8Sigma Energy Services

Crypto™ Toe Initiation Subs

Limited-Entry Capable, Pressure-Test Cyclable

Technical Specifications

Crypto™, with its revolutionary, field proven design, **has minimal moving parts,** no shear pins, **no atmospheric chambers,** no burst discs, no sliding sleeves, no cavities, and is **pressure testable** up to 10 days from the production string cement job being bumped an **unlimited number of times** allowing the well's pressure integrity to be proven before treatment operations.

Multiple Crypto™ Toe Subs can be installed in the toe of the well so that the **toe stage can mimic** the Plug and Perf (PnP) **cluster spacing** and **treatment schedule** of the **uphole stages** resulting in **no lost reserves, no lost production** and a **full-rate-treatable toe stage at a fraction of the cost of conventional toe sleeves.**

Features and Benefits

- One moving part, no shear pins, no atmospheric chambers and no burst discs making the Crypto™ the most reliable toe sub ever constructed.
- **All ports within one Crypto™ Sub,** even though they are redundant backups to one another**, will all open after the first port is opened** and the reservoir is accepting fluid.
- Multiple Crypto™ subs can be ran in the toe of the well resulting in stage one of the well having the same cluster spacing, the same pumping schedule and same pumping rates as the other well stages resulting in **no lost reserves, and no lost production** due to toe stage pumping inefficiencies.
- **When running multiple Crypto™ Toe Subs all ports in all Crypto™ Toe Subs will open even after the first port of the first Crypto™ Sub has opened.**
- Crypto™ toe subs remain a primary **well barrier** during pressure testing and **up until they are pumped through** during treatment or offline toe opening operations.
- No need to run coiled tubing perf guns to initiate reservoir communication at the beginning of well treatment operations.
- 100% success rate for hydraulic toe openings and full treatment pump rate and schedule toe treatment.
- Full Drift ID means Crypto™ toe subs are plug-play with all cement wiper plugs and float equipment including large OD latchdowns.
- No need to run a wet toe.
- **Unlimited pressure test cycles.**

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Call 1-844-4NOCOIL
Email sales@8sigmaes.com

Technical Specifications

- Crypto™ Subs are installed by the drilling rig as part of the production casing or liner string and can be torqued through using casing tongs or casing running tools and top drives.
- The Crypto™ Subs, each weighing less than 25 lbs and having a box by pin design, can be installed on the rig floor, catwalk or the casing racks. If desired a Box by Box design can be ordered.
- Crypto™ Subs can be cemented through or installed as part of an open hole style completion design with no alterations to the completion or cementing jewelry.
- The Crypto™ Subs are **immediately pressure testable** by the cementing units after the cement plug bump and can also be pressure tested offline of drilling and completion operations up to two weeks from cement plug bump to casing body burst pressures.
- Typically on well pads, when the drilling rig Blow Out Preventer Equipment (BOPE) is nippled up on the next well the BOPE will be pressure tested and at this time the Crypto™ Subs may be pressure tested as well without having to call out extra pumping equipment.
- The Crypto™ Subs **remain primary well barriers to 15,000 psi** pressure ratings until they are opened by online or offline treatment pumping operations.

Tool Nominal Size	4.500, 5.000, 5.500 inch	114.3, 127.0,139.7 mm
Casing Weight	All available	All available
Tool Connection	As requested	As requested
Burst Rating	As per casing body specs	As per casing body specs
Collapse Rating	As per casing body specs	As per casing body specs
Tensile Rating	As per casing body specs	As per casing body specs
Torsional Strength	As per casing body specs	As per casing body specs
Port Differential Rating (Burst, Collapse)	15,000 psi	103.4 MPa
Maximum Body OD	5.50 in, 6.00 in, 6.500 in	139.5, 152.4, 165.1 mm
Tool ID before Treatment	100% of API Drift	100% of API Drift
Tool ID after Treatment	100% of API Drift	100% of API Drift
Maximum Temperature	320° F	162 °C
Length (incl. pin cnx)	16 inch	0.4 m
Opening Pressure after 10-14 days	10 psi	69 kPa
Sub Port Flow Area Sizing	One to six 0.75 inch ports	One to six 19 mm ports
Sub Port Phasing	As requested	As requested
Number of Openable Subs per Stage	Unlimited	Unlimited
Max Number of Pressure Test Cycles	Unlimited	Unlimited
Time Sleeves are Pressure Testable	2 - 10 days	2 - 10 days
Max Recommended Pressure Test Pressure	12, 000 psi	82.7 MPa
Recommended Pressure Test Window	48 - 72 hours after bump	48 - 72 hours after bump