

Features, Advantages and Benefits

- Design, material, manufacturing, assembly, and test documentation retention are in accordance with API Q1 and API 14A quality programs, ensuring integrity to industry standards, as well as qualification to API Class 1 and 2.
- Several features of the model WCP(E)-5 and Model WCP(E)-10 maximize reliability:
  - The hydraulic control system has only two potential leak paths (the industry minimum).
  - Metal-to-metal premium housing connections are standard.
  - The simple design of this safety valve incorporates no sleeves, plugs, or other mechanisms that can be inadvertently actuated, thus preventing premature control-line communication.
  - The number of pressure seals minimizes potential leak paths.
  - Premium metal-to-metal up stop is part of the dynamic seal system
  - Non-elastomeric flapper soft seat backs up the metal-to-metal primary seat
- The valve's field-proven through-the-flapper self-equalizing mechanism provides simple operation.
- The pressure-rated flow tube isolates the critical components of the safety valve from cement during the cementing operation
- The non-elastomeric seals avoid fluid compatibility and explosive decompression issues, enhancing safety.
- Accessories can be deployed on slickline, avoiding complex operational requirements.
- The optimized safety-valve design facilitates the use of control-line communication and lockout tools, and the wireline-insert safety valve in the event of a malfunction, minimizing production disruption.

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Model WCP(E)-5 and Model WCP(E)-10

Specifications

Model WCP(E)-5

Size* (in./*mm*)	2-3/8 *60.625*	2-7/8 *73.025*	3-1/2 *88.900*	4-1/2 *114.300*
Maximum OD (in./*mm*)	3.620 *91.948*	4.610 *117.094*	5.170 *131.318*	6.925 *175.895*
Overall length (*in./cm*)	61 *154.94*	57 *144.78*	66 *167.64*	71 *180.34*
Standard seal bore (minimum bore) (in./*mm*)	1.875 *47.625*	2.313 *58.750*	2.813 *71.450*	3.813 *96.850*
Housing threads (in./*mm*)	3.300 and 2.400 *88.320 and 60.960*	4.250 and 2.875 *107.950 and 73.025*	4.687 and 3.500 *119.050 and 88.900*	6.250 and 4.500 *158.750 and 114.300*
	Weatherford Premium Thread			
Working pressure (psi/*MPa*)	5,000 *34.474*			
Test pressure (psi/*MPa*)	7,500 *51.711*			
Nipple profile	Petroline® QN profile as standard, other manufacturers' profiles available on request.			
Control-line connection	Industry standard metal seal compression fitting for 1/4-in. control line			
Rated working temperature (°F/°*C*)	30° to 300° *–1.11° to 148.89°*			
Fail-safe setting depth (ft/*m*)	1,000 *304.80*		2,000 *609.60*	
Operating pressures	1,500 psi full open, 500 psi full close		2,000 psi full open, 1,000 psi full close	
	These are estimated operating pressures, subject to verification			
Equalizing feature	Available on (E) versions of these safety valves—our reliable through the flapper equalizing technology.			
Dynamic seal system	Proprietary design non-elastomeric rod piston seal stack, verified in tests to 10,000 psi gas differential pressure at 300°F (*148.89°C*).			
Flapper soft seal	Proprietary design of filled plastic material to provide a reliable low pressure seal, verified in tests to 10,000 psi gas differential pressure at 300°F (*148.89°C*).			
Standard metallic materials	9 Chrome – 1 moly or 13% minimum chrome 80,000 psi minimum yield as standard material for all housings and internal components. INCONEL® 718 flapper and seat material. MP 35 N power spring, piston rod, flapper pin and torsion spring. All materials heat treated in accordance with NACE MR0175.			
Accessory tools	Lockout tool Wireline insert safety valve Control-line communication tool			
Tubing thread connection	As requested			
Design and manufacturing compliance	API Q1 and API 14A			
Class of service	3S2			

*Contact Weatherford for availability.

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Optimax™ Series Cement through Tubing-Retrievable Surface-Controlled Subsurface Safety Valves

Model WCP(E)-5 and Model WCP(E)-10

Specifications (continued)

Model WCP(E)-10

Size* (in./*mm*)	2-3/8 *60.625*	2-7/8 *73.025*	3-1/2 *88.900*	4-1/2 *114.300*
Maximum OD (in./*mm*)	3.625 *92.075*	5.110 *129.794*	5.810 *147.574*	7.470 *189.738*
Overall length (in./*cm*)	61 *154.94*	57 *144.78*	70 *177.80*	71 *180.34*
Standard seal bore (minimum bore) (in./*mm*)	1.875 *47.625*	2.313 *58.750*	2.813 *71.450*	3.813 *96.850*
Housing threads (in./*mm*)	3.300 and 2.400 *88.320 and 60.960*	4.250 and 2.875 *107.950 and 73.025*	4.687 and 3.500 *119.050 and 88.900*	6.250 and 4.500 *158.750 and 114.300*
	Weatherford Premium Thread			
Working pressure (psi/*MPa*)	10,000 *68.948*			
Test pressure (psi/*MPa*)	15,000 *103.421*			
Nipple profile	Petroline® QN Profile as standard, other manufacturers' profiles available on request			
Control-line connection	Industry standard metal seal compression fitting for 1/4-in. control line.			
Rated working temperature (°F/°*C*)	30° to 300° *–1.11° to 148.89°*			
Fail-safe setting depth (ft/*m*)	2,000 *609.6*			
Operating pressures	2,000 psi full open, 1,000 psi full close			
	These are estimated operating pressures, subject to verification.			
Equalizing feature	Available on (E) versions of these safety valves—our reliable through the flapper equalizing technology			
Dynamic seal system	Proprietary design non-elastomeric rod piston seal stack, verified in tests to 10,000 psi gas differential pressure at 300°F (*148.89°C*).			
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