

DeepSea EXPRES

Subsea cementing head

APPLICATIONS

- Deepwater 958-in to 20-in casing cementing operations
- Running heavy liner or casing string

BENEFITS

- Remote operation improves safety
- Quick dart release reduces rig time
- Ability to combine casing pressure test and top plug bump improves safety by protecting cement integrity

FEATURES

- Unlimited mud circulation
- Improved cement bond
- Improved mud removal because of uninterrupted pumping schedule
- Enhanced fluids separation
- Identical bottom and top darts to reduce human error
- Two versions: 1,000,000- or 1,595,000-lbm hook load capacity
- Surface indications of plug launch
- Option for three darts and three plugs to separate all fluid stages

PLUG DESIGN FEATURES

- Sealing without latching mechanism
- High pressure rating
- High temperature rating
- High wiping efficiency

The DeepSea EXPRES* cementing head is used in offshore wells from floating drilling vessels. The mechanism is designed for efficient, accurate cement placement. This system consists of three major elements: the Surface Dart Launcher, the Subsea Tool, and EXPRES* plugs.

Surface Dart Launcher

The Surface Dart Launcher (SDL) is connected to the top drive on the drilling vessel. It is preloaded with the darts that control plug release. It can be racked in the derrick for easy access. The high hook load capacity allows running very heavy landing strings. Even with an SDL loaded with darts, mud can be circulated at high rate through the top drive. A remote control panel facilitates the dart launch in a matter of seconds. Because no human intervention is required, the operation is safer. The kidney-shaped rotating valves allow positive dart displacement that prevents fluids from bypassing during the dart drop.

Subsea Tool

Located at the seafloor, the Subsea Tool (SST) is connected into the casing hanger. The top and bottom EXPRES plugs are preloaded in a basket at the bottom of the SST, leaving a large flow area between this basket and the casing to be cemented. Because fluids are not pumped through the inside of the plugs, there is no erosion and therefore no limit to the number of times the mud may circulate.

When the first dart arrives at the SST, it pushes a rod that in turn pushes and launches the bottom plug. The top plug release procedure is the same. High plug release pressures create surface cues for the cement supervisor: bottom plug release pressure of 1,500 psi and top plug release pressure of 3,000 psi.

The DeepSea EXPRES subsea cementing head features strong mechanisms to prevent or mitigate premature top plug departure.

- A hydraulic shock absorber controls the rod travel velocity in case the dart lands at a high pumping rate (wrong drillpipe volume calculation, etc.).
- In addition to the friction that holds the plug in the basket, three shear pins hold the top plug in the basket, requiring additional pressure to release it.
- A top plug equipped with a high-pressure burst disk is available on request.



DeepSea EXPRES system, including SDL, SST, and EXPRES plugs.

DeepSea EXPRES

EXPRES plug

Because the SST takes care of the launching mechanism, the EXPRES extrusion plug release system used with the DeepSea EXPRES system can fully benefit from a neat and simple design (as opposed to the conventional hollow design). This system offers the following advantages.

- No latching mechanism is required, thus preventing sealing problems like internal plug erosion and imperfect dart landing.
- Multiple premium features are combined in a single model; e.g., the 95/8-in plug is rated at 9,500 psi and 300 degF—and it is also free of aluminum.
- The high pressure rating allows a casing pressure test during the top plug bump, which is far safer for cement integrity than a test performed when the cement is set.
- An antirotation sleeve is also available.

Because the SDL and the SST are modular, three plugs can be launched.

DeepSea EXPRES Surface Dart Launcher Specifications

	Standard Version	Heavy Version
Overall height	192 in [4,880 mm]	170 in [4,318 mm]
Total weight	3,400 lbm [1,545 kg]	3,400 lbm [1,545 kg] (Estimated)
Max. dart retainer length (2 per)	24 in [600 mm]	24 in [600 mm]
Operating air temperature	-22 degF to 140 degF [-30 degC to 60 degC]	-22 degF to 140 degF [-30 degC to 60 degC]
Maximum working pressure	10,000 psi [690 bar]	10,000 psi [690 bar]
Hook load, no pressure	1,000,000 lbm [455,000 kg]	1,595,000 lbm [725,000 kg]
Hook load at 10,000 psi	500,000 lbm [227,000 kg]	797,500 lbm [362,500 kg]
Lifting sub top connection	NC50 Box	65/8 in [168.3 mm] FH Box
Saver sub bottom connection	NC50 Pin	65/8 in [168.3 mm] FH Pin
Connection recommended make-up torque	24,000 ft.lbf [32,500 N.m]	37,100 ft.lbf [50,240 N.m]
Maximum torque through the tool	24,000 ft.lbf [32,500 N.m]	24,000 ft.lbf [32,500 N.m]
Swivel rotation	40 rpm	No swivel
High-pressure Weco connection (2 per)	1502 female sub	1502 female sub
Maximum slurry flow rate	15 bbl/min [2.4 m ³ /min]	15 bbl/min [2.4 m ³ /min]
Maximum displacement flow rate	22 bbl/min [3.5 m ³ /min]	22 bbl/min [3.5 m ³ /min]
Power pack operating air pressure	100 psi [7 bar]	100 psi [7 bar]

DeepSea EXPRES Subsea Tool Specifications

	Standard Version	Heavy Version
Overall height	190 in [4,830 mm]	190 in [4,826 mm]
Total weight (95/8-in configuration with 2 plugs)	990 lbm [450 kg]	990 lbm [450 kg]
Total weight (103/8-in configuration with 2 plugs)	1,002 lbm [455 kg]	1,002 lbm [455 kg]
Total weight (133/8-in configuration with 2 plugs)	1,025 lbm [466 kg]	1,025 lbm [466 kg]
Connection to the casing hanger	NC50 Box	NC50 Box
95/8-in plug basket OD	7.49 in [190 mm]	7.49 in [190 mm]
103/8-in plug basket OD	8.67 in [220 mm]	8.67 in [220 mm]
133/8-in plug basket OD	11.63 in [296 mm]	11.63 in [296 mm]
Bottom plug releasing pressure	1,300 psi [90 bar]	1,300 psi [90 bar]
Top plug releasing pressure	2,900 psi [200 bar]	2,900 psi [200 bar]
Recommended plug releasing flow rate [†]	1 to 4 bbl/min [0.16 m ³ /min to 0.6 m ³ /min]	1 to 4 bbl/min [0.16 m ³ /min to 0.6 m ³ /min]

[†]Plug selection table is shown in the DeepSea EXPRES dart and plug system sheet.



External and internal views of the SST.

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