ELSA-HD (High Debris)

Elsa HD was specifically developed to operate in applications with highly aggressive erosive solids and deep water environments, offering exceptional reliability for all horizontal / vertical subsea xmas tree well completion and intervention operations.

The ELSA HD comprises of a full suite of valve assemblies. The lubricator valve, retainer valve and subsea test tree provides a full range of well intervention, pressure control functions and disconnection capabilities for harsh completion installation, workover or intervention operations.

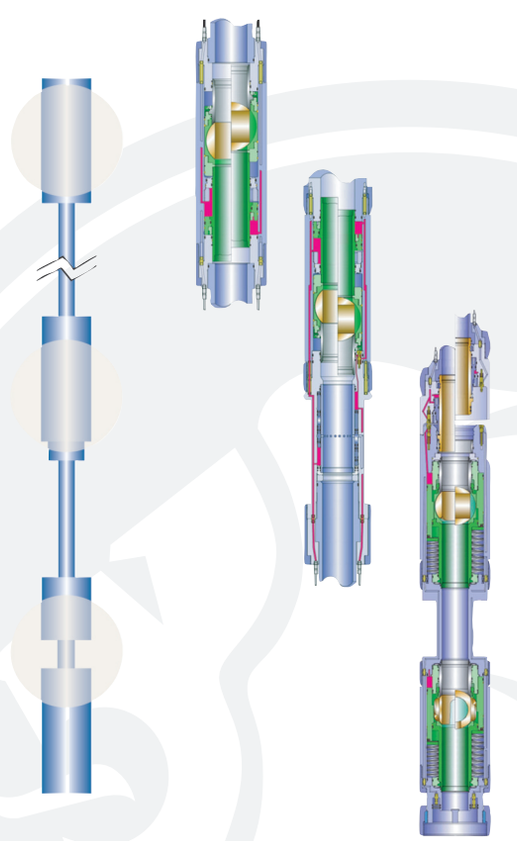
Expro's high integrity ball valve system is at the heart of the system, and features a unique seat-reacted and trunion mounted valve mechanism. The advanced design and construction techniques used in the development of ELSA-HD extends their operating cycle, allowing an increased number of installations between maintenance periods, even in challenging applications where aggressive media such as produced sand and proppant are present.

Applications:

- Completion installation, workover and intervention operations on horizontal subsea xmas trees from mobile offshore drilling units in water depths up to 10,000 ft (3048m)
- Drill stem testing, well clean up and extended appraisal operations requiring a large flow bore
- Specifically designed to suit environments where high levels of entrained solids and aggressive media are present in the completion fluids e.g. reservoir fracturing applications
- Specifically designed to operate in batch completion campaigns where minimal redress operations between runs are critical

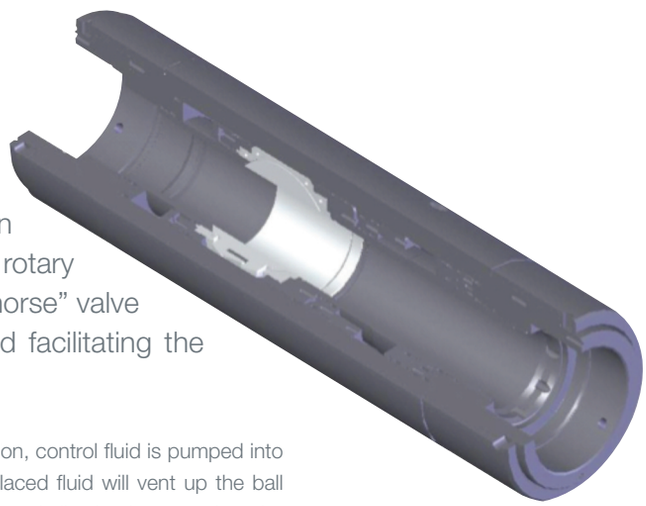
Benefits:

- Provides a dual primary subsea barrier between the well and surface during subsea operations
- Allows subsea well operations to be conducted under controlled conditions without having to function the BOP
- Disconnect function allows mobile offshore drilling unit (MODU) to unlatch and re-latch safely should environmental conditions dictate
- Mechanical features permit hydraulic fracturing and back flow erosive solids through the string without compromising safety
- Independent ball closure allows a single cutting device to be selected in the subsea test tree
- System reliability and maintenance requirements virtually eliminating rig down time
- High integrity ball valve construction protects seal surface from debris damage
- Electrical feed through and wet connectors to facilitate surface read out
- Can be run with either EXPRESS subsea control systems or direct hydraulic
- Facilitate injection of chemicals to production bore
- Pump through capability for well equalisation or bull heading



