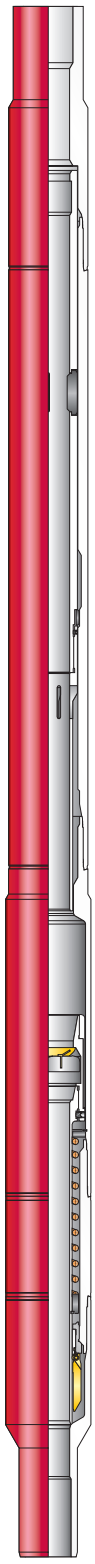
InjectionSaver Valve with Lockout



Weatherford's tubing-retrievable InjectionSaver valve with lockout is an advanced-design check valve that prevents the backflow of injected fluid to the surface. The flapper-and-seat design of this valve has proved to be one of the industry's most reliable, durable, and effective sealing mechanisms. As a tubing-retrievable injection valve, the InjectionSaver valve offers certain advantages over alternative backflow prevention devices for injection wells.

The InjectionSaver valve with lockout features a safety-valve flapper as well as three triangular actuator flappers that are spring-biased closed. Reverse flow closes the tri-flappers, providing a pressure drop that closes the safety-valve flapper. The tri-flapper actuation mechanism sets this valve apart from other devices, which rely on a choke mechanism for actuation or a ball and seat for sealing. The InjectionSaver valve with lockout design does not restrict wellbore diameter; therefore, pressure drop is minimized, and flow is optimized. The InjectionSaver valve with lockout uses a shifting tool to lock the flappers open and return them to the self-piloting position—enabling the valve to be locked open, intervention tools to be run, and the valve returned to autopilot in a single trip.

Applications

- The InjectionSaver valve with lockout is used as a tubing-retrievable device, installed deep in the well to function as a safety barrier to prevent backflow and ensure long-term well integrity should tubing-to-annulus communication develop.

Features, Advantages and Benefits

- Self-piloting capability allows totally remote actuation of the valve, eliminating dependence on a hydraulic control line and other mechanical components.
- The valve can be set at any depth to preserve well integrity, even in the presence of tubing leaks.
- The flapper-based seal does not have the integral diameter restriction associated with ball designs; therefore, pressure drop is minimized, and flow is optimized.
- The tri-flapper mechanism, with its full-bore, unrestricted ID, automatically actuates the tool, with minimal pressure drop, therefore providing a greater injection pressure to the formation.

