

e-cd™ Circulating Sub

MANAGED PRESSURE DRILLING OPERATIONS FOR CONTINUOUS CIRCULATION AND HOLE CLEANING

OVERVIEW

The e-cd™ circulating device is an Eni-patented system used in managed pressure drilling (MPD) operations to enable continuous circulation and hole cleaning even while making connections. It is used while either drilling or tripping in or out of the hole. The e-cd circulating sub, when used in conjunction with the e-cd diversion manifold, allows connections to be made without ever turning rig pumps off.

In today's drilling environment, the industry is facing greater pressure-related challenges while developing mature and unconventional fields, both on land and offshore. There is also greater focus on improving the feasibility of marginal wells while increasing efficiency with improvement in safety. MPD is an enabling technology which aides in accomplishing these goals while mitigating drilling risks.

FEATURES

- » The sub has a dual flapper valve configuration. The upper flapper valve acts as a check valve when disconnecting the top drive while adding a new stand.
- » The side flapper entry port connection is used when making a drill pipe connection without turning off the mud pumps. A second metal-metal plug seal acts as another barrier.
- » During drill pipe connections, a high pressure flexible hose is connected to the side port to maintain flow down the drill string.
- » Subs are preinstalled at the top of drill pipe stands needed to drill the next open hole section. The number of subs required is dependent on the length of open hole section to be drilled.

- » During a connection, once mud flow has been diverted from the top drive to the side entry radial port, the process forces the upper axial valve to close and seal.
- » After confirmation of axial valve sealing is received, the top drive can then be broken out and a new stand can be installed in the drill string.
- » Once the new stand is installed, the e-cd manifold is then used to divert the mud flow back through the standpipe/top drive and drilling can continue. All processes are safely concluded with the rig pumps running, maintaining constant equivalent circulating density (ECD).

BENEFITS

- » Used to drill over 200+ wells successfully since 2006.
- » The e-cd system enables the mud pumps to maintain uninterrupted flow during connections, allowing constant ECD and hole cleaning during the connection process.
- » Reduces transition errors during connections.
- » Reduced likelihood of connection gas.
- » Reduced stuck pipe incidents.
- » Reduced ballooning effects.
- » No bottom hole temperature variations due to stopped circulation.
- » Allows real-time monitoring during connections.
- » The upper axial valve is not spring-loaded when closed; therefore, wireline/intervention operations can be performed.



Equipment Specifications | Standard Grades

	7" e-cd Sub	7" e-cd Sub	7" e-cd Sub	7" e-cd Sub	8" e-cd Sub	8" e-cd Sub
Connections	4 1/2" IF (NC50)	4 1/2" VAMEIS	5 1/2" FH	5 1/2" VAMEIS	6 5/8 FH	6 5/8 VAMEIS
Drillpipe Manufacturer	API	VAMEIS	API	VAMEIS	API	VAMEIS
Drillpipe Thread Seal	Single	Double	Single	Double	Single	Double
e-cd Sub Thread	Single	Single	Single	Single	Single	Single
Make-Up Torque, ft.-lb.	Contact Engineering	Contact Engineering	Contact Engineering	Contact Engineering	Contact Engineering	Contact Engineering
Tensile Strength, lb.	1,164,400	1,164,400	1,360,751	1,360,751	1,380,000	1,380,000
Working Pressure, psi (bar)	10,000 (690)	10,000 (690)	10,000 (690)	10,000 (690)	7,500 (517)	7,500 (517)
Length, in. (mm)	39.4 (1000)	39.4 (1000)	39.4 (1000)	39.4 (1000)	39.4 (1000)	39.4 (1000)
Outer Diameter, in. (mm)	7.02 (178.3)	7.02 (178.3)	7.02 (178.3)	7.02 (178.3)	8.02 (203.2)	8.02 (203.2)
Inner Diameter, in. (mm)	2.85 (72.5)	2.85 (72.5)	2.85 (72.5)	2.85 (72.5)	4.12 (104.65)	4.12 (104.65)
Drift ID, in. (mm)	2.625 (66.7)	2.625 (66.7)	2.625 (66.7)	2.625 (66.7)	4.0 (101.6)	4.0 (101.6)
Maximum Flow Rate (side port), gpm (lpm)	900 (3406)	900 (3406)	900 (3406)	900 (3406)	1200 (4500)	1200 (4500)
Side Port Primary Seal	Metal/Metal Flapper	Metal/Metal Flapper	Metal/Metal Flapper	Metal/Metal Flapper	Metal/Metal Flapper	Metal/Metal Flapper
Side Port Secondary Seal	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug
Temperature Rating, °F (°C)	325 (163)	325 (163)	325 (163)	325 (163)	325 (163)	325 (163)
Body Material	4145	4145	4145	4145	4145	4145
Elastomers	Viton	Viton	Viton	Viton	Viton	Viton
Service	Standard	Standard	Standard	Standard	Standard	Standard
Design Specifications	API 7.1	API 7.1	API 7.1	API 7.1	API 7.1	API 7.1
Maintenance Specifications	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5

Equipment Specifications | Grant Prideco

	7" e-cd Sub	7" e-cd Sub	7" e-cd Sub	7" e-cd Sub	7" e-cd Sub	7" e-cd Sub
Connections	GP HT-55	GP XT-54	GP XT-57	GPTT525	GPTT575	TT585-HAL
Drillpipe Manufacturer	Grand Prideco	Grand Prideco	Grand Prideco	Grand Prideco	Grand Prideco	Grand Prideco
Drillpipe Thread Seal	Double	Double	Double	Double	Double	Double
e-cd Sub Thread	Single	Single	Single	Single	Single	Single
Make-Up Torque, ft.-lb.	Contact Engineering	Contact Engineering	Contact Engineering	Contact Engineering	Contact Engineering	Contact Engineering
Tensile Strength, lb.	1,116,333	918,000	1,082,424	1,312,800	1,018,960	879,811
Working Pressure, psi (bar)	10,000 (690)	10,000(690)	10,000 (690)	10,000 (690)	10,000(690)	10,000 (690)
Length, in. (mm)	39.4 (1000)	39.4 (1000)	39.4 (1000)	39.4 (1000)	39.4 (1000)	39.4 (1000)
Outer Diameter, in. (mm)	7.02 (178.3)	7.02 (178.3)	7.02 (178.3)	7.02 (178.3)	7.02 (178.3)	7.02 (178.3)
Inner Diameter, in. (mm)	2.85 (72.5)	2.85 (72.5)	2.85 (72.5)	2.85 (72.5)	2.85 (72.5)	2.85 (72.5)
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Side Port Secondary Seal	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug	Metal/Metal Plug
Temperature Rating, °F (°C)	325 (163)	325 (163)	325 (163)	325 (163)	325 (163)	325 (163)
Body Material	4145	4145	4145	4145	4145	4145
Elastomers	Viton	Viton	Viton	Viton	Viton	Viton
Service	Standard	Standard	Standard	Standard	Standard	Standard
Design Specifications	API 7.1	API 7.1	API 7.1	API 7.1	API 7.1	API 7.1
Maintenance Specifications	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5	TH Hill DS1 Level 5

Notes:

- » Refer to the equipment databook for individual equipment specifications.
- » These ratings are guidelines only. Contact your local Halliburton representative for more information.

*e-cd sub torque ratings are less than some double shoulder drillpipe torque ratings

For more information, contact your local Halliburton representative or visit us on the web at www.halliburton.com

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