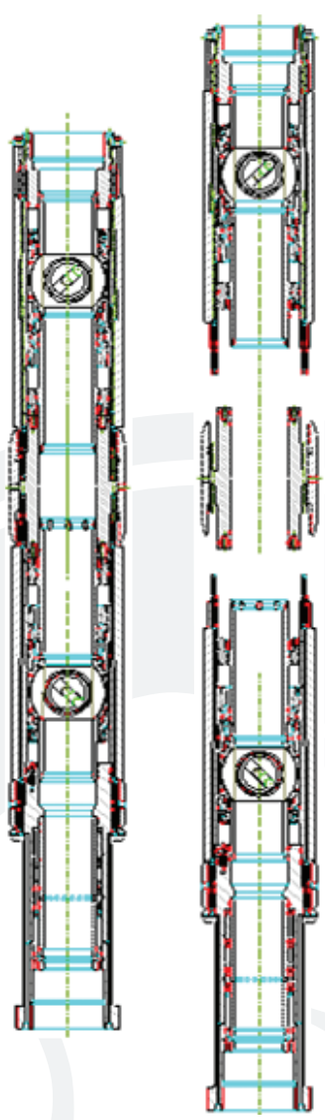
ELSA-HD (High Debris)

The Lubricator Valve



The lubricator valve (LV) forms an integral part of the subsea landing string for well test or intervention operations and can be set at some point below the rotary table or deep-set in shallow wells. It is the “work horse” valve within the production string, isolating the well and facilitating the introduction of any through tubing tools.

The valve is of a ‘fail-as-is’ design. To cycle the ball to the open position, control fluid is pumped into the ball open line, displacing the piston/mandrel assembly; the displaced fluid will vent up the ball close line. The valve is closed by pumping fluid into the ball close line and allowing it to vent into the ball open line. For well isolation purposes the LV is designed to hold a pressure differential from below without further application of control pressure. To hold pressure from above, close control line pressure is applied to override the pump through feature. It is possible to equalise pressure across the valve by pumping through before opening the ball or bull heading the well while in the closed position. The pump through pressure should not exceed the maximum working pressure.



Features:

- To facilitate the introduction of through tubing tools (i.e. coiled tubing and wireline) into production string longer than those acceptable in a customary derrick installed lubricator assembly
- To provide a method of isolating surface equipment from the production flow
- To provide a means of pressure testing the surface equipment and lubricator sections once the Wireline tool string has been installed
- Provides through port capability for either dual high set LV’s or downhole functionality when deep set
- To allow the safe passage of an umbilical/s along its length (high-set option)
- To allow chemicals to be injected directly into the well stream through a dual sealing/backflow valve arrangement with injection point below the ball
- To provide a pressure tight barrier between the well bore and BOP stack and/or marine riser
- Slickline cutting - optional

ELSA-HD (High Debris)

The Lubricator Valve

Technical Specifications:	
Service	H_2S NACE MR 0175 + CO_2
Maximum Working Pressure	10,000 psi (690 bar)
Test Pressure	15,000 psi (1,034 bar)
Design Temperature	-18°C to 121°C (0°F to +250°F)
Maximum Tensile Loading @ MWP	400,000 lbs (1,779,288 N)
Maximum Tensile Loading @ 0 psi / Bar	1,000,000 lbs (4,448,220 N)
Torsion Capacity	30,000 ft lbs (40,675 Nm)
Pump through Capability (Volume)	$12in^2$ @ 800psig differential
Differential pressure from above (max) Up to 10 000psi bore pressure	Close assist ratio = 1:1
Differential pressure from below (max)	10,000psi (690 bar)
Overall length	53.96” (1370.58 mm)
Outside Diameter (Max.)	15.180” (385.57 mm)
Internal Diameter (Min.)	6.740” (171.2 mm)
Hydraulic Control Working Pressure	10,000 psi (690 bar)
Hydraulic Control Fluid Cleanliness	AS 4059 Class 6B through to F
Chemical Injection Facility	Injection below ball
Chemical Injection Facility Working Pressure	10,000 psi (690 bar)
Weight (Approx.)	1985 lbs (900 kgs)

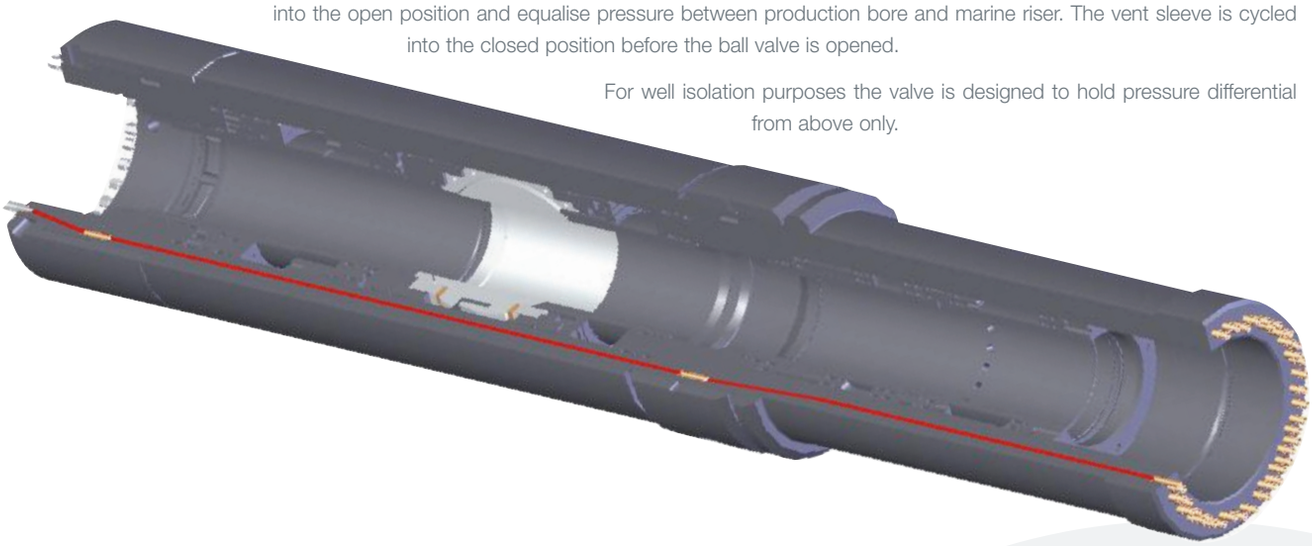
ELSA-HD (High Debris)

The Retainer Valve

The retainer valve (RV) forms an integral part of the subsea landing string for well test or intervention operations. It is situated above the shear sub within the BOP stack. In the event of an emergency the RV acts as an environmental valve reducing the spill of hydrocarbons into the environment.

The RV is 'fail as is' design. To cycle the ball to the open position, control fluid is pumped into the ball open line, displacing the piston/mandrel assembly; the displaced fluid will vent up the ball close line. The valve is closed by pumping fluid into the ball close line and allowing it to vent into the ball open line. Once the ball is in the fully closed position an interlock is opened allowing control fluid to move the vent sleeve into the open position and equalise pressure between production bore and marine riser. The vent sleeve is cycled into the closed position before the ball valve is opened.

For well isolation purposes the valve is designed to hold pressure differential from above only.



Features:

- To retain the contents of the landing string above the ball after disconnection
- To vent the production bore pressure between the RV and the subsea test tree to the marine riser prior to disconnection of the SSTT
- To provide a slick diameter for the annular preventer to seal around (BOP spaceout dependant)
- To provide hydraulic interlock feature between the retainer valve and subsea test tree latch assembly to ensure the RV has fully sequenced prior to disconnection
- To provide through porting capability for hydraulic control lines
- To provide a pressure tight barrier between the well bore and BOP stack
- To provide a bore large enough to accommodate plugs or tool strings specified by the customer

ELSA-HD (High Debris)

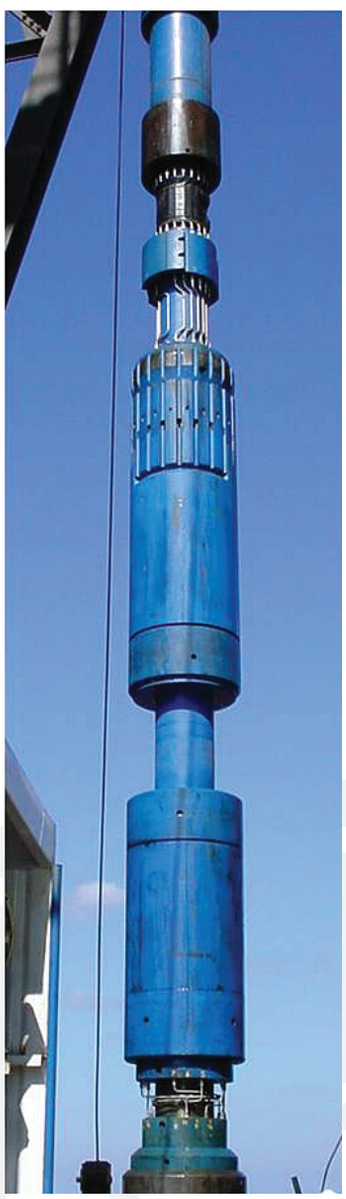
The Retainer Valve

Technical Specifications:	
Service	H_2S NACE MR 0175 + CO_2
Maximum Working Pressure	10,000 psi (690 bar)
Test Pressure	15,000 psi (1,034 bar)
Design Temperature	-18°C to 121°C (0°F to +250°F)
Maximum Tensile Loading @ MWP	Up to 400 000 lbs (1,779,288 N)
Maximum Tensile Loading @ 0 psi / Bar	1,000,000 lbs (4,448,220 N)
Torsion Capacity	30,000 ft lbs (40,675 Nm)
Pump through Capability	No facility
Pressure Differential Support Facility From Above Only	10,000 psi (690 bar)
Overal length	82.35” (2092 mm)
Outside Diameter (Max.)	16.50” (419.10 mm)
Internal Diameter (min.)	6.740” (171.2 mm)
Valve Failure Mode	Fail As Is
Hydraulic Control Working Pressure	10,000 psi (690 bar)
As Built Hydraulic Control Fluid Cleanliness	Up to AS 4059 Class 6B through to F
Through Bore Hydraulic Line	Up to 28
Weight (Approx.)	2977 lbs. (1350 kgs)

ELSA-HD (High Debris)

The Subsea Test Tree

The Subsea Test Tree (SSTT) forms an integral part of the subsea landing string for well test or intervention operations, and mimics the functionality of the BOP stack. It provides an operable primary safety system to control tubing pressure with dual barrier isolation in the event of an undesired situation or emergency.



The lower ball within the SSTT is capable of cutting wireline and/or coil tubing. The SSTT has a debris tolerant, high tensile latch arrangement, which is capable of multiple unlatch/latch operations. The latch assembly also isolates the hydraulics after disconnection and facilitates communication upon reconnection. Should all hydraulic pressure be lost downhole then a secondary disconnect can be performed with the application of pressure below the closed annular element. To open either valve, hydraulic pressure is applied to the open side of the actuation piston, which compresses the spring pack, and an offset camming pin arrangement rotates the ball to the open position. To close either valve the open hydraulic pressure is vented to allow the spring pack to push the piston, which in turn closes the ball. Inherent to the valve is an interlock that ensures the well is isolated prior to disconnection.

Functional redundancy can be provided via a secondary system that is activated independently from the primary hydraulic circuit; pressure manipulation from surface through the choke / kill lines below the BOP pipe rams will access a pre-arranged sequential set of shuttles that direct the pressure to the desired functions.

Features:

- To provide a means to isolate the well
- To provide a means to disconnect safely from the well
- Compact in size, thus facilitating the closure of the BOP pipe/shear rams
- To provide a connectable conduit for hydraulic control functions for the tree vendor and down hole functions
- To provide secondary methods for disconnection, closure and tubing hanger running tool (THRT) disconnection
- To allow chemicals to be injected directly into the well stream through a dual sealing/backflow valve arrangement, with injection point between the balls
- To provide a pressure tight barrier between the well bore and BOP stack
- To provide a bore large enough to accommodate plugs or tool strings specified by the customer
- To facilitate the pressure testing of the landing string above the upper ball
- Latch retrieval tool profile (LRT) - optional

ELSA-HD (High Debris)

The Subsea Test Tree

Technical Specifications:	
Service	H_2S NACE MR 0175 + CO_2
Maximum Working Pressure	10,000 psi (690 bar)
Test Pressure	15,000 psi (1,034 bar)
Design Temperature	-18°C to 121°C (0°F to +250°F)
Maximum Tensile Loading @ MWP	Up to 400,000 lbs (1,779,288 N)
Maximum Tensile Loading @ 0 psi / Bar	1,000,000 lbs (4,448,220 N)
Torsion Capacity	30,000 ft lbs (40,675 Nm)
Pump through capacity (volume)	47.5in^2 @ 1000psi differential
Up to 10,000psi bore pressure Differential Pressure from below (max)	10,000psi (690 bar)
Differential pressure from above (max)	Close assist ratio = 1:1.13
Overall length	117.35" (2980.70mm)
Outside Diameter (max.)	18.550" (471.20mm)
Internal Diameter (Min.)	6.740" (171.20mm)
Hydraulic Control Working Pressure	10,000 psi (690 bar)
Hydraulic Control Fluid Cleanliness	Up to AS 4059 Class 6B through to F
Chemical Injection Facility	Injection Between Balls
Chemical Injection Facility Working Pressure	10,000 psi (690 bar)
Coiled Tubing Cutting Capability	Up to 2.375" OD x 0.203 wall @ 90ksi yield c/w 0.438" braided cable
Weight (Approx.)	6670lbs (3025kgs)