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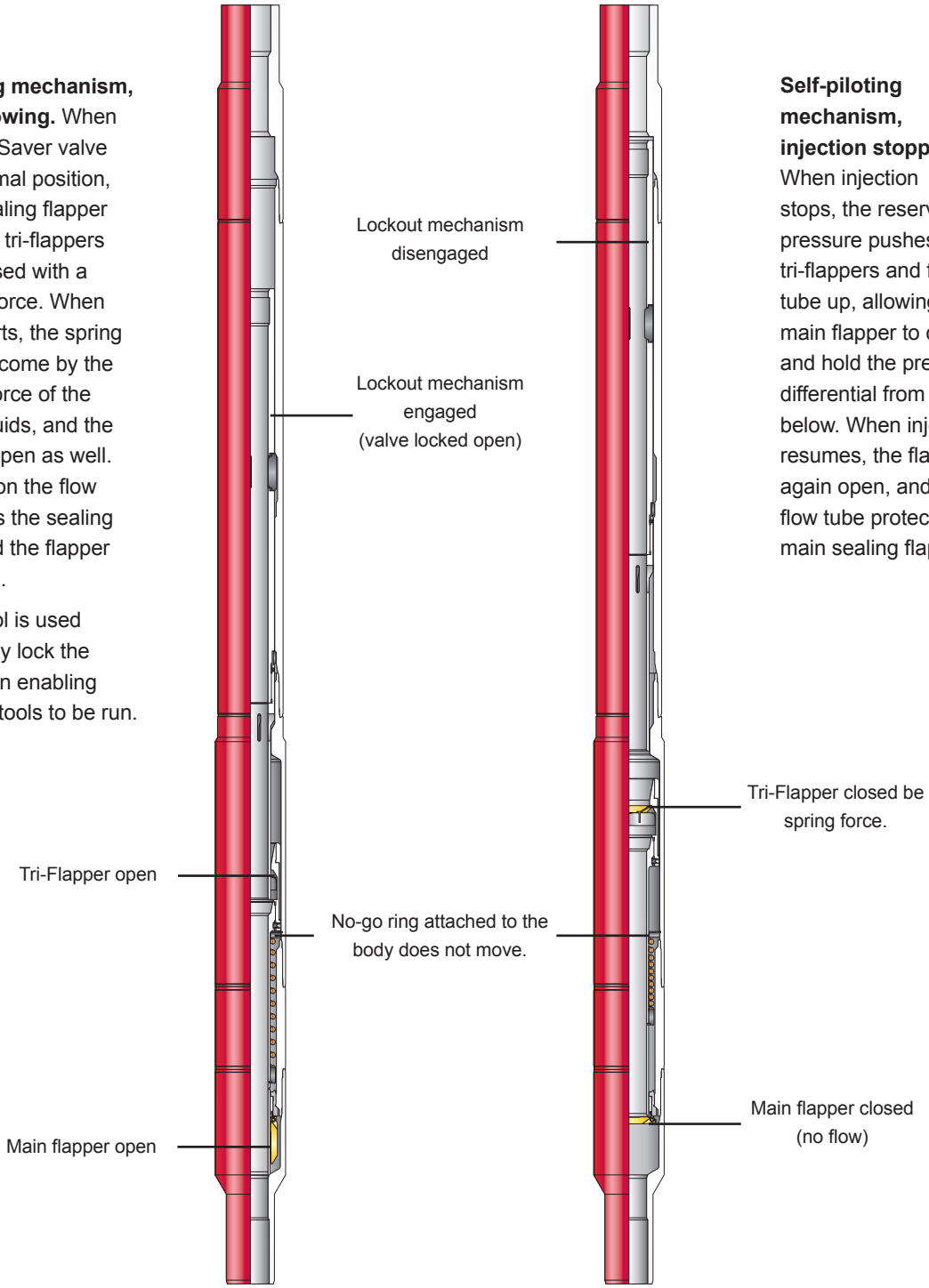
Self-piloting mechanism, injection flowing. When the InjectionSaver valve is in the normal position, the main sealing flapper is open. The tri-flappers are held closed with a light spring force. When injection starts, the spring force is overcome by the downward force of the producing fluids, and the tri-flappers open as well. In this position the flow tube protects the sealing surfaces and the flapper from erosion.

A shifting tool is used to temporarily lock the flappers open enabling intervention tools to be run.



Self-piloting mechanism, injection stopped. When injection stops, the reservoir pressure pushes the tri-flappers and flow tube up, allowing the main flapper to close and hold the pressure differential from below. When injection resumes, the flappers again open, and the flow tube protects the main sealing flapper.

InjectionSaver Valve with Lockout

Features, Advantages and Benefits (continued)

- Under static conditions, the valve remains open, allowing use of shut-in wellhead pressure readings to monitor reservoir pressure.
- The valve remains open as long as there is injection flow. This design removes the need to size an actuation choke for the intended injection rate, as is the case with other injection valves.
- When the valve is open, the flapper is protected by a flow tube, regardless of injection rate, mitigating the potential risk of failure caused by flapper chatter.
- All sealing components, including the surface of the main flapper (API qualified), are protected from erosive effects by the flow tube. This patent-pending design reduces seal damage to ensure greater reliability and longer life than industry-standard ball-and-seat configurations.
- The lockout feature enables the valve to be temporarily locked open to allow passage of intervention tools.

Specifications

Casing		Tubing		InjectionSaver Valve with Lockout							
						Materials		Ratings			
OD (in.)	Weight (lb/ft)	OD (in.)	Weight (lb/ft)	Maximum OD (in./*mm*)	Maximum ID (in./*mm*)	Wipers	Flapper Seal	Burst Pressure (psi/*MPa*)	Collapse Pressure (psi/*MPa*)	Temperature (°F/°*C*)	Tensile Strength (lb/*kg*)
7	32.0	3-1/2	9.2	5.50 *139.7*	2.76 *70.1*	PEEK™	Teflon®	7,500 *51.7*	7,500 *51.7*	80 to 375° *27 to 191°*	200,000 *90,718*
9-5/8	47.0	4-1/2	12.6	8.00 *203.2*	3.72 *94.5*						328,000 *148,778*
		5-1/2	20.0	8.25 *209.6*	4.58 *116.3*			10,000 *68.9*	10,000 *68.9*		466,000 *211,374*

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