

# EWT

## Well Testing Fluid Storage and Performance Enhancing Tanks

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In 2016, our client requested that Stena Drilling work on a concept for taking crude oil to the rigs hull storage tanks. Taking the crude oil into the hull storage tanks allowed our client to mitigate any unnecessary shut-ins associated with flare out situations. This was vital to this operation as the interrupted flow meant that downhole gauges installed in five wells already drilled in the field could collect data on the reservoir performance.

Stena Drilling thoroughly investigated this option across the following areas:

- Three tanks, total capacity 80000bbls.
- Stand-alone Nitrogen generator capable of creating an inert atmosphere.
- Dual redundancy hydraulic HPU's.
- Dual redundancy transfer pumps in each tank.
- Gas freeing fan compatible.
- Proven effective tank washing system.
- Accurate fluid quantity measurement.
- Fluid temperature measurement facilities.
- Oil / Water Interface facilities provided in each tank.
- Robust proven procedures in the safety management system.
- Experienced Stena Drilling operators with Dangerous Cargo Endorsements (Oil)
- Provision for fitting offloading discharge reel.



The Stena DrillMAX is a Harsh Environment dynamically positioned DP Class 3 drillship capable of drilling in water depths up to 10,000ft.

Stena DrillMAX class vessels are fitted with an 80000bbls hydrocarbon storage within the ship's hull. The system allows for flowing directly from a well into the ships hydrocarbon storage tanks. The storage facility can provide significant advantages for extended well testing and shorter well testing programs. In particular, removing the necessity to flare well fluid as it's flowing from the well and consequently allowing for improved environmental operations and stability in the well flowing process.

The hydrocarbon storage facility has been approved DNV-GL and the MCA (Maritime Coastguard Agency).



### Benefits



**Reliability**  
Added reliability from uninterrupted flow of well testing.



**Safe**  
Crude is stored and flared later, at a more convenient time. Zero back pressure required.



**Environmental Impact**  
Ability to divert flow to storage tanks at any time reduces risk of oil spills in a flare out.



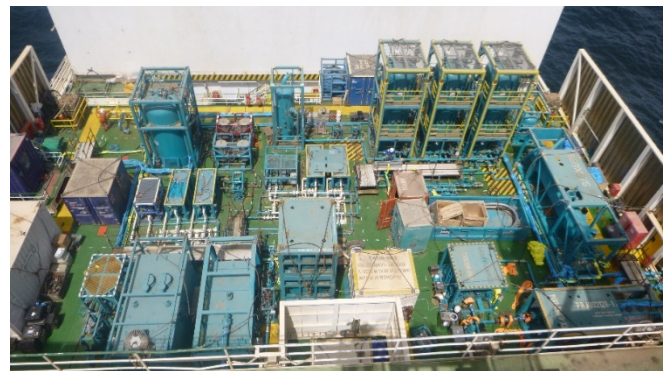
**Well Test Measurement**  
Reduce metering error and improve consistency of data gathering.

The Stena Drilling Well Testing Fluid Storage Facility is a proven system giving clients the confidence that they will be able to flow/test a well without interruption to their planned program. The advantages of such a system are as follows:

- Relegating Crude Flaring from an on-line process as part of the overall well testing operation to an offline one - flaring traditionally provides challenges both from an environmental standpoint and with difficulties in well test data interpretation, as a result of unplanned shut in/test interruption. With the large volume crude storage provided by the DrillMAX class EWT fluid storage design, crude is initially stored in the EWT tanks then flared at a convenient time offline.
- Improved Environmental Impact - the ability to divert flow to DrillMAX class EWT storage tanks at any given moment during flowing of the well, minimises the volume of oil drop out (Burner fall out) from the flare in the event of the flare having operational issues.
- Accurate Pressure Transient Analysis - added reliability provided from uninterrupted flow of well testing fluid to Stena EWT tanks. Provides the reservoir engineers improved data stability/reliability, allowing for more accurate interoperation of well performance and pressure transient analysis.
- Accurate Accumulated Volume Calculation - direct flow to the Stena EWT tanks allows for improved reliability and more accurate validation of liquid volumes. Rather than relying on test separator meter accuracy variations, the tangible volumes & flowrates achieved by DrillMax EWT tank measurement reduces meter error thus improving well test measurement and ultimately reservoir interpretation.
- Zero back pressure required for flaring - in normal well testing condition when flaring the system demands sufficient back pressure for efficient flaring. By flowing directly to Stena's EWT tanks, it effectively removes this constraint. Therefore, removing any potential flaring environmental efficiency issues (Burner fall out) and removes the risk of burner back pressure influencing critical Well Test pressure measurement upstream.
- Improved Clean-up environmental efficiency - cleaning up the well directly to large volume tanks removes flare environmental performance risk, where any non-flammable interface (Drilling/Completion fluids) are captured and processed. The availability of 80,000bbl tank storage effectively removes the threat of becoming tank constrained. The result of which, being early termination of test without objectives having been met.
- Reduced Emission Testing - the ability to store up to 80000bbls of well test fluid in the vessels tanks and potentially discharge to another vessel allows for reduced emission well testing. This would be

particularly attractive for well in No flaring zones such as the GOM and in future potentially the Arctic and other environmental sensitive areas.

- 80000bbls Extended Well Testing Fluid Storage - Stena's vessels can store up to 80000bbls of fluid / crude oil.
- Removes the flaring versus wind problem - there are many areas globally that light wind conditions are a cause for concern when carrying out well testing operations. When well testing on a Stena DrillMAX class vessel you have the option to divert the oil flow to tanks at any time during the test or go directly to the tanks for the full duration of the test.
- Challenging Flaring Issues Removed - when testing if flowing directly to EWT tanks it removes the flaring issues which can then lead to inconsistent down hole data. Examples of where this would be beneficial is on wells with high water cuts and oil with low API and high viscosity.



**“Utilising Stena Drilling EWT tanks can improve operational performance of the flaring systems and lead to higher quality data acquisition.”**

*Ryan Thomson, Senior Operations Engineer*

## The Future

An Extended Well Testing system like this can be integrated for a well testing programme on any of the Stena DrillMAX fleet.



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