

Expro Annulus-Operated Circulating and Test (ExACT™) Tool

The ExACT™ tool is a combined annulus operated multi-cycle, shut-in ball-circulating valve. The unique ‘SmartCollet’ and interlocking system makes this tool highly operationally flexible and efficient, requiring a maximum of four annulus pressure cycles to place the ball and circulating ports in any required position, however the ball and ports are mechanically prevented from being open at same time. As the tool operates against a trapped reference pressure, there are no costly waiting times between cycles.

The ExACT™ tool is placed above the packer assembly and gauge carriers and functions as a downhole shut-in valve and a circulating valve for spotting underbalancing fluid, reverse circulating produced fluids and circulating during the well kill process. As the valve is operated by annulus pressure, it is ideal for spotting nitrogen cushions and for cycling open in gas well applications. Its high rate circulating capability (10 bbl/min) makes it operationally efficient in high rig cost operations such as in deepwater. The high strength, debris tolerant ball sealing mechanism has superior sealing capability for downhole shut-ins and can be opened with up to 7,500 psi (51.7 Mpa) differential pressures, from above or below the ball. The ball can be locked open, which allows self-filling of the tubing string while running in hole and stabbing into production packers. It also optimises the well-kill process and allows the passage of through tubing tools below the valve, without fear of the ball closing.

Specifications:

Working pressure and temperature (See note 1)	15,000 psi / 103.42 Mpa at 350°F/177°C (Std dress)
OD	5 in / 127 mm
ID	2.25 in / 57.2 mm
Upper thread connection	3 1/2" IF or 3 1/2" PH6 box
Lower thread connection	3 1/2" IF or 3 1/2" PH6 pin
Tensile strength	350,000 lbf / 155,600 daN
Approx. tool length	40 ft / 12.2 m
Approx. tool weight	1,700 lbs / 771 kg
Service condition	H ₂ S per NACE MR-01-75, CO ₂

Note 1: Working temperature can be increased by changing sealing configuration as follows:
Up to 400°F/204°C – Standard elastomers and premium back-up rings.



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Operation:

The ExACT™ tool, pre-charged with nitrogen, is run in the hole locked open (position 1) allowing the test string to fill from below. A self-fill tubing test valve (SF-TTV) is utilised to pressure test the string. When the DST tool string is at depth and the packer set, hydrostatic pressure is trapped in the nitrogen reference section of the tool on the first application of annulus pressure. The ball and circulating ports can now be operated as required by annulus pressure cycles as per the table below. The tool will respond immediately to pressure cycles, so there is no waiting time between cycles. Also, there is no limit to the number of tool operating cycles. On completion of the well test, trapped reference pressure is automatically relieved whilst pulling out of hole.

Position	Functionality	Ball status	Ports status	Annulus status (nom.) psi	Apply/bleed annulus (nom.) psi	Goto position
1	Run in hole/through-tubing work/ below packer circulating/ bull out of hole	Open	Closed	0	2000	2
2	Well flowing	Open	Closed	2000	0	3
3	Well shut in	Closed	Closed	0	2000 1500/0	4 5
4	Transit position	Open	Closed	2000	0	1
5	Reverse / circulate	Closed	Open	0	1500	6
6	Transit position	Closed	Open	1500	0	7
7	Circulate	Closed	Open	0	2000 1000/0	8 5
8	Transit position	Closed	Closed	2000	0	9
9	Transit position	Closed	Closed	0	2000 1500/0	4 5