

Zenith tubing drain valves for ESPs

Protect ESPs with reliable, effective solids management

Applications

- High sand cut ESP wells or entrained coal fines and suspended solids
- ESP wells producing heavy oil and high viscosity fluids
- Dual redundant ESP systems
- ESP wells capable of natural flow

Features and benefits

- Manages production solids reliably to defend against ESP equipment damage and blockage on shutdown
 - Prohibits backspin, motor shaft, or rotor breakage at start up
 - Protects from pumpoff situations
 - Prevents losses from downtime, deferred production, and time required to pull, clean, and rerun the completion
- Provides high flow rates and low pressure drops via optimized flow paths
- Eliminates restriction with the HCP-TDV option when producing natural flow through the pump
 - Pump is fully protected from scale, wear and debris build up with flow path routed through annular ports
 - Specially designed potted magnet delivers increased actuation pressure in naturally flowing wells with high annular free flow

Suspended solids descending into electrical submersible pump (ESP) systems following shutdown can result in complete loss of production. The efficient solids management system in the **Zenith™ tubing drain valves (TDV) for ESPs** effectively safeguards pumping equipment from damage or blockage caused by descending solids.

The TDV is installed in the tubing string directly above the pump, preventing backflow of fluid through the pump when it is shut down. Fluid and solids held in suspension are diverted directly and immediately to the annulus, preventing damage or blockage of the pump.

A range of TDV models is available to suit various applications:

The **Zenith ESP-TDV option**, with large annular ports, allows fluids, including heavy oil and high viscosity fluids, to flow freely through the valve.

The **Zenith high cracking pressure TDV (HCP-TDV)** has been specifically engineered to support operation in dual redundant ESP systems and/or naturally flowing wells. Dependent on well conditions, the valve will enable free flow to bypass the ESP when switched off, reducing the choking effect through the pump stages.



1. Pump started

Ports pilot to closed position routing production through the pump.

2. Pump shut down

Ports open preventing backspin and damage from descending solids.

3. Pump off (HCP-TDV only)

Ports allow flow around the pump, eliminating restrictions and damage.

Specifications	ESP-TDV (3-1/2 in.)	HCP-TDV (3-1/2 in.)
Maximum working pressure	3,600 psi (248 bar)	5,000 psi (345 bar)
Maximum test pressure	3,600 psi (248 bar)	5,000 psi (345 bar)
Maximum flow – tubing	10,000 B/D 5-psi (0.3-bar) pressure drop	20,000 B/D 120-psi (8.2-bar) pressure drop
Maximum flow – annulus	N/A	20,000 B/D 25-psi (1.7-bar) pressure drop
Actuation pressure	25 psi (1.72 bar)	175 psi (12.07 bar)

Construction	ESP-TDV						HCP-TDV
Product Number	12330105202	12330105401	12330204202	12330204402	12330402202	12330402402	12330413402
Upper connection	2-7/8 in. 6.5 lb/ft EUE box	2-7/8 in. 6.5 lb/ft EUE box	3-1/2 in. 9.3 lb/ft EUE box	3-1/2 in. 9.3 lb/ft EUE box	4-1/2 in. 12.75 lb/ft EUE box	4-1/2 in. 12.75 lb/ft EUE box	3-1/2 in. 9.2 lb/ft Vam Top Box
Lower connection	2-7/8 in. 6.5 lb/ft EUE pin	2-7/8 in. 6.5 lb/ft EUE pin	3-1/2 in. 9.3 lb/ft EUE pin	3-1/2 in. 9.3 lb/ft EUE pin	4-1/2 in. 9.3 lb/ft EUE pin	4-1/2 in. 9.3 lb/ft EUE pin	3-1/2 in. 9.2 lb/ft Vam Top Pin
Maximum length	47.88 in. (121.6 cm)	47.88 in. (121.6 cm)	46.86 in. (119.02 cm)	46.86 in. (119.02 cm)	57.04 in. (144.88 cm)	57.04 in. (144.88 cm)	4.61 ft (1.41 m)
Make up length	45.75 in. (116.2 cm)	45.75 in. (116.2 cm)	44.48 in. (112.98 cm)	44.48 in. (112.98 cm)	54.42 in. (138.23 cm)	54.42 in. (138.23 cm)	4.36 ft (1.33 m)
Weight	104.604 lb (47.45 kg)	104.604 lb (47.45 kg)	139.74 lb (63.38 kg)	139.83 lb (63.43 kg)	267.3 lb (121.25 kg)	267.2 lb (121.20 kg)	152 lb (68.95 kg)
Annulus flow area pump off / ports open	11.25 in. ² (28.58 cm ²)	4.19 in. ² (27.03 cm ²)					
Tubing flow area Pump on / ports closed	2.834 in. ² (7.20 cm ²)	2.834 in. ² (7.20 cm ²)	2.38 in. ² (6.05 cm ²)	2.38 in. ² (6.05 cm ²)	3.57 in. ² (9.07 cm ²)	3.57 in. ² (9.07 cm ²)	1.73 in. ² (11.16 cm ²)
Outside diameter	4.92 in. (12.50 cm)	4.92 in. (12.50 cm)	5.63 in. (14.30 cm)	5.63 in. (14.30 cm)	7.35 in. (18.69 cm)	7.35 in. (18.69 cm)	5.625 in. (14.29 cm)
Inside diameter	N/A blank ported bottom sub	N/A blank ported bottom sub					
Internal fishing neck	F/ 2.313 B-shifting tool	F/ 2.313 B-shifting tool	F/ 2.313 B-shifting tool	F/ 2.313 B-shifting tool	F/ 3.312 B-shifting tool	F/ 3.312 B-shifting tool	F/ 2.313 B-shifting tool
Drift diameter	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Metallurgy	4140-80 ksi + 17-4PH carbon steel	13Cr-80 ksi + 17-4PH stainless steel	4140-80 ksi + 17-4PH carbon steel	13Cr-80 ksi + 17-4PH stainless steel	4140-80 ksi + 17-4PH carbon steel	13Cr-80 ksi + 17-4PH stainless steel	13Cr-80 ksi + 17-4PH stainless steel
* Elastomer / polymer	*Viton/PEEK	*Viton/PEEK	*Viton /PEEK	*Viton /PEEK	*Viton /PEEK	*Viton /PEEK	*Viton /PEEK

*Other materials are available to suit each application.

Contact your local Baker Hughes representative.

