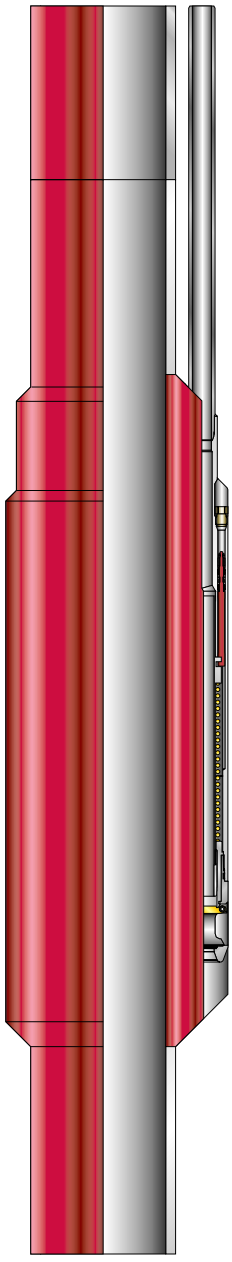
Weatherford®

Safety Systems

Optimax™ Series Annular Tubing-Retrievable Surface-Controlled Subsurface Safety Valves

Model WA(E)-5



Weatherford's *Optimax* model WA(E)-5 annular tubing-retrievable surface-controlled subsurface safety valve (TRSCSSV) is designed to shut in a well in the event of uncontrolled flow caused by equipment failure or damage. An integral part of the completion string, the WA(E)-5 TRSCSSV is controlled by a single hydraulic control line. Application of control-line pressure keeps the valve in the *open* position; when pressure is bled off, the valve closes to protect property, personnel, and the environment.

The model WA(E)-5 valve, like all *Optimax* series TRSCSSVs, is designed to maximize simplicity and reliability of operation. Conventional annular safety valves typically incorporate either poppet or sliding sleeve-type closure mechanisms, which increase the complexity of the valve design. In addition, their elastomeric components limit the life expectancy of conventional valves. The model WA(E)-5 valve, rated to 5,000 psi (35.15 MPa), features the field-proven rod-piston mechanism of the *Optimax* series valves for the most demanding applications. This mechanism incorporates non-elastomeric dynamic seals for high durability and long life. *Optimax* series valves are the first in the industry to incorporate the benefits of totally non-elastomeric operating and closure systems in an annular safety system.

Applications

- Production and injection applications in fluid and gas environments
- Gas-lift applications

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Model WA(E)-5

Features, Advantages and Benefits

- Design, material, manufacturing, assembly, and test documentation retention in accordance with API Q1 and API 14A quality programs ensure design and manufacturing integrity and conformance to industry standards.
- Several features of the model WA(E)-5 valve maximize reliability:
  - The hydraulic control system has only two potential leak paths (the industry minimum).
  - Metal-to-metal premium tubing thread connections are standard.
  - Single-piece housing reduces the number of potential leak paths.
  - The non-elastomeric flapper soft seat reinforces the primary metal-to-metal seat for low-pressure seal integrity.
- The simple design of this valve incorporates no sleeves, plugs, or other mechanisms that can be inadvertently actuated, causing premature control-line communication.
- The field-proven non-elastomeric dynamic seal system avoids fluid-compatibility and explosive-decompression issues, enhancing safety.

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Specifications

Size (in.)[a,b]	4-1/2 × 0.850	5-1/2 × 0.850	7 × 0.850
Maximum OD (in./*mm*)	6.5 *165.1*	7.5 *190.5*	9 *228.6*
Overall length (in./*mm*)	46 *1,168*		
Housing threads (in.)[c]	4-1/2 and 3/4	5-1/2 and 3/4	7 and 3/4
Working pressure (psi/*MPa*)	5,000 *35.15*		
Test pressure (psi/*MPa*)	7,500 *52.72*		
Control-line connection	Industry standard metal seal compression fitting for 1/4-in. control line		
Rated working temperature (°F/°*C*)	30° to 300° *–1° to 149°*		
Operating pressure, fully open (psi/*MPa*)[d]	2,000 *13.8*		
Operating pressure, fully closed (psi/*MPa*)[d]	1,000 *6.9*		
Dynamic seal system	Proprietary design non-elastomeric rod-piston seal stack, verified in tests to 15,000-psi *(103.42-MPa)* gas differential pressure at 300°F *(149°C)*		
Flapper soft seal	Proprietary design of non-elastomeric material to provide a reliable low-pressure seal, verified in tests to 10,000-psi *(68.9-MPa)* gas differential pressure at 300°F (*149°C).*		
Standard metallic materials[e]			
Housing and internal components	9 chrome, 1 moly, or 13% minimum chrome, 80,000-psi *(551.6-MPa)* minimum yield		
Flapper and seat	Alloy 925 or 718		
Power spring, piston rod, flapper pin, and torsion spring	MP 35 N		
Tubing thread connection	As requested		
Design and manufacturing compliance	API Q1 and API 14A		
Class of service	3S2		

[a]Contact Weatherford for availability.
[b]Annular flow area is dependent on tubing casing combination. Listed flow area is the minimum achievable.
[c]Weatherford premium threads.
[d]Operating pressures are estimated and are subject to verification.
[e]All materials heat-treated in accordance with NACE MR 01 75.

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