

## ELSA-DH (Direct Hydraulic)

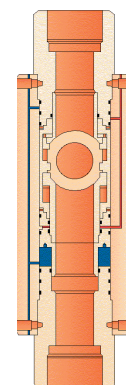
Expro's Landing Strings Assemblies (ELSA) are in riser safety systems designed to allow well operations to be conducted safely, when completing or intervening subsea wells. The ELSA-DH systems are deployed with direct hydraulic controls, interface with mono-bore tubing hangers and provide a rapid shut-in and disconnect facility should conditions dictate.

A full suite of valve assemblies has been developed comprising of Lubricator, Retainer Valve and Subsea Test Tree.

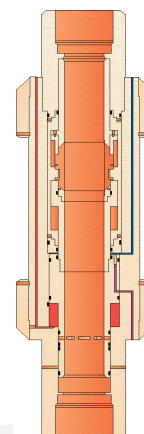
The Lubricator Valve is located below the surface providing an increased lubricator section. This ball valve features selective bi-directional sealing to allow the safe deployment and retrieval of well bore intervention tooling.

The Retainer Valve is located just above the Shear Rams and is designed to isolate the Landing String contents and vent trapped pressure from between Retainer Valve and Subsea Tree to the Marine Riser. As the landing string pressure is bled down, the Retainer Valve allows riser fluid to enter, displacing hydrocarbons from within the string..

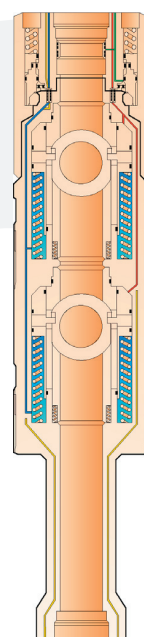
The Subsea Tree provides the primary safety barrier to contain well pressure. The Subsea Tree offers a safe disconnect facility from the Tubing Hanger or Tree Cap should adverse environmental conditions prevail. Dual barrier isolation is achieved using two independently controlled ball valves



Lubricator Valve



Retainer Valve



Subsea Tree

### Applications:

Completion installation, workover and intervention operations on subsea wells from mobile offshore drilling units with direct hydraulic control systems

Drill stem testing, well clean up and extended appraisal operations requiring a large flow bore

### Benefits:

Provides a dual primary subsea safety barrier between the well and surface during subsea operations

Allows subsea well operations to be conducted under controlled conditions without having to function BOP

Disconnect function allows MODU to unlatch and relatch safely should environmental conditions dictate

Independent ball closure allows a single cutting device to be selected

Pump through capability provides the ability to kill the well at high rates

SSTT valve supports pressure applied from above allowing string and latch seals to be pressure tested

Interlocked functions ensures well and landing string control upon completion of unlatch sequence

Annular controlled secondary cut & disconnect system allows well isolation even in the event of total umbilical loss

## ELSA-DH (Direct Hydraulic)

### Technical Specifications:

#### 5<sup>3</sup>/<sub>8</sub>"

|  |  |                    |
|--|--|--------------------|
| Service                                  | H <sub>2</sub> S NACE MR 0175 (+ CO <sub>2</sub> ) |                    |
| Working Pressure                         | 6,000 psig (414 bar)                               |                    |
| Working Temperature                      | 0°F to 250°F (-18°C to 121°C)                      |                    |
| Tensile Load Capacity (@ W.P.)           | 400,000 lbs (1,779 kN)                             |                    |
| Tensile load capacity (@ Opsi)           | 842,000lbs (3,745 kN)                              |                    |
| Max Torque                               | 14,500 lbf ft. (19,659 Nm)                         |                    |
| Minimum Internal Diameter                | 5.375" (136.5 mm)                                  |                    |
| Maximum External Diameter                | Subsea Test Tree                                   | 18.5" (469.9 mm)   |
|  | Lubricator Valve                                   | 12.125" (308.0 mm) |
|  | Retainer Valve                                     | 17.0" (431.8 mm)   |
| Pump Through Capability                  | Valve opens with differential from above           |                    |
| Coil Tubing Cutting Capability           | 2" x 0.19" wt 80 ksi yield c/w 0.438 conductor     |                    |
| Differential Pressure Support From Above | 6,000 psig (414 bar)                               |                    |
| Differential Pressure Support From Below | 6,000 psig (414 bar)                               |                    |
| Overall Weight                           | Subsea Test Tree                                   | 3968 lbs (1800 kg) |
|  | Lubricator Valve                                   | 1102 lbs (500 kg)  |
|  | Retainer Valve                                     | 1764 lbs (800 kg)  |

#### 7<sup>3</sup>/<sub>8</sub>"

|  |   |                    |
|--|---|--------------------|
| Service                                  | H <sub>2</sub> S NACE MR 0175 (+ CO <sub>2</sub> )    |                    |
| Working pressure                         | 10,000 psi (690 bar)                                  |                    |
| Working Temperature                      | -26°F to 250°F (-32°C to 121°C)                       |                    |
| Tensile load capacity (@ W.P.)           | 400,000 lbs (1,779 kN)                                |                    |
| Tensile load capacity (@ Opsi)           | 1,000,000 lbs (4,448 kN)                              |                    |
| Maximum Torque (system)                  | 14,500 lbf ft. (19,659 Nm)                            |                    |
| Minimum Internal Diameter                | 7.375" (187.3 mm)                                     |                    |
| Maximum External Diameter (system)       | Subsea Test Tree                                      | 18.55" (471.2 mm)  |
|  | Lubricator Valve                                      | 16.50"             |
|  | Retainer Valve  | 15.75" (400.1 mm)  |
| Pump through capability                  | Valve opens with differential from above              |                    |
| Coil Tubing Cutting capability           | 2.375" x 0.203" wt 80 ksi yield with 0.438" conductor |                    |
| Differential pressure support from above | 10,000 psig (690 bar)                                 |                    |
| Differential pressure support from below | 10,000 psig (690 bar)                                 |                    |
| Overall Weight                           | Subsea Test Tree                                      | 3565 lbs (1617kg)  |
|  | Lubricator Valve                                      | 2205 lbs (1000 kg) |
|  | Retainer Valve  | 1995 lbs (905 kg)  |

#### Certification

Certified by Bureau Veritas to API 14A, SI 289  
Design Codes API 14A, 6A and SI